Managing open distance learning (ODL) for changing futures

Mackintosh, Wayne Grant

Award date:
2006

Awarding institution:
University of Bath

Managing open distance learning (ODL) for changing futures

Wayne Grant Mackintosh

A thesis submitted for the degree of Doctor of Philosophy
University of Bath
International Centre for Higher Education Management
School of Management
November 2006

Table of contents

Chapter 3 Scenario planning and key uncertainties challenging DE futures

Chapter 4 Plotting scenarios on the implementation of DE technologies at a traditional research university in New Zealand

Chapter 5 The value of scenario planning for leading DE technology futures

Appendix 1 Macro systems architecture for building the scenarios

Abstract

The adoption and implementation of digital information and communication technologies (ICTs) can change the way campus-based universities view their missions, place within society and the higher education market by challenging current aims and values. This thesis explores the future impact these distance education technologies might have on campus-based universities in New Zealand by applying the technique of scenario planning. The value of the thesis will lie in making a contribution to the range of factors that must be taken into account when implementing sustainable technology strategies on campus.

The study interrogates the set of conditions that are exerting pressure on universities to change including: the global knowledge society; massification; and advances associated with digital ICTs. In addition, the study investigates what we can learn from the theory, research and history of distance education focusing on the future adoption of these technologies on campus. Corresponding with the requirements of scenario planning, factors that will potentially have a significant impact on the future, but are not sufficiently mature to have a reliable implementation history (and therefore difficult to predict) are also identified and analysed. Three scenarios are generated from this preceding theoretical work resulting in a justifiable framework to facilitate comparative analysis of the future impact of DE technologies at campus-based universities.

The development of well-founded scenarios has resulted in a test-bed for university planners to compare alternatives for the future within the context of the trade-offs that universities will need to consider in order to ensure sustainable implementation of DE technologies. The scenarios have enabled more detailed analysis of the assumptions that should underpin strategic planning when considering technology futures on campus.

Chapter 1

Objective, problem formulation, research questions and limitations of the study

1.1 Introduction

The adoption of distance education (DE) technologies can change the way universities view their missions, their place in society and the higher education market by refocusing strategic and operational priorities. This thesis focuses on alternatives for technology strategies concerning the future of university-level, DE systems at campus-based institutions. In the absence of evidence reporting sustainable success of technology precipitated change in the university sector, the study applies the technique of scenario planning to gain foresight into probable DE futures. The thesis seeks to investigate the nature of the trade-offs confronting universities in the light of the adoption of DE technologies. It will explore the impact that these technologies might have on the strategic priorities of the respective university and the competition among them. The study, therefore, is an attempt to think systematically about the future concerning the nature of the planning that universities will need to undertake in the light of emerging technologies for DE delivery and corresponding trade-offs for strategic priorities. The prime purpose of this forward-looking focus is to promote the finesse universities may need in order to implement sustainable DE initiatives. This is not an empirical thesis, but seeks to engage in the prior task of theorising about the various factors that universities need to consider in developing alternatives for organising DE operations on campus. The benefits of the thesis will lie in helping university planners to take into account a range of factors required for the development of sustainable DE technology strategies.

The research reported in this thesis must overcome two fundamental challenges. First, systematic research into the future "does not have a well defined methodological base" (Miller 2003: 3). The future has not happened yet; consequently there is no observable manifestation of the future or an empirical dataset that can be analysed. Furthermore, it is risky to predict the future, assume that you can control it, or even worse, the conceit that you can forecast what will happen leading to "a 'tunnel vision' that could be fatal" (Kahane 2001: 18). Second, the risks associated with the current trend among conventional universities who are now embracing the new DE technologies "without the benefit of the expertise and understanding that decades of research, theory, and practice in distance education could provide" (Evans & Nation 2003: 785). In overcoming these challenges, this thesis will apply the technique of scenario planning. It will draw on the research, theory and practice of distance education to inform the development of the scenarios.

The scenarios developed in this thesis will be used as a test bed to critically review strategic alternatives and the corresponding implications for future DE technology strategies in the university sector. Scenario planning is a conceptual modelling tool, that is well suited for analysing complex systems that operate within uncertain futures. University systems are notoriously complex and the recent surge of DE in the higher education sector gives credence to growing uncertainty regarding how DE markets are likely to develop in the future, especially when taking the rapid advances of digital technologies into account. There is an abundance of speculative rhetoric on technology related change in the university sector which is not based on research findings or practical evidence. However, scenario planning is an appropriate tool which university planners can use to explore the gap between technology's promise for enhanced DE systems of the future and the present day reality of campus-based provision.

While scenario planning has not been widely adopted as a mainstream planning tool in the university sector, there are nonetheless examples where the technique has been applied. There are scenarios reported in the literature that aim to promote strategic discourse within the academy (Salmon 2002; Wheeler 2004). There are also more rigorous examples of the technique to explore alternatives for the future of tertiary education in the learning society (see Firminger 2002; Learning Circuits 2004; Miller 2003; University of Michigan 1996). These scenarios have focused on the level of educational policy, however there is a gap in the available research literature where scenarios have incorporated the research, theory and practice of DE into the modelling process. This study will contribute to the growing knowledge base on scenario planning for DE futures in the university sector by:

- incorporating the research, theory and practice of distance education into the conceptual modelling process used for developing the scenarios;
- focusing on how the adoption of DE technologies might impact on the strategic and operational priorities of campus-based universities; and
- modelling alternative organisational structures for DE operations at campus-based institutions.

Given the DE focal point of this study, the thesis will draw on the experience of the so-called mega-universities[1], as these institutions have acquired extensive experience of the unique requirements of dedicated DE provision. The concept "mega-university" is potentially misleading, because it was originally intended to refer only to the single-mode DE universities which operate at significant scale. Today, with emerging alliances and partnerships among tertiary education providers traditional campus-based providers have exceeded the arbitrary threshold of 100 000 enrolments even though they may not necessarily specialise in DE delivery. However, in this thesis, the concept mega-university is used to refer to Daniel's original meaning of large-scale, single-mode DE universities.

There is no shortage of contributions to the literature concerning the promise of technology for education. However, evidence on the ground reveals a different story. The challenge for this study is to systematically analyse the future potential of DE technologies taking into account the shortage of empirically verifiable research on the successes of technology futures in education.

[1] Mega-university is a concept coined by John Daniel, former Vice-chancellor of the British Open University, to refer to those universities who have a student enrolment of more than 100 000 students (see ICDL 1995). Surprisingly, all these institutions use large-scale teaching systems based on distance teaching methods. The mega-universities will be described in more detail in the problem formulation section of this chapter.

DE in recent years has experienced prolific growth, largely due to the pervasive advances in digital information and communication technologies (ICTs). In this regard, Christensen, Aaron and Clark (2003: 45) report that distance learning is growing at three times the rate of conventional campus-based delivery in the United States. Elsewhere, Oblinger and Kidwell (2000) remind us of some further telling statistics in the United States:

- First the education market is big. The total size of the US education market (pre-school through to lifelong learning) is $665 billion per annum — more than the total spent on US national defence. (The higher education market is estimated at $225 billion per year);
- Unprecedented growth is predicted for the distance learning market. International Data Corporation's market research expects a 33 percent compound annual growth rate for distance learning over the next few years (This translates to 15 percent of all students in higher education will be studying by distance in 2002 — an increase from 5 percent in 1998);
- The academic market will continue to grow and the corporate education market's component will grow more rapidly. The academic university market is expected to grow from $16 million in 1997 to $1.57 billion in 2002 whereas the corporate market will grow exponentially from $217 million to $7.6 billion over the same period.

Oblinger and Kidwell (2000) also point out that if the university continues to focus on the traditional 18 to 24 cohort using traditional modes of delivery, and if the higher education market grows as expected, universities will see their respective portions of the tertiary education market shrink considerably over the next 10 years.

Despite these statistics on the growth potential of DE, the track record of e-learning — after the burst of the dot.com bubble at the turn of this century — has been less impressive. Zemsky and Massy (2004) refer to e-learning as "thwarted innovation" and based on their longitudinal research have shown that, on most campuses, universities have failed to connect learners meaningfully to their learning experiences and as such, e-learning at its best is merely seen as a convenience. Zemsky and Massy (2004) also point out that e-learning has failed to change the way academics teach and most contemporary applications are merely extensions of the traditional transmission model associated with classroom lectures. These researchers envisage that "e-learning will become pervasive only when faculty change how they teach — not before" (Zemsky & Massy 2004: iii).

On the virtual university front, both publicly funded and for-profit initiatives appear to be struggling. Consider for example: the disappointing performance of the Western Governors University project that has not succeeded in attracting large numbers students (Morrison & Mendenhall 2001); The closure of New York University's online for-profit initiative (Carlson & Carnevale 2001); Columbia University's withdrawal from the Fathom consortium notwithstanding significant levels of investment (Carlson 2003); and the failure of the United Kingdom's eUniversity (HEFCE 2004; Schmoller 2004). Yet on the other hand, there are reports that some virtual university initiatives are building sustainable revenue streams (Epper & Garn 2004) and the wholly online offerings of the University of Phoenix continue to grow (Schmoller 2004).

Whether this "failure" of e-learning constitutes the demise of e-learning expansion on campus or whether it signifies a temporary reprieve where the early experimenters are learning from their mistakes for the next wave of innovation, is unknown. This provides fertile ground for the application of the scenario planning technique, thus emphasising the timeliness of this study.

Arguably, the tertiary education sector is poised for a number of technology precipitated changes in conventional delivery systems. Although it is difficult to predict the magnitude and definitive characteristics of this transformation, change in the delivery systems in the tertiary education sector are certainly plausible. Therefore the differences and tensions among emergent, evolutionary or substantive transformation require some consideration.

Analysing change is a complex activity, especially when it is fast-paced and unpredictable. Furthermore there are degrees of change which range from incremental evolutionary change to more fundamental transformation. Quantifying change is also influenced by perspective. For example, the institution of the world's first single-mode distance education universities after the onset of the industrial revolution may not be viewed as an example of fundamental transformation from the perspective of the university as institution. However, when viewed pedagogically there are researchers that that cite single-mode DE delivery as an example of structural transformation (see for example Peters 1989 & 1994).

From a scenario planning perspective, value judgements are not necessarily made between evolutionary versus revolutionary change. The purpose is to analyse the factors which could make a difference to existing business models (Van der Heijden 1996: 94). Consequently, scenarios can incorporate both incremental and more fundamental transformation perspectives so as to improve understanding of the assumptions which can inform strategic planning. The requirement for scenario planning is to interrogate the plausibility of transformation thus separating that which is "predictable from what is fundamentally uncertain" (Van der Heijden 1996:26).

The notion of substantial change suggests that a set of emerging conditions may be exerting forces of sufficient magnitude to spur organisational transformation of considerable proportions. This concerns the tensions between evolutionary and revolutionary change. On the one hand, evolutionary change is stable, predictable and easier to manage. Also, assuming that an organisation can maintain a high pace of incremental change, the combined effect of a series of minor changes may collectively add-up to represent fundamental transformation.

From an organisational perspective, it is difficult to decide which strategy is best; however, it appears that successful organisations are those organisations that have the capacity "to perceive evolutionary and revolutionary change as faces of the same coin, and to recognise when each is appropriate" (Goldsmith & Clutterbuck 1997: 5). This is where the power of scenario planning comes to the fore. By developing multiple scenarios, organisations can examine the implications of alternative responses and are more likely to make the right decision concerning whether evolutionary or transformative change interventions are more appropriate. In this study, it will be necessary to investigate the set of conditions that are exerting pressure on the university and to ascertain the type of intervention that is most appropriate given the best analysis of the conditions. The forces bringing about a change in conditions — that is, the drivers of change — will be examined in the section discussing the problem formulation below (Section 1.3).

Another important dimension pertaining to the notion of change is the difference between organisational change and organisational transformation. Norris and Morrison summarise this difference well: "Just because we are changing a great deal does not mean we are transforming" (1997: 1). The difference should be self-evident, but in practice change is very often confused with transformation. We need to recognise the difference in perspectives between incremental change and substantive transformation (Newman 2000). Whereas change might be traumatic for those directly involved and may impact on components of the organisation's existing processes, transformation is distinctive because it tackles both the "current and known world *and* the future" (Taffinder 1998: 36). From the corporate perspective, transformation:

> *[i]s concerned with the creation of new opportunities, with the ability to junk conventional wisdom and destroy old (often cherished) advantages, to violate established business practice, compete in different ways, shut down competitors' angles of attack and behave in counterintuitive and, indeed, unpredictable ways. If this is to happen, then big change must too. In the obverse, change of an incremental, narrow, single-process and straight-forward kind is unlikely to transform the organization.* (Taffinder 1998: 36)

Some change interventions are focused on improving and adapting the past as opposed to anticipating the future. Kotter warns against the risks of managing change as opposed to leading transformation: "those who attempt to create major change with simple, linear, analytical processes almost always fail" (1996: 25). The essence of the problem is that in complex and rapidly changing environments "[i]ncremental thinkers can't set the transformation agenda ... only those companies that reinvent themselves and their industry in a profound way will be around a decade hence" (Hamel 1999a: 4).

The change phenomenon is a distinctive feature of present-day society. Alvin Toffler as early as 1970 identified the accelerative thrust of super-industrialisation as a key factor of future life:

> *[T]he final, qualitative difference between this and all previous lifetimes is the one most easily overlooked. For we have not merely extended the scope and scale of change, we have radically altered its pace. We have in our time released a totally new social force — a stream of change so accelerated that it influences our sense of time, revolutionizes the tempo of daily life, and affects the very way we 'feel' the world around us. We no longer 'feel' life as men did in the past. And this is the ultimate difference, the distinction that separates the truly contemporary man from all others.* (1970: 25)

The popularist nature of Toffler's *Future Shock* (1970) does not provide a justifiable research base to argue for transformation in the higher education. Yet, accelerated change is a condition of contemporary society. The change phenomenon permeates all layers of contemporary society and today we are challenged with rapidly fluctuating contexts more so than in any period before. A review of the management literature reveals that the change phenomenon is a significant area of research interest. Chattel (1995) characterises the contemporary context by pointing out that we live and operate in a continuous state of rapid flux. Tapp (1997: 27), for example, states that "[t]he seismic forces of technology, globalization and the emerging knowledge economy are altering the playing field so quickly that we are being forced to continuously reinvent ourselves and our companies to survive". McCallum emphasises the managerial difficulties of responding successfully to change especially "when change is as fast paced, complex and unpredictable as it is now" (1997: 73). The conditions of change are expressively articulated by Barber and Bristow when they expand on the cliché: "the only thing which is constant is change" by adding that this cliché "is probably not true because the rate of change is continuously accelerating" (1997: 11).

Clearly, trends in management thinking and corporate practice have developed in parallel with the dynamics of the contemporary change phenomenon. Since the mid 1990s, greater emphasis has been placed on the imperatives of improving market responsiveness, smaller flexible companies and increased prominence of transformational leadership in attempts to deal with the complex change dynamic (see for example Barber & Bristow 1997; Boehnke, Distefano, Distefano & Bontis 1997; Johnston 1996; Tapp 1997).

It plausible to hypothesise that the change dynamic of contemporary society could have an impact on the university. Middlehurst, for example, concludes that higher education "is in a state of flux, but as much (or more) in response to pressures from outside as from within" (1995: 90). Also, Sibley points out, that the "demands upon the university have never been greater or more numerous than today" (1993: 117). The question of whether these changing contexts constitute a "predicament" or "crisis" for higher education is an open question (Sibley 1993: 114). If considered a "predicament", then only minor managerial interventions may be required to improve the effectiveness of a growing and successful higher education institution. In management terms, this would mean that benchmarking, re-engineering and quality management systems may be all that is required to improve effectiveness in a changing environment. However, if these changing contexts are considered a "crisis", then more substantive management interventions will be necessary for organisational renewal.

The advantage of scenario planning is that scenarios can be generated for both minor change and more substantive transformation before organisations are required to commit themselves to any particular strategy. After multiple scenarios are compared in this way, the probability for making the "right" choice can be enhanced. Therefore, this study does not make a value judgement concerning whether or not the university is facing a "crisis" regarding the implementation of DE technologies on campus. Nonetheless, it is necessary to explore the theoretical constructs of change management thinking to set the context for more robust analysis of the drivers of change in higher education.

Institutional leaders also have to deal with the perplexing dilemma of deciding when to begin instituting change strategies, if at all. On the one hand, as stated above, institutions change more quickly when they are in crisis. Handy affirms this characteristic of organisational and personal change when he says: "the real energy for change comes only when you are looking disaster in the face" (1994: 52). Unlike the corporate sector, the university adopts a more conservative and incremental approach to managing change. This could be attributed to the fact that faculty members "are more devoted to their disciplines than to their institutions, yet they expect to have a major voice in managing the enterprise" (Green 1997a: 1). Yet to be fair, it must also be recognised that society in general prefers the security derived from the conventional way of doing things. Furthermore, the methodical and rational characteristics of the "scientific" approaches preferred by the university have contributed to the sustained survival of the university as institution, notwithstanding significant societal changes that have occurred during the course of its history.

With a touch of sarcasm, Taylor alludes to the difficult dilemma facing transformational leaders:

> *Conformity may give you a quiet life; it may even bring you a University Chair. But all change in history, all advance, comes from the nonconformists. If there had been no trouble-makers, no dissenters, we should still be living in caves.* (cited in Coffield & Williamson 1997: 19)

A planning approach that is based on waiting until a real crisis looms in the university sector would be the route of least resistance. Furthermore, this stance is academically justifiable, when considering the traditions of enlightenment that underpin the success of the university because there is no substantive empirical evidence to validate the potential demise of the university. In fact, many would refute claims challenging the survival of an institution that has survived the industrial revolution, and has reported exponential growth since the 1950s. Kerr, for instance shows that between 1530 and 1980, 62 out of 66 institutions that had survived in recognisable forms were universities (cited in Shattock 2000: 103).

Yet, applying hindsight, Charles Handy (1994) argued that it is too late to transform when you are in the downward slope of decline. He suggests that organisations (in our case universities) should reassess their strategic position. With particular reference to emerging DE futures, this study will examine whether conditions in the tertiary education sector may indicate the possibility of whether universities have reached the turning point to a downward trend.

The potential controversy related to such a view is duly recognised. Nonetheless, from a foresight and scenario planning perspective, these tensions must be examined more closely in the interests of understanding the successful implementation of DE technologies on campus. In support of the call to examine whether universities have reached a turning point because of the advent of disruptive technologies, Glick and Kupiec insist: "those of us in higher education would be poor stewards if we did not examine and respond to the new environment in which we function" (2001: 34).

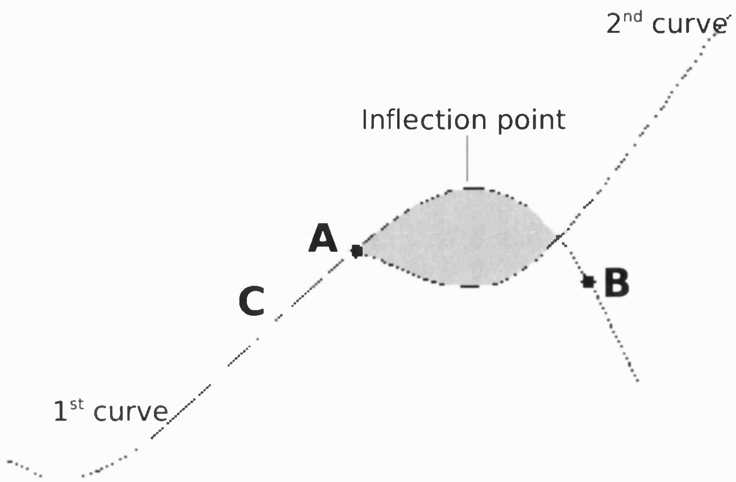
The traditional place of the university is being challenged from a variety of rhetorical perspectives. It is critical that higher education leaders must overcome their inherent but understandable resistance to reflect critically and responsibly about the plausibility of future changes in the university sector, in spite of its successes in the past. As Coffield and Williamson emphasise:

> *[U]niversities must themselves change, as otherwise their future will be defined for them by political or business elites. The limits to what they can achieve are, however, set by the societies in which they function. For this reason, it is not sufficient for higher education institutions, universities in particular, to reform themselves. They must seek also to engage in a wide-ranging and critical dialogue within society to secure the conditions of future growth and sustainable development for both.* (1997: 5)

Questioning the university's future is a contested view. Yet in the interests of the university as institution, it is important to reflect systematically about its future to ensure that, leaders do not miss the opportunities for timely change management, if so required.

In this regard Handy (1994) deliberates on the sigmoid curve which is an S-shaped curve representing the life cycle of many organisations. This curve is illustrated in Figure 1.1 below, showing how a new organisation or initiative first wanes before it continues on an escalated path of growth and expansion. Point B is the juncture when disaster looms, and is the point where the perception of crisis, in some respects, facilitates transformation. Paradoxically, at this point, huge effort is also required to bring the organisation back onto a steep growth pattern, because usually resources are low, motivation is depleted and leaders lack credibility because they are seen to be the primary reason for the decline. "The secret to constant growth is to start a new sigmoid curve before the first one peters out" as represented by point A in Figure 1.1 (Handy 1994: 51). The shaded area represents a time of great confusion between competing ideas for the future, that is, those who support the first curve and those who have bought into the second curve. This is the paradox of success: namely that "the things and the ways which got you where you are are seldom those that keep you there" (Handy 1994: 50).

Figure 1.1 Handy's sigmoid curve



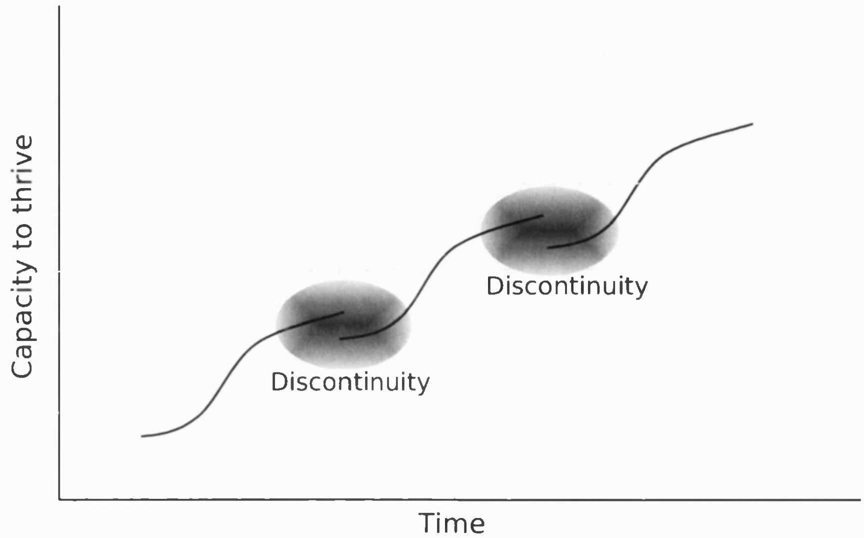
Adapted from Handy (1994: 52)

Conceptually, the research reported in this thesis pertaining to the futures of DE technologies is hypothetically represented by point "C" in Figure 1.1. Although it is difficult to provide definitive evidence that, for example, the mega-universities (as the mainstream traditional providers of DE) have commenced on a downward slope there is compelling evidence that this trend is probable in the light of growing competition in DE. This poses a significant methodological problem for the research reported in this thesis. The key theoretical and practical problem with Handy's account is that identifying the turning point downwards is always a matter of theory and related empirical analysis. We rely on our best theories to tell us whether we have reached such a turning point and yet given the degree of uncertainty involved, choosing the best theory is a difficult business.Yet at the same time, we need to use the best intellectual tools that are at our disposal to help inform our strategies. The leadership of the university sector will need to seriously consider whether point "A" of the sigmoid curve is imminent and therefore start preparing for a new curve so as to avoid the complications of trying to achieve a turn-around once point "B" has been reached.

Handy's advice that organisations should transform while they are still successful underpins the core objective of this study and will be discussed in Section 1.2 of this chapter. The methodological difficulties associated with researching probable futures will be tackled in the section dealing with the research questions directing the study (see Section 1.4 below).

Linking with the earlier points concerning the difference between organisational change and organisational transformation, Taffinder's (1998) concept of "discontinuity" combined with his adaptations of Handy's sigmoid curve deserve particular mention in the context of this study. Taffinder argues that "[d]ecline can either be arrested or pre-empted, however, by transformational action since this creates discontinuity — *that is, it disconnects the organization from its original path*" (1998: 39). In other words, the principle of discontinuity means that in order to initiate a new sigmoid curve in the organisation, it is necessary to break the path of the old one. Discontinuity can be forced onto the organisation because of radical changes in the external environment — for example, the break in IBM's hegemony in the mainframe computer market by the new market wave triggered by the personal computer. Alternatively, the leadership of the organisation can initiate discontinuity, as was the case with IBM's later transformation from a "besieged box maker to a dominant service provider … a wave that even Bill Gates and Microsoft originally missed" (Hamel 2000a: 138).

Figure 1.2 Taffinder's discontinuities and transformation trajectories



Adapted from Taffinder (1998: 40).

Taffinder's (1998) principle of discontinuity is represented graphically in Figure 1.2. His view does not challenge the validity of Handy's (1994) thinking. Handy, for example, refers to the source of a new curve as "a place of paradox, a confusion of simultaneous opposites, of unexpected consequences, of altered meanings, and oxymorons" (1994: 56) and emphasises the inertia required to transform the organisation. The added value of Taffinder's (1998: 40) graphical representation is that it highlights the principle of discontinuity as an imperative of transformational leadership when launching an organisation onto a new trajectory at the right moment.

The challenge of deciding on the right time to begin transformation is also complicated by the fact that the accelerated pace of change compresses the sigmoid curve. This compression has certainly contributed to the increasing levels of complexity with specific regards to the strategic management of university technology strategies. It may also be described by some as representing the characteristics of high-order chaos. The spirit contained in the words of Priesmeyer encapsulates the need to think systematically about the future:

> *High-order chaos appears randomly because we do not understand it. With this view, chaos can be taken to define any activity we do not understand. What is chaotic, therefore, is not determined by the nature of the activity we are studying, but by our own level of understanding. What is chaotic to some is orderly and predictable to others.* (1992:7)

This should not be misinterpreted as a denial of current complexity for the sake of future simplicity. Rather, this study will attempt to make some sense of this complexity, with particular reference to planning and managing strategic futures for universities engaged in DE.

In summary, the pertinent issues concerning the nature of the change phenomenon and its implications for organisational transformation introduced above have resulted in the following conceptual division of this chapter:

- Following Handy's advice, the objective of this study is based on developing foresight about the probable futures of DE provision in the university sector while still at point C of the sigmoid curve so that these organisations can be prepared to begin a new sigmoid curve at point A rather than dealing with the difficulties of transformation at point B when it is already in a downward cycle. The rationale and justification associated with the objective for this study are discussed in Section 1.2;

- It was suggested that a set of economic and social forces might exist that have led to a fundamental changes in the conditions under which universities now operate and to which universities will need to respond. These factors will be discussed in the section on the problem formulation of this study in Section 1.3;
- Researching probable futures — for which there is no substantive empirical evidence to validate the specific futures discussed — poses a number of methodological problems for the research, and these problems will be discussed in conjunction with the specific research questions that have directed this study in Section 1.4;
- Finally the focus of the study will be clarified further when the limitations of the study are set out in Section 1.5.

1.2 Objective of the study

This is a study about alternatives for implementing DE technologies at campus-based universities. The question directing this study is:

> *How should a campus-based, research-intensive university organise the implementation of DE where the future advances in digital technologies are unknown?*

There is a strategic tension between the promise of DE technologies and evidence of sustainable success regarding the implementation of e-learning and corresponding transformation of the university beyond the rhetoric from the proponents of technology precipitated transformation in higher education. In the absence of such evidence, strategic management processes can be enriched using the techniques of conceptual modelling, strategy innovation and scenario planning (Amidon 1997; Handy 1994; Schoemaker & Mavaddatt 2000; & Senge 1994).

Strategy innovation is a leadership disposition aimed at generating strategic advantage through differentiation and is purposefully designed to take action before the inflection point of the sigmoid curve is reached. Glick and Kupiec summarise the leadership choices facing higher education in this regard as follows:

> *We can continue to be reactive and use whatever technology seems to fit a given or perceived need, or we can be proactive and purposefully consider the larger arena in which we operate, and adapt our strategies accordingly.* (2001: 36)

In recent years there has been an increasing emphasis on strategic management in the university sector , "because management that does not take into account an assessment of future priorities would be short sighted and ineffective" (Shattock 2000: 93). Strategic management is based on analysis which requires the strategist to understand the strategic position of the organisation in order to prioritise current resource allocations (Peeke 1994: 9). In the current period of declining state funding it is imperative to strike the right balance between strategic priorities and effective utilisation of scarce resources. Strategic management is proactive and good universities "encourage a climate of innovation and development, where new ideas are supported and initiative is rewarded" (Shattock 2003: 41).

The theory of planning and strategic management is well documented in the general and university management literature (see for example Courtney 2002; Keller 1983; Mintzberg 1994; Peeke 1994; Shattock 2000 & 2003). It is the cornerstone for guiding the future success of institutions. However, when dealing with the potential for disruptive change, it is necessary to compliment strategic management interventions with tools that can contrast and compare alternative futures taking into account uncertainties that could potentially have a major impact on the existing business models of the organisations concerned. For example, preceding the first democratic elections in South Africa in 1994, a group of academics, business people and political activists used scenario planning to explore the economic and social future of a post-apartheid South Africa in 1991 (Kahane 2001). In 1991, the outcome of a post-apartheid South Africa was unknown but was also the most fundamental change in the history of the country. Conventional planning methodologies did not have the capacity to adequately plan for the impact of a post-apartheid South Africa, because there was no representative data set that could be used to inform the planning process.

Similarly, contemporary advances in digital DE technologies do have the potential to transform teaching and learning at campus-based institutions. However, we do not have evidence of success that can inform strategic planning. For this reason the study will focus on the methodologies of conceptual modelling using the technique of scenario planning to gain foresight into alternative DE futures. This is not a substitute for strategic management in the university, but a methodology to systematically analyse uncertain futures thus providing further information which can be taken into account when planning the implementation of DE on campus.

This section will introduce some key concepts regarding scenario planning. First, a brief introduction of the concepts of *knowledge innovation* and *scenario planning* is provided. Then the problems associated with "borrowing" management principles from the corporate world and applying these directly to complex university environments will be illustrated. Finally, the rationales underpinning the shifts in leadership thinking from strategic planning to strategy innovation are summarised in justification for adopting multiple scenarios in this study. This will highlight the risks associated with traditional forecasting techniques where future strategies become too dependent on historical data at the expense of creating strategic value from changes in contemporary social and economic conditions within which universities must operate.

1.2.1 Introducing knowledge innovation and scenario planning

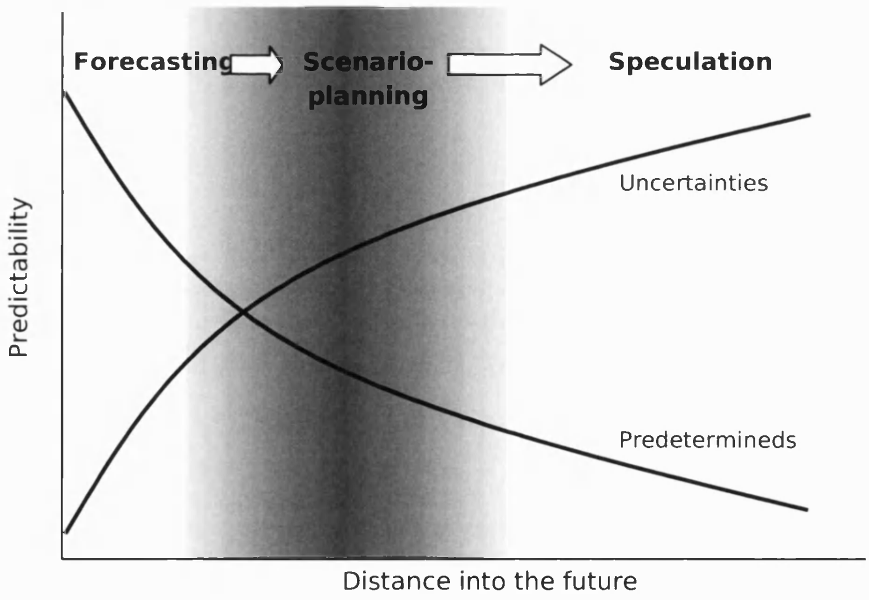
Amidon defines the concept of *knowledge innovation* from a management perspective as "the creation, evolution, exchange and application of new ideas into marketable goods and services for the excellence of the enterprise, the vitality of a nation's economy and the advancement of society as a whole" (1997: 7) The *knowledge* component of the concept refers to the evolution of the nature and role of knowledge in the world and corresponding management practice. Knowledge is a way to describe the *content* that needs to be managed. In contrast *innovation* refers to new ways of thinking regarding how to create and sustain competitive advantage in the business world. Innovation is a way to understand the strategic *processes* of management in the knowledge economy (Amidon 1997).

Knowledge and innovation are interdependent and the unique interplay between these two dimensions provides a powerful base for attaining successful and sustainable futures in complex knowledge-based economies. Linking to Handy's advice in the previous section, knowledge innovation is a way in which organisations can transform while they are still successful. Hence, they avoid the difficulties of fundamental transformation when in a state of decline. The objective of this study, then, is to examine the meaning of knowledge innovation and how it can be applied to develop foresight into ODL university futures.

Scenario planning is one of the tools (Schoemaker 1995) that can be used for knowledge innovation and is ideally suited to environments that are characterised by uncertainty, complexity and potential paradigm shifts precipitated by disruptive technologies (Shoemaker & Mavaddat 2000). The advantage of scenario planning is that it provides a systematic way to contrast future alternatives that incorporate substantive uncertainties which do not have a historical track record, but nonetheless could have a material impact on the existing business model (see Fahey & Randal 1998). Hence this is an appropriate tool for exploring questions associated with the implementation of DE. Scenario planning mitigates against the risks associated with planning for uncertainties because multiple futures are considered. The outcomes of these scenarios can be used as a test bed for analysing the strategic plans for technology futures in the university sector.

Scenario planning has evolved from the art of balancing the tensions between identified drivers of change (predetermineds) and factors which are difficult to predict (uncertainties) because of the absence of empirically verifiable data (such as the future role of DE and the university sector). This is especially pertinent when considering the accelerating developments and uncertainties associated with digital ICTs. In these environments, it becomes increasingly difficult to use traditional forecasting techniques, which are based on extrapolations from the past. Figure 1.3 below places the predictability of planning interventions into context, illustrating the range where scenario planning is most effective.

Figure 1.3 Scenario planning and predictability



(Adapted from Van der Heijden 1996:92)

Conventional planning relies heavily on detailed analysis of the existing data to anticipate trends and changes. If we assume that the future will be significantly different from the past, then historical data becomes less reliable for planning purposes. Therefore we need methodologies that can overcome these limitations without negating the utility of conventional planning approaches. Scenario planning is a methodology that enables managers to explore alternative futures, thus lessoning the risks associated with forecasting techniques that rely on historical data alone. Scenario planning avoids over reliance on historical data but utilises a systematic methodology to counter the the risks of speculation. Scenario planning is a tool that is used to supplement strategic planning by providing a test bed for evaluating strategic plans that are derived from data extrapolation and other strategic forecasting techniques.

Hence the objective of this study is to examine the interaction between the drivers of change in higher education (predetermineds) and the emerging uncertainties relating to the technology of DE over the medium term, with specific reference to the shaded scenario-planning zone depicted in Figure 1.3. In this chapter, the main change drivers in higher education will be introduced in the problem formulation section, while the technique of scenario planning and the selected uncertainties for this study will be analysed in more detail in Chapter 3 of the thesis. However, before proceeding with the analysis of the drivers of change, it is necessary to question the application of management theory in the university environment. It is also necessary to illustrate the growing support for conceptual modelling in contemporary thinking about strategic planning.

1.2.2 Tensions regarding university traditions and managerialism

Given that the objective of this study is rooted in contemporary management trends, it is necessary to problematise its direct application to university contexts. Glick and Kupiec, for instance, suggest that tensions exist whether business concepts such as strategy innovation and the sigmoid curve "contain lessons for higher education" (2001: 34) and this conflict will be considered in this section.

Adopting managerial practices in complex university environments that are derived from an alien business environment (geared towards sustaining growth through competition) is not without its problems and debate. For example, the educational objective for universities to expand access to tertiary education is not primarily driven by a philosophy of competitive advantage. Thus, there are reasonable grounds to question the application of these kinds of managerial principles to the university sector. (Notwithstanding, at an organisational level, the modern university competes for student places as witnessed, for example, by impressive marketing campaigns of many universities and substantial investments in student facilities to attract the "best" students).

Emphasising the complexities of university management, Green (1997a) refers to the difficult task facing university leaders: balancing the pressures from government and its policies, external pressure groups and the specific needs of students and university staff. In the context of change management, she goes on to say that universities "do not 'restructure' or 'reengineer' the way corporations do; their habits and processes are simply different" (Green 1997a: 2). Elsewhere, Green refers to the coexistence of academe and management as an uneasy relationship but concedes that although "there continues to be resistance to the growing 'managerialism' in higher education, it is increasingly difficult to ignore the fact that complex enterprises must be expertly managed" (1997b: 41).

With justifiable reluctance from the academy, concepts like "management" and the "market" have become increasingly important for publicly-funded institutions of higher education. "University managements are adopting some of the practices and language of private corporations and the market, and this is affecting the day-to-day activity and consciousness of the ordinary academic" (Miller 1995: 150). This trend corresponds with increased but also changing perspectives of accountability in higher education over the last two decades (Middlehurst 1995). According to Middlehurst, in the 1980s accountability was principally associated with accounting for public funds in terms of efficiency and value for money and the principal focus was on "government as official sponsor of higher education and proxy for the tax payer" (1995: 78). The concept of accountability has broadened to encompass the responsibilities towards a wider group of stakeholders, including accountability to students under the banner of "quality" and accountability to industry, the economy and society in terms of the quality of graduates and relevance of the curriculum (see for example Middlehurst 1995 and Meade 1997).

Despite the controversy associated with conceptualising the university as a business, some researchers argue that an enterprising strategy may be the only way to ensure the future success of the institution. For example, McNay suggests that if "the entrepreneurial academy can do better than its ivory-towered predecessor ... the university may well continue its long historical record of adaptive genius which has allowed it to outlive most institutions" (1995: 114). On the other hand, universities are complex organisations that have a definitive role to play concerning the maintenance and development of a critical voice for society. For example, Klein (2000) illustrates one of the risks of entrepreneurialism with particular reference to corporate branding in the university sector. She argues that universities are one of society's most important social spaces where open debate and transparency should be valued. Allowing corporate brands into these institutions on the grounds of "sound" business decisions may undermine the very values that underpin the institution. At the same time, it is important to recognise that intellectual autonomy is not an excuse for inefficiency or a mandate to disregard the adoption of appropriate management and leadership practices.

With due recognition of the justifiable tensions that should exist between the traditions of the academy and direct application of corporate management strategies, universities have been placed under increasing pressure to "borrow" ideas from corporate management thinking — especially given public expectations to do more with considerably less.

Part of the predicament is that education is not a perfect market and that the corresponding market failure (concerning the 'imperfect' dynamic between conventional supply and demand theory in education) justifies government intervention in the form of public expenditure through subsidies (Hammer 1996: 1). Paradoxically, the higher education sector is complicated by the fact that global demand outstrips global supply – a condition that any corporate enterprise would welcome — yet this condition does not permit complacency among university leaders, particularly because of the pressures to do considerably more with very much less. Massy (1990) points out that the biggest problem on the demand side is affordability, in the sense that, compared to the costs of provision, higher education is under-priced. At the same time, it is generally becoming less affordable for the wider public.

Furthermore there is a changing dynamic regarding the emergence and potential for anticipated success of the for-profit universities such as Phoenix University and Jones International University. This in combination with private-public partnerships (such as Universitas 21) and the growing significance of the corporate university in the tertiary education scene places increased pressure on the traditional academic "business" of publicly-funded universities. In a purely economic sense, there "is no doubt that higher education in private institutions and higher education in public institutions are substitutes" (Eckaus 1990: 61). To illustrate the potential difficulties of the for-profit universities as a substitute for public providers: What should the traditional universities do if large numbers of students in commercially lucrative subject areas (such as business) are drawn away to private institutions? Most universities use the large numbers of students in the employment related subject fields to cross-subsidise the non-employment related subjects. Plainly, there is good reason for the strategic leaders of the university to get a better grasp on the dynamics of competition in the tertiary education market place. At the same time, strategies will need to be sensitive to the tensions between intellectual autonomy and managerialism. This is why it is necessary to generate scenarios from the perspective of the university and not from the dictates of the business world.

1.2.3 Anticipating and responding to change using knowledge innovation techniques

This study draws on contemporary approaches to understanding competition in the corporate world. Newer conceptions about competitive advantage have resulted in qualitative shifts in the know-how and techniques for knowledge innovation. In particular, a planning bias focused on conceptual modelling and synthesis is informing strategic thinking in the corporate world. These qualitative shifts will be interrogated with regards to their potential application concerning questions about the future of university-level DE.

While contemporary corporate approaches of knowledge innovation have not necessarily become mainstream in higher education thinking, probing questions of competitive advantage in university management thinking have been considered within the DE literature. For example, Daniel (1999a) has analysed the success of the mega-universities using Porter's (1980 & 1985) frameworks for analysing the dynamics of competitive advantage. In justifying this approach, Daniel points out that universities are complex organisations but advises that it "is instructive to review higher education within Porter's framework" (1999a: 68). Daniel conducted a detailed analysis of Porter's three distinct strategies for outperforming other enterprises, that is, cost leadership, differentiation and focus on specific niche markets. Based on his analysis, Daniel (1999a) concludes that some of the mega-universities were able to achieve success quickly through cost advantage and value differentiation. However, Daniel warns that the mega-universities will not be able to sustain this degree of competitive advantage because "the structure of the higher education and training industry is changing as more campus universities offer courses at a distance" (1999a: 85).

There is a strong relationship between competitive advantage and the strategic positioning of an organisation (Porter 1996). This involves the development of strategies that deliver a value proposition or set of benefits, different from those that competitors offer (Porter 1996). Successful strategies involve trade-offs in foregoing some product features, services or activities in order to be distinctive from other companies operating in the same value chain — hence the requirement for this study to investigate the nature of the trade-offs confronting universities in the light of the adoption of DE technologies. In addition, Internet technologies provide considerable opportunities for organisations to establish distinctive strategic positionings when compared to previous generations of technology (Porter 2001). Drawing on recent research, Porter (2001) confirms that establishing strategic position with Internet technologies still requires organisations to build on the proven principals of effective strategy.

Strategic planning (as opposed to operational planning) is the systematic process whereby an organisation envisions its future and develops strategies, goals, objectives and action plans to achieve that future (Steiner 1979). It is associated with long-range planning which is distinct from operational or tactical planning for the short term. The challenge for this study, as illustrated in Figure 1.3, is that it becomes increasingly difficult to plan for the long term, especially in environments characterised with a high level of technological uncertainty and accelerated change.

While there is evidence of competitive advantage analysis in the DE literature, it is insightful to reflect on how strategic thinking has evolved since Porter's (1980 & 1985) early work in this area. Historically, strategy has relied predominantly on analysis oscillating between an emphasis on the external dynamics of the value chain to emphasis on internal analysis of cost efficiency (for instance re-engineering strategies) as time has progressed. Three distinctive alternatives for strategy can be distinguished: (1) planning with an external bias derived from detailed analysis of value chain networks; (2) planning with internal bias derived from detailed analysis of optimising organisational efficiency and quality (for example organisational re-engineering and total quality management approaches); and (3) strategic thinking with a bias for intuition and creativity.

Porter's (1980 & 1985) early frameworks on competitive advantage were, to a large extent, based on cost analysis and differentiation analysis of the external environment. According to Porter (1980 & 1985), this analysis should be used as the groundwork for developing strategy in an organisation. In other words, data analysis was previously the major determinant of strategic planning according to Porter's early frameworks. Even so, Porter's early work resulted in placing strategic planning and competitive advantage at the forefront of contemporary management thinking during the 1980s.

By the time *Re-engineering the corporation* (Hammer & Champy 1993) was published, the emphasis had shifted towards an internal focus of operational efficiency and internal quality in the wake of global competition and "impatient shareholders" (Hamel 1998: 80) thus downplaying the impact of external factors. This shift had already taken place because cost and quality themselves are determinants of competitive advantage, corresponding with a clear shift in emphasis towards an internal dominated focus. Two approaches dominated this period: *restructuring* which focused on getting smaller and *re-engineering* which concentrated on getting better (Hamel 2000b). This signified that the strategy star — dominated by an external analysis focus — had dimmed because of the overriding preference for an internal focus on cost reduction and margin improvement in a bid to remain competitive (Hamel 1999b). During this period, implementation work was perceived more important than strategy work. The effectiveness of this dominant analytical approach, combined with the downplaying of strategic planning, began to be questioned — thus giving rise to the beginnings of strategic innovation in leadership thinking.

The management literature of the early 1990s began questioning the rationales of basing strategy on analysis alone. For example, Mintzberg's seminal publication, *The rise and fall of strategic planning* (1994), critically questioned the effectiveness of basing strategic planning on analysis alone and argued that it should be based on synthesis, intuition and creativity, thus distinguishing classical strategic planning from contemporary strategic management.

Qualitative shifts have taken place regarding questions of strategy and competitive advantage in management and leadership thinking. The most significant conceptual shift regarding thinking about leadership in the corporate world concerns the organisational *ability* to be ahead of change instead of adapting to change (Drucker 1999: 8). "Strategic planning makes little sense today … What is needed is a different approach to planning — one that starts with scenarios" (Drucker 1999: 8). Hamel and Prahalad's publication: *Competing for the Future* (1994) is a good example of this qualitative shift in thinking about the future . They argue that benchmarking and analysis within specific industries (that is, analysing competition) is insufficient to ensure sustainable futures and that managers should rather develop foresight about the future. Based on this foresight, managers should then create innovative strategies that create new markets. Hamel summarises this shift in thinking about strategy as follows:

> *I believe we should spend less time working on strategy as a "thing" and more time working to understand the preconditions that give rise to the "thing".* (1999b: 4)

Without discrediting the importance of sound planning and administrative acumen, such strategic approaches can be enriched by the implementation of knowledge innovation techniques so as to realise the full potential and opportunities now possible because of the changing set of conditions in the university context. Hamel warns that the "most risky thing today for any company is simply doing more of the same. It's a quick way to become irrelevant" (2000c: 17). The critical difference between analytically based strategic planning and strategic innovation is the application of conceptual thinking. Hamel, within the context of strategic innovation, defines conceptual thinking as "the ability to see patterns, to induce from specific events something more general" (2000c:17).

The capacity for deep strategic thinking is more important today than in any period before, given the complexity and rapid state of flux associated with the change phenomenon. This is exacerbated by the demands of an evolving knowledge-based economy, which is different from the requirements of the previous industrial-based economy. In a recent interview, when asked what is critical for business leaders to be effective today, Charles Handy stressed the importance of foresight: "The first thing a leader must do is to chart a path into the future ... particularly in the context of a changing world" (cited by Honore 2000a: 53). The implication is that ideas and knowledge about where to be heading is critical for the future success of any organisation attempting to function effectively in these turbulent times. This challenge holds equally true for the university.

Table 1.1 Alternatives for strategy development

Strategic planning approach	Planning Disposition	Representative Techniques
Developing strategy through analysis of changes in the ***external*** environment	Responsive	• Competitive advantage analysis • Value chain analysis
Developing strategy through analysis of changes in the ***internal*** environment	Responsive	• Restructuring / reorganising • Re-engineering • Total quality management
Developing strategy with the purpose of being **ahead of change** (as opposed to responding to change)	Generative	• Strategy innovation • Conceptual modelling • Scenario planning

The core objective of this study is to apply the techniques of knowledge innovation. With reference to Table 1.1 above, the research will focus on scenarios as a generative planning tool. The study aims to develop alternative scenarios for the future of DE using conceptual foresight techniques as opposed to analytical planning that is derived from existing practice. The preference for using a conceptual modelling approach for generating sustainable futures is corroborated in the words of Prahalad:

> *The future belongs to the imaginative, those that have the courage to overcome the discontinuities and reshape their firms to meet the challenges of the New Economy.* (1998: 23)

However, the combined complexities of university tradition and the specialised requirements of university management must necessarily be taken into account when attempting to bridge the gap between technology's promise for the future and the present day reality of the challenges facing higher education. In areas such as higher education, "embracing the fads and the pursuit of change for its own sake are as potentially harmful as resisting it" (Green 1997b: 6). Thus conceptual modelling and scenario planning does not obviate the requirements for well-founded research. Although pioneering research may appear "radical" within more conservative circles of the academy, successful innovation must nonetheless be well-founded because, in order to be effective "research needs to be radical — that is, deeply grounded while involving a willingness to think 'outside the box' " (Brown 1998:24).

1.3 Problem formulation

This section posits that there are sets of preconditions that have evolved in recent times that are increasing pressure for change particularly for those institutions engaging with DE delivery.

With specific reference to technology strategies in higher education, Glick and Kupiec point out that "the more we understand the drivers of change the better equipped we will be to act strategically" (2001: 36). The fundamental question is to consider the conditions that might exist that require universities to rethink their operational priorities.

Peter Drucker talks profoundly about the "future that has already happened" (Drucker 1998: 16). Drucker explains this apparent paradox:

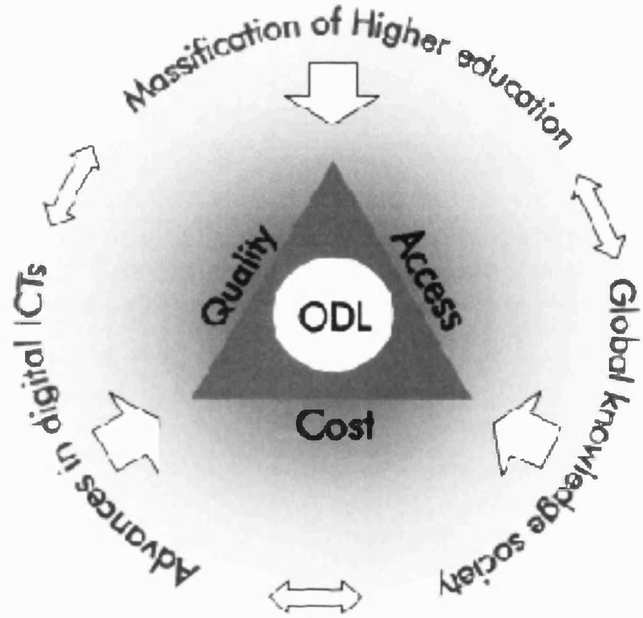
> *In human affairs —political, social, economic, and business — it is pointless to try to predict the future, let alone attempt to look ahead 75 years. But it is possible — and fruitful — to identify major events that have already happened, irrevocably, and that therefore will have predictable effects in the next decade or two. It is possible, in other words, to identify and prepare for the future that has already happened.* (1998: 16)

Despite the compelling logic of this statement, generating conceptual foresight is both a demanding and complex activity. As mentioned earlier, strategic analysis often falls prey to becoming trapped in the data and so to overlooking valuable foresight into the future (Hamel 1999a). Drucker is suggesting that we can find meaning in the events happening around us, "events that are visible but not yet seen" (Hesselbein, Goldsmith & Beckhard 1997: xi). There are early signs that major events may already have occurred because a number of prominent theorists have suggested that the university and education systems are under pressure to transform. Drucker argues that university education is nearing the affordability thresholds of average families and that other providers, in conjunction with the smart application of technology, may make considerable inroads into the market share of higher education currently dominated by traditional universities. Consider for example, Drucker's prediction of the demise of large university campuses:

> *Thirty years from now the big university campuses will be relics. Universities won't survive. It's as large a change as when we first got the printed book. Do you realize that the cost of higher education has risen as fast as the cost of health care? Such totally uncontrollable expenditures without any visible improvement in either content or the quality of education, means that the system is rapidly becoming untenable. Higher education is in deep crisis. ...Already we are beginning to deliver more lectures and classes off campus via satellite or two-way video at a fraction of the cost. The college won't survive as a residential institution.* (1997a)

Clearly there are major contextual forces: social, economic and epistemological at work that may impact on the evolution of university practice (see for example Salmi 2001). These are: globalisation and the advent of the knowledge society. In addition there are forces to which universities may require more immediate responses, these include the massification of higher education and the growing possibilities of open distance learning (ODL) forms of provision now possible through advances in digital information and communication technologies (ICTs). These factors are presented graphically in Figure 1.4.

Figure 1.4 Conceptual overview of the problem formulation



These drivers of change and the interplay among them potentially constitute a powerful transforming force for universities. For example, the evolving knowledge economy will place increased demands on the supply of multi-skilled professionals, which in turn places increased pressure on the massification of education. At the same time, digital ICTs provide exciting opportunities to facilitate massification and at the same time is capable of promoting accelerated learning opportunities that are not possible in cohort-based conventional university models.

At the organisational level, individual universities are faced with the challenge of managing sustainable economics. That is: increasing access and the quality of educational provision while attempting to maintain or reduce the cost of provision. In response to managing this triangle of sustainable economics, many universities are turning to ODL forms of provision. This is represented by the ODL circle in the middle of Figure 1.4.

1.3.1 Globalisation and the knowledge society

As early as the early 1970s, the sociologist Daniel Bell (1973) identified the coming of a post-industrial society. Today, some economists point out the inadequacies of conventional economic growth theory to explain the dynamic of the so-called knowledge economy. They are calling for the development of new economic growth theories (Conceição & Heitor 1999).

The concepts like the "knowledge economy" and "knowledge society" are receiving increased attention in the published literature. Yet, well-founded analytical and conceptual work on the theme is limited and substantive in-depth interpretations are in short supply. Manuel Castells's Trilogy, *The information age: Economy, society, and culture* (1996, 1997 & 1998a), however, provides a comprehensive analysis of this emerging economy. This section draws extensively on the scholarship and in-depth analysis reported in this multi-volume work as a basis to justify the plausibility of a global knowledge economy.

According to Castells (1996), a new economy has emerged that distinguishes itself from previous economies because it is *global* and *informational*. Hence the concepts of globalisation and knowledge society are inextricably intertwined, but for the purposes of analysis will be discussed under separate subheadings. The new economy is global because "the core activities of production, consumption and circulation, as well as their components (capital, labor, raw materials, management, information, technology, markets) are organized on a global scale" (Castells 1996:66). It is informational because the productivity and competitive advantage of the participants in this economy — enterprises, regions and nations — depend on the innovation, processes and application of knowledge-based information (Castells 1996). Castells goes on to say that the new economy is both informational *and* global because "under the new historical conditions, productivity is generated through and competition is played out in a global network of interaction" (Castells 1996: 66).

Globalisation

According to Castells (1996) the first element of the new economy is that it operates on a global scale.

Internationalisation is not a new phenomenon. Multinational business goes back to the fifteenth century. For example, the Florence-based Medici bank managed more than a dozen branches covering Europe and is cited as being the world's first global financial "superpower" (Drucker 1997b: 3). However, Castells argues that the new global economy is something different: "it is an economy with the capacity to work as a unit in real time on a planetary scale" (1996: 92). The point is that this kind of economy was simply not possible before the implementation of the new ICT infrastructure that facilitates unprecedented speed, complexity and international connectivity in the management of a global economy. In fact, instantaneous global connectivity is the basis for enabling the new economy to operate because first, on-line transactions and interconnected information systems allow for very fast movements of capital; second, the new financial products mix valuables derived from a variety of countries, and are traded in a number of countries and finally, these markets are based on speculation that attempt to anticipate price using the power of complex computer-based forecasting models and huge international databases (Castells 2000).

Castells has analysed this new global economy and provides the following examples as evidence (see for example Castells 1996, 1997, 1998a, 1998b & 2000):

- Globalisation is usually justified by tracing the international flow of capital. Today capital is shuttled back and forth between economies in a globally integrated financial market and the flow of capital is virtually instantaneous and managed around the clock (Castells 1996). Castells compares the transborder financial flow as measured by the purchases and sale of shares between residents and non-residents expressed as a percentage of the country's respective GDP. For example, the transborder financial flow of the United States was 9.3 percent of the GDP in 1980 whereas in 1992 this was 109.3 percent of the GDP. The transborder financial flows of the United Kingdom was 1016.6 percent of GDP in 1991. In 1992, most of the major market economies of the world (including Canada, France, Germany, Italy, the United Kingdom and the United States) have reported transborder financial flows close to, or in excess of, the country's respective GDP. They have also increased by about a factor of 10 over the period from 1980-1992 (see Castells 1996). A serious implication of instantaneous connectivity is that it makes it easy to bypass national economies — with a click of the mouse — that are economically valueless or territories that are devalued. This was proven during the Asian crisis of the early 1990s where capital simply flowed to more stable economies. While Asian economies where substantially devalued, at the same time there was a corresponding increase in the value of the US stock market by 31 percent and German stock by 54 percent, evidencing the capital flight during the Asian crisis (Castells 2000);

- During 1998 average daily trade in the global currency markets was US$ 1.5-trillion. This equates roughly to the size of the GDP of France, the 4th largest GDP in the world (Castells 2000);
- Labour markets are not yet truly global except for the growing segment of professionals and scientists who are becoming increasingly mobile, reflecting the dynamic of global demand for specialised skills. However, local labour markets are still effected by globalisation in the sense that firms may choose to locate components of their operations in a variety of places. Also international competitiveness of products and services will impact on local labour markets. Yet, the mobility of labour over the planet is still largely restricted by xenophobia and strict immigration controls (Castells 1996);
- Science, technology and information are organised in global flows, largely because the capacity to innovate is stored in human brains, and because innovation is dependent and spurred on by the global connectivity of new knowledge;
- Globalisation has also contributed significantly to the modern nation state losing much of its sovereignty, bypassed by the global networks of wealth, power and information (Castells 1997). There is a changing dynamic between nation and state (remembering that universities are predominantly state-funded institutions). This, combined with the growing tendency for universities to generate income streams by contract research and increasing levels of student fees may constrain ideals of wider access to tertiary education. This is a complex moral problem because the "information economy emphasises education" (Castells 1997: 54);

The second element of Castells's analysis of the new economy is that it is based on an *informational* paradigm. Castells suggests that informational capitalism will still be driven by the conventional norms of profitability and competitiveness drawing extensively on "technological innovation and productivity growth" (1996: 81). In other words, technology innovation and productivity growth are not goals in themselves, and the global economy is still predominantly capitalist.

The evolution of the new informational economy is complex, and this explains why highly aggregated statistics fail to adequately describe the "extent and pace of economic transformation under the impact of technological change" (Castells 1996: 91). Notwithstanding these difficulties, Castells (2000) refers to the growth in the US economy in 1998 pointing out that on average, 225 000 jobs where created every month with a corresponding increase in hourly wages by about 4 percent with only1.6 percent inflation. He ascribes this achievement to productivity growth. Castells (2000) also refers to Alan Greenspan's testimony before the US Congress on 23 February 1999 where it was reported that productivity growth in non-financial enterprises averaged 2.2 percent in the business cycle under review, compared with 1.5 percent in the late 1980s. Overall productivity growth for the period 1995-1998 was 2 percent, which was twice the growth rate for the corresponding period 1973-1995 (Castells 2000). Castells (2000) argues that information technology is the foundation of this new economy because:

- it enables businesses to restructure around networks;
- it has resulted in reductions of the prices of manufacturing equipment and consumer goods;
- it is creating a new generation of products and processes that previously centred around the personal computer but now focus on information sharing technologies;
- it is creating new jobs and earnings at an unprecedented pace; and
- it is leading the dynamic growth in the value of stock market trading largely because the technology allows small investors to buy and sell electronically.

According to Castells (1996), the distinctive feature of this new economy is not knowledge *per se*. In both the industrial and the new informational-global economy, knowledge has contributed to productivity growth. The informational economy is a distinctive socio-economic system when compared to the industrial economy because of "the shift toward a technological paradigm based on information technologies" and not necessarily knowledge alone (Castells 1996: 91). The technological paradigm has changed the scope and dynamics of the industrial model by creating a global economy based on a new wave of global competitiveness. Castells argues that the new informational economy is distinctive from its predecessor:

> *[T]he generalization of knowledge-based production and management to the whole realm of economic processes on a global scale required fundamental social, cultural, and institutional transformations that, if the historical record of other technological revolutions is considered, will take some time. This is why the economy is informational, not just information-based, because the cultural-institutional attributes of the whole social system must be included in the diffusion and implementation of the new technological paradigm, as the industrial economy was not merely based on the use of new sources of energy for manufacturing but on the emergence of an industrial culture, characterized by a new social and technical division of labor.* (1996:91)

Notwithstanding the compelling economic evidence of the phenomenon of globalisation, it must be acknowledged that globalisation is a complex and contested concept. Alternative theories contesting globalisation as a new social order have been presented in the literature. Hirst and Thompson (1999 & 2002), for example, present an alternative view that globalisation is not a new phenomenon and that it is unlikely that globalisation will result in national economies dissolving over time. In particular, they argue that international economic integration is widely overestimated and while digital ICTs are necessary for modern financial markets, they are not the drivers of fundamental change in the economy and society. Castells, on the other hand positions his work as a theory of change and not simply an analysis of economic indicators.

As a change theory, the concept of globalisation is "political, technological and cultural, as well as economic. Instantaneous electronic communication isn't just a way in which news or information is conveyed more quickly. Its existence alters the very texture of our lives, rich and poor alike" (Giddens 1999: 3). Therefore, globalisation should not be misinterpreted simply as a technological phenomenon. Rather, its effects have radically altered some time-space relations "to an extent which fundamentally affects the way people now view, understand and engage the world in which they live. It is far more than technology which facilitates globalisation — it transcends the economic, social, political and cultural boundaries and is inclusive of processes, structures and products" (Evans 1995:258).

Giddens describes globalisation as "the intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by the events occurring many miles away and vice versa" (Giddens 1990:64). This dialectical nature of globalisation contributes to its complexity, but also refers to the latent potential of local transformation to be part of the global processes.

Despite the dialectical potential of globalisation, it has not evolved in an equitable way. In many instances globalisation appears to be nothing more than "Westernisation" or even "Americanisation" when considering that many of the most visible "cultural expressions of globalisation are American" (Giddens 1999: 5) for example, Coca-Cola and McDonalds. It appears that developing societies do not play an active part in these processes, resulting in the widening of inequality in our society: "The collapse of space, time and borders may be creating a global village, but not everyone can be a citizen. The global, professional elite now faces low borders, but billions of others find borders as high as ever" (UNDP 1999: 31). Consider for example the following aspects highlighted in the 1999 Human Development Report (UNDP 1999), which concentrated on the question of globalisation:

- The top fifth of the world's high income people living in high income countries have 86 percent of the world's GDP, 82 percent of the world's export markets and 74 percent of world telephone lines: while the bottom fifth in the poorest countries have about 1 percent in each of these sectors;
- English is used in almost 80 percent of the world's websites, yet fewer than 10 percent of the people worldwide speak the language;
- Industrialised countries hold 97 percent of all patents worldwide;
- Only 33 countries have achieved sustained economic growth of 3 percent in gross national product (GNP) during 1980-1996, whereas 59 countries — mainly from sub-Saharan Africa and economies from the former Eastern Block — showed declines in GNP per capita over the same period.

The new rules of globalisation focus on the integration of markets, often neglecting the needs of people that those markets cannot meet, thus concentrating power in the wealthy nations at the expense of marginalizing the poor, both countries and people (UNDP 1999: 30). The negative aspects of globalisation for tertiary education in developing society contexts must necessarily also be taken into account because the demand for tertiary education is greatest in the developing countries of this world. Globalisation poses a serious double threat for these countries.

First, the low output of the tertiary sector in developing societies may exclude them even further from participating in the knowledge economy with people, unable to develop the skills required for the 21st century. President Mkapa of Tanzania stresses that universities in Africa "must produce men and women willing to fight an intellectual battle for self-confidence and self-assertion as equal players in the emerging globalized world" (cited by World Bank 2000: 2). Yet university systems in Sub-Saharan Africa are crumbling and becoming obsolete in many countries on this continent.

Second, given that the largest component of the global demand for tertiary education is found in the developing society countries, this amplifies the threat of "Westernisation" of tertiary education in developing societies. Universities based in the highly-industrialised countries of the world that are struggling with enrolment levels (or perhaps driven by profit motives) may target the sizeable demand for tertiary education in developing societies without due consideration for the cultural relevance of the curriculum concerned. It is not unreasonable, for example, to question the cultural relevance of an

American-based curriculum in social studies for a learner living in Uganda. Without expressing a value judgement on the initiative, the African Virtual University (AVU) — initiated under the auspices of the World Bank — is an example of the potential risks of "Americanisation" of tertiary education in developing societies. The AVU was originally designed as a system whereby a lecture provided by an American professor was relayed via satellite to various sites in Africa. Consequently the notion of "Westernisation" of tertiary education in developing societies is not far-fetched. It is difficult at this stage to assess whether "Westernisation" in tertiary education, as in the case of the AVU example, is necessarily a good or bad thing, particularly since the university sector on the continent is currently in a poor state and it can be argued that some education is better than none.

However, the example does illustrate the dialectical characteristics of globalisation in tertiary education. The point is that tertiary education leaders and higher education policy makers in developing societies should critically examine the strategic position they plan to take with reference to the time-space compression of globalisation. Massingue answers this challenge from an African perspective: "You cannot be part of the global village by just sitting and waiting to be 'globalized' ... We want to be the globalizers" (cited in Useem 1999:A52). The risks are huge — "[t]hose who do not have some mechanisms to monitor and understand the internationalization of knowledge are likely to be left out of important spheres of discovery, and they may find themselves less competitive in ways that have major economic and political consequences" (Green & Hayward 1997:17).

The university has begun to experience some of the effects of globalisation, yet the extent of its impact has yet to reach comparable levels to those associated with the economic transformation described above. At the same time, it must also be recognised that the university, since its inception, has always maintained transborder relationships specifically in terms of the traditions associated with international peer-review of the outputs of its thinking and the limited flow of foreign students across national boundaries.

Turning to the question of globalisation in higher education, in more recent times, individual universities have been experiencing increased international competition, particularly in the high-demand employment-related subject areas. For example, although the markets of management schools are traditionally regional (because a campus-based delivery philosophy is geographically dependent), competition is certainly global in terms of the curriculum. Referring to the Claremont Graduate School in southern California where Peter Drucker teaches, he writes that: "Increasingly our prosperity, indeed our survival, depends on enrollment from foreign countries" (1997b: 3). Also, there have been international studies focusing on what has been called "borderless education", attempting to get an intellectual grip on the phenomenon of international competition in the higher education sector because modern ICTs do not recognise national boundaries. Thus, it is technically possible for an individual university to deliver its courses anywhere around the globe (see for example Cunningham, Tapsall, Ryan, Stedman, Bagdon & Flew 1998 & 2000).

However, in the immediate future it is unlikely that globalisation in the economic sense of competitiveness will radically transform university practice as long as the global provision of tertiary education is dominated by the classical philosophy and traditions of a campus-based model. There are a number of reasons for this:

- First, education is culturally bound and effective pedagogy must take the local context into account. Most curricula do not transport well into foreign cultures and must necessarily be recontextualised, usually at considerable expense, according to local conditions to ensure relevance of the curriculum. Although digital technology will reduce the costs of recontextualisation over time, it is still a difficult barrier to overcome using conventional delivery systems;

- The global provision of university-level education is predominantly a state-funded activity. Despite changing relationships between university and state — as evidenced by growing reliance on student fees and contract research as income streams — internationally there are understandably still restrictions to protect national universities from subsidising international students with national funds;
- The international student base of most national universities will remain elitist for the foreseeable future simply because the largest component of the global demand for tertiary education is based in developing societies, which can rarely afford the student fees of international universities because of exchange rate disadvantages and the substantially lower per-capita income levels in developing societies.

The potential of digital customisation of the curriculum, particularly if this results in radical reductions in the cost of DE provision must be taken into account. This is one scenario alternatives that must be considered when building scenarios for the future. Also globalisation will impact on the curricula taught by universities with specific reference to the changes in the skills base required of prospective graduates aiming to find gainful employment in the evolving economy. Furthermore, self-directed learning — as facilitated by online methodologies — will result in greater autonomy regarding learner generated curricula, as opposed to the institution-driven curricula we have come to know with the traditional expository model of conventional universities.

In summary, globalisation is clearly a phenomenon that has, and continues to have, a significant impact on the economy, society and culture. Taking the assumption of discontinuity into account along with the evidence presented above, we can see that globalisation is a distinctive element of a new economy and social order. Although the effects of globalisation have not yet had a major impact on the provision of university-level education, it is plausible that this could have impact on the strategic priorities of the individual institutions. There are also complex tensions between industrialised and developing societies with particular regards to how globalisation might influence the provision of tertiary education in these contexts, and these tensions must be managed responsibly.

The emerging knowledge society

The emerging knowledge society "has fundamentally changed the value of knowledge and the kinds of knowledge valued" (Irvine 2001:1). The significance of globalisation for the university as institution is not so much the fact that it is technologically possible to provide instantaneous access to information and knowledge on a global scale. Rather, it refers to the underlying effects of change concerning the university's role in society. In a connected world, it is virtually impossible for universities to claim custodianship of codified knowledge, as was previously the case with its knowledge monopoly. As the university is closely involved with the knowledge venture in society, with specific reference to the generation and dissemination of knowledge — notably its functions of research and teaching — changes relating to knowledge will undoubtedly influence the future of the university.

The discussion in this section is argued from the perspective of showing how epistemological questions may fundamentally change the nature of university operations. Thus, if this situation is deemed conceivable, then this factor must be recognised as part of the scenario dynamic.

The concept of the "knowledge society" represents two faces of the same coin. The dimensions of the concept relate first, to the role of knowledge in the new economy and second, to a more fundamental condition, namely the shifting conceptions of what constitutes knowledge (see for example Gibbons 1998; Scott 1997a, 1997b, & 1997c).

A significant characteristic of the knowledge society is the pivotal role that knowledge will arguably play in the emerging global economy. The critical role of knowledge in the new economy is hypothesised widely, for example by Bell: "knowledge and information are becoming the strategic resource and transforming agent of the post-industrial society" (1980: 531). Drucker, for example, states that "the real controlling resource and the absolutely decisive 'factor of production' is now neither capital nor land nor labor. It is knowledge" (1993: 6). According to this view, knowledge is replacing the central role that the traditional economic factors of production played during the previous era of the industrialisation of society. Supporters of this interpretation of the knowledge economy have envisaged: an increased demand for "knowledge workers" who would need to exercise greater discretion and ingenuity required of rapidly changing and innovative working environments; a shift of autonomy to the individual (as opposed to the employer); and a move away from standardisation of work processes; thus heralding the advent of a post-industrial society. However, analysis of the knowledge economy thus far would suggest otherwise.

Brown and Lauder (2003) present evidence that the demand for university graduates in the economy has not increased exponentially during the period of this "new economic revolution". In fact, there is evidence that positions traditionally filled by non-university graduates are now being substituted by new university graduates. Brown & Lauder (2003) also highlight that standardisation – a hallmark of the industrial era – is central to the disciplining and devaluing of knowledge work. Paradoxically, technology is increasingly being used for the automation of decisions thus limiting the discretion and autonomy of individual workers. Brown and Lauder (2003) concede that there are some forms of work that are more susceptible to standardisation than others. They point out that work based on expert scientific knowledge, creativity, discretion and profitable networking will escape standardisation, drawing on Reich's (1991) classification of "symbolic analysts". However, within the broader economy these positions are in the minority and the knowledge economy is yet to achieve the ideals of worker autonomy associated with post-industrial work environments. Consequently, an analysis of the knowledge economy based on the notions of knowledge replacing capital as the central driving force of the economy is problematic, albeit theoretically plausible.

While the knowledge society is distinct from the industrial economy, it does not oppose its logic; rather it "subsumes it through technological deepening, embodying knowledge and information in all processes of material production and distribution on the basis of a gigantic leap forward in the reach and scope of the circulation sphere" (Castells 1996: 92). The industrial economy had to become *global* and *informational,* otherwise, it would not have survived (Castells 1996).

As a result, it would be more accurate to describe the knowledge economy as sliding over the industrial model and as we progress into the future the industrial component of the economy will steadily decrease. What will change is that the knowledge society component of the economy will become the dominant component, with pockets of the industrial model, and even agrarian models coexisting in parallel throughout the world. In other words, mass production can be organised according to the principles of industrialisation; yet, at the same time mass production can be organised and managed according to the distinct features of the new global and informational economy.

Insofar as the university is concerned, the knowledge society could represent a difficult paradox as articulated by Scott:

> *[T]he closer we approach to a 'knowledge society', the more diffuse become our notions of what counts as 'knowledge' and the more problematical, even precarious, becomes the status of traditional*

> *'knowledge' institutions, pre-eminent among which is the university. This account is in stark contrast to the triumphalist accounts that accord the university, as a begetter of the most advanced knowledge traditions, a leading role in this 'knowledge' society.* (1997b: 5)

Scott identifies five characteristics of the emerging knowledge society and advocates that they "tend to support rupture rather than continuity" (1997a: 43):

- *acceleration:* which refers to the exponential growth and rapidly changing nature of everything including for example: goods and services; data and images. Acceleration is not limited to the velocity of change but also represents the considerable volatility characteristic of the current situation;
- *time-space compression* concerning the intensification of time over space;
- *risks* which are growing in proportion to new knowledge to such an extent that they can no longer be regarded as side effects. In the present-day context, with particular reference to change interventions, risks can no longer be treated as anomalies and can be of similar magnitude to the change initiative itself;
- *complexity, non-linearity and circularity* which characterise the nature of new knowledge. Complexity, to some extent, can be controlled through the application of sophisticated models of chaos theory, utilising the computational power of digital technology to process enormous data sets. Non-linearity concerns more open accounts of social and economic change as opposed to reductionalist, rationalist and positivistic interpretations. Circularity is apparent in the social sciences where social knowledge is generated through interaction with environments;
- *reflexivity* which takes many forms, for example, where subjects and objects of research become mixed-up. Another example would be where traditional distinctions of class, gender and sexual orientation fall away and individuals have greater freedom, thus promoting the relative importance of the individual in society. Another example is that abstract systems take over from traditional structures, where both values and institutions are freed from the constraints of tradition.

In addition to the characteristics listed above, it is also necessary to consider changing modes of how knowledge is produced. These changes correspond closely with changing conceptions in knowledge itself. Gibbons, Limoges, Nowotny, Schwartzman, Scott and Trow (1994) have argued that the way in which scientific knowledge is produced has changed radically. Mode 1 and Mode 2 are terms used to describe these two distinctive conceptualisations of knowledge production (see for example, Gibbons *et al* 1994; Gibbons 1998; Mansell and Wehn 1998). Each mode is differentiated by:

- the respective epistemological foundations of what constitutes knowledge;
- the respective purposes for knowledge creation;
- the characteristic methodologies associated with the processes of knowledge production;
- organisational responsibilities of knowledge creation within broader society; and
- the way in which knowledge is evaluated.

The characteristics of the two modes of knowledge production are briefly introduced in the following paragraphs.

Mode 1 refers to the discipline-based practice of scientific research and is "built around propositional knowledge" (Barnett 1997a: 170). Gibbons points out that, although individual research activities in the university can be traced back to the 19th century or earlier, it was only after the second World War that "research — particularly basic research — was taken up by universities and became one of their core values" (1998: 3). This signified the addition of a new activity of generating new knowledge to the traditional university functions of preserving and transmitting knowledge. Under Mode 1 knowledge production, universities have prescribed the "scientific" processes and methods for discovering knowledge and as such also set out the criteria for what constitutes knowledge, itself. The disciplinary structure of Mode 1 knowledge production is specialist. The disciplinary structure of scientific research has played a significant role in how universities are managed; how they have organised themselves, as well as how they determine the framework for the undergraduate curriculum (Gibbons 1998: 4).

Whereas Mode 1 problems are set and solved in the context of specialist academic areas of interest, Mode 2 knowledge production is transdisciplinary and produced in the context of application. Today, society in general "dismisses contemplative knowledge, knowledge which brings understanding" (Barnett 1997c: 29). Society wants knowledge which will have immediate demonstrable effects on the world. While Mode 1 is characterised by homogeneity of skills, Mode 2 is recognised by its heterogeneity of skills. Organisational structures of Mode 2 knowledge producers tend to be organic and have considerably flatter hierarchies. Under Mode 2 knowledge production, the responsibilities of knowledge production are distributed among a variety of knowledge producers in society. In Mode 2 levels of social accountability are notably higher than in Mode 1 forms, and Mode 2 forms have a far wider spectrum of participants in quality assurance processes. The following table provides a summary of the most significant changes associated with the emerging knowledge society by comparing it to the industrial era.

There have been some highly imaginative prognoses of change. For example, Griffin contends that the crisis we face in higher education today is that "knowledge, as we have known it in the academy, is coming to an end" (1997: 3). More soberly, we could argue that the problem with knowledge for the modern university is "*not* that knowledge has come to an end" (Barnett 2000: 35). Rather the problem is that there are many "knowledges" and that universities have lost their monopoly over the production of some kinds of knowledge and have lost their monopoly over determining what constitutes knowledge (Barnett 2000: 35). The transformational imperative of the shift from Mode 1 to Mode 2 means that contemporary science cannot remain within the confines of the university and this "is prompting the emergence of a host of new institutional arrangements" with regards to knowledge production (Gibbons 1998: 13).

The industrialisation and massification of tertiary education has indirectly enabled the shift to a distributed knowledge production system. This has resulted in large numbers of graduates who have been trained in the skills of knowledge generation, thus significantly increasing the capacity for knowledge production outside the confines of the university. It is interesting to note that the university itself, in many respects, is responsible for eroding its own power-base concerning its previous monopoly over knowledge creation. Gibbons reflects on this dilemma and suggests that:

> *The implication, not yet fully grasped, is that to the extent that universities continue to produce quality graduates, they are progressively undermining their monopoly as knowledge producers. ... Universities are coming to recognise that they are now only one player, albeit still a major one, in a vastly expanded knowledge production process.* (1998: 31)

This is a good example of the complexity of the relationship between society and the university. On the one hand, the university is a construct of society and has responded to the industrialisation of society through massification of a previously elitist system. On the other hand, notwithstanding the university's historical autonomy and independence regarding knowledge creation, through its research and teaching it has significantly increased society's capacity to generate new knowledge independently from the university — a condition that will require the university to respond accordingly in the near future thus directing the institution on a new evolutionary tangent because of the interplay between the society-university dynamic. For example, the requirements of the new economy for transdisciplinary knowledge workers is difficult to meet when using the discipline-based hierarchical structure of a classical university. Therefore it is conceivable to expect changes in the organisational structures of the university as well as changes in the curricula, in response to the human resource needs of the evolving economy.

Table 1.2 Summary of the changing dynamic of knowledge

Industrial era	Knowledge society era
Role and nature of knowledge	
• Industrial workers have specialised skills in support of the division of labour typical of industrial processes.	• Knowledge workers have a holistic knowledge base, focusing on ability to adapt to a range of different areas when necessary.
• Knowledge is relatively static.	• Knowledge is dynamic.
• It is characterised by a discipline-based knowledge structure.	• It is characterised by an interdisciplinary and transdisciplinary knowledge processes.
Knowledge production and utilisation	
• Knowledge production is governed by the "scientific" method associated with enlightenment traditions. Scientific criteria are used to determine what constitutes knowledge.	• Knowledge production is guided by the context of application, as opposed to knowledge for knowledge's sake.
• Universities are the primary institutions responsible for knowledge production.	• Distributed knowledge production systems involve a wide range of non-university institutions where the majority of new knowledge is generated from outside the university.
• The task of the university is knowledge production and the dissemination of this knowledge through teaching and "scientific" publication of findings. Universities tend to work alone (ivory tower institutions).	• The role of the university will shift to knowledge reconfiguration and facilitating learning for knowledge workers. The university becomes an integral component of society through networks of dynamic partnerships.
• The emphasis is on preservice education.	• There is an emphasis on lifelong learning.
• Higher education is for the elite.	• Higher education is for all.
• Expository teaching and receptive learning characterise university pedagogy.	• Autonomous self-directed learning characterises university pedagogy.

In summary, the changes associated with the knowledge society could constitute a "crisis of legitimacy for the university, related specifically to its role in creating, managing and disseminating knowledge, and that it may only survive as an institution if it comes to terms with a new, or perhaps revived, role within a much larger and more diffuse learning community" (McNair 1997: 27). There are three critical issues concerning the knowledge society that will impact on the future of the university:

- First, universities will need to adapt their traditional epistemologies, systems and processes regarding the generation of knowledge to be able to function more effectively within a distributed system of knowledge production;
- Second, universities will need to become more adept concerning the skills required for the reconfiguration of knowledge. This is particularly true with regards to its teaching function because today the majority of knowledge is produced outside the confines of the university. Also, in the knowledge-based economy, knowledge itself could potentially become a commodity that is bought and sold;
- Third, the shift towards autonomous self-directed learning, combined with the dynamic demands of life-long learning for knowledge workers, will have a significant impact on the university curriculum and credentialisation of third party knowledge.

In the past universities have been able to sustain change over time; however, the nature of change resulting from the influences of the knowledge society may require a deepened understanding on those planning techniques associated with knowledge innovation and conceptual modelling.

1.3.2 Massification of higher education

The massification of higher education refers to the exponential growth in the provision of higher education, particularly during the post war period. Furthermore, the massification of higher education also represents an apparent philosophical shift away from elitist provision. The massification of higher education has also influenced the way universities are managed and organised, as represented by the increasing managerialism and bureaucratisation of university systems.

From a more critical perspective — despite the achievements of widening access to higher education — the majority of adults in the world are still excluded from gaining access to a tertiary education. The problem is complicated further by the ever-increasing knowledge demands from the workplace, for example, the requirements for higher prerequisite entry qualifications in positions that previously did not require a tertiary-level qualification. This section examines the achievements of tertiary education with particular reference to the widening of access, but also considers the tensions regarding further massification of higher education as a fundamental driving force that will continue to transform the university sector.

According to Trow's (1973) taxonomy, a gross enrolment ratio over 15 percent for the traditional age group represents the threshold between elitist and mass participation in higher education. Most of the industrialised economies of the world have exceeded this threshold; however, for most of the developing world the gross enrolment ratio for tertiary education is still below 15 percent. For example, the gross enrolment ratio for Sub-Saharan Africa in 1995 was below 3 percent (see for example Saint 1999). As with many indicators, arbitrary classifications do not necessarily paint a comprehensive picture. For example, in today's world given the knowledge requirements of the evolving economy, is a gross enrolment ratio of 15 percent adequate to sustain economic growth and prosperity? Alternatively, is it fair to say that tertiary education is no longer elite once the 15 percent cut-off has been reached when considering that the majority of the remaining age group (75 percent) is still excluded? Notwithstanding these probing questions, tertiary education has certainly recorded considerable achievements in widening access.

Exponential growth in the provision of tertiary-level education is most evident during the post war period; yet, the start of this trend can be traced to earlier beginnings. Phenomenal and unprecedented growth was experienced in higher education in England during the late nineteenth and early twentieth centuries (Lowe 1983: 37). This was also replicated for example, in Germany, Russia and the United States where enrolments grew from between 17 and 66 times during the period from 1860 and 1930 (Jarausch 1983: 15).

The exponential expansion of higher education provision really began after the Second World War, and despite phenomenal growth in levels of provision over a relatively short period, significant expansion in tertiary enrolment is still required. In 1995, only a few countries have reported tertiary enrolment ratios that exceed 50 percent, including for example, Australia, Canada, Denmark, New Zealand, Norway, United States, and countries in Central and Western Europe (World Bank 2000: 1). On the other end of the spectrum, the majority of countries on the African continent, Afghanistan, Pakistan, Nepal, Cambodia, Vietnam and Papua New Guinea have all, for example, reported tertiary enrolment ratios below 5 percent. It is also questionable whether tertiary enrolment ratios under the 50 percent level are sufficient to sustain and grow global knowledge economies in a responsible and equitable way.

The shift from "elite" to "crowded" higher education poses a number of difficult challenges regarding how to maintain standards while teaching a more diverse student group. Also, there are increased demands for accountability regarding the effectiveness and relevance of its research and increasing expectations vis-à-vis the quality of its teaching combined with the dilemma of attenuating resources. Robertson acknowledges that the challenges of massification are substantial:

> *Universities are being tested by unusual and formidable forces. As modern economies restructure and reposition themselves in a competitive, post-imperial and global market place, governments require that higher education provides democratic access to high-quality credentials for greater numbers of students, unmatched by commensurate resources, while at the same time demonstrating that they are contributing to national economic effectiveness through the production of relevant new knowledge and highly qualified output.*
> (1997: 88)

Despite the apparent successes and perceived good of expanding access to tertiary education, critical theorists will be quick to point out that the massification of higher education through increased access does not necessarily support and promote the ideals associated with the emancipation of the masses. Some will argue that society and the economy have adapted in ways that entrench elitist ideology in the sense that "making educational opportunities more accessible to those it has excluded does not ultimately make the system fair" (Herman & Mandell 1999:19), for example:

- Many jobs, which previously never required degrees, now specify this as an entry requirement and those that required degrees in the past now require more advanced degrees (Herman & Mandell 1999: 21);
- Drawing on the social critique of Jürgen Habermas (1989) — in particular his examination of the tensions between the rational pragmatism of the "system" and the normative ideals of the "lifeworld" — it is evident that the curricula and systems of higher education have acceded to and are particularly responsive to the demands of the contemporary market. This often occurs at the expense of the liberal arts curriculum aimed at developing the skills of critical skepticism as a social voice in the continuing development of society. Instrumental learning carries more perceived value, based on societal demand for professional training

than the demand for normative "lifeworld" ideals associated with what is good, authentic and beautiful;

- The nation with the highest proportion of graduates cannot necessarily claim to have the population with the greatest tolerance, understanding or appreciation for that which extends beyond superficial appearances. This is especially so when considering the contemporary social problems of intolerance, violence, drug abuse, fraud, environmental degradation, political inequality and other fundamental problems associated with the ethics of humanity in many highly developed societies (Shore 1992: 234).

This critical perspective is not forwarded as a rebuttal against the urgency for expanding access to higher education, but is rather an indication of the tensions in tertiary education with regard to the evolution of future societies. The societal relevance of tertiary education in the future will necessarily have to take cognisance of these responsibilities regarding the empowerment of a critical social conscience otherwise it will paradoxically exclude meaningful participation in society of those it is purporting to help through extended access and massification of the higher education system.

Daniel stresses that for much of the world "higher education is in crisis" (1999a: 1). Without even attempting to increase participation rates in higher education, Daniel (1999a) points out that it will be necessary to create a sizable new university every week simply to sustain current participation rates when taking population growth into account. For example, based on demographic projections of the traditional age cohort, Saint (1999:2) points out that at least 16 countries in Sub-Saharan Africa will need to *double* the number of enrolments in their respective systems in the coming decade simply to maintain the existing (and unacceptably low) participation ratio because of population growth in the numbers coming through the school systems. Furthermore, Saint (1999) predicts that these counties will need to *triple* their current tertiary enrollments by the year 2010 if they intend to increase their tertiary gross enrolment ratio by even a few percentage points. He also reminds us that the HIV/AIDS pandemic in Africa will require many African countries to produce significantly higher numbers of university graduates to maintain current levels of human resource capacity, let alone to maintain the requirements for growing knowledge economies.

The massification of higher education as a transformational force is not limited to the economic and social issues of demand versus supply for tertiary education. Of particular significance for this study is the question of how the management and organisation of the university has evolved as a result of the shifts from elitist to mass provision.

Corresponding to the unparalleled widening of access, unprecedented bureaucratisation of educational systems at all levels followed, mirroring the dominant form of societal organisation associated with industrial economies. However, at the same time, this bureaucratisation has enabled the massification of education systems by providing access to the working-class, particularly at the higher education level. The critical question now is whether an academic bureaucracy is still an appropriate form of organisational design for the university to tackle the challenges of the evolving knowledge society?

The managerial revolution in higher education through partial repudiation of collegiality and tighter management control has resulted in the university moving much closer to an industrial pattern of organisation (Gibbons 1998). Paradoxically, "[j]ust as universities have moved closer to a corporate model of management, so private corporations have become more collegial" (Gibbons 1998: 19). In other words, just as the university has become a more powerful centralised organisation, knowledge as the core article of its trade has become more diffuse under Mode 2, and will become more decentralised in its production through sophisticated networks. Arguably, the dissipation of traditional disciplines because of the transdisciplinarity of present-day knowledge production is indirectly contributing to the centralisation of university management as discipline-based structures "have become less able to provide a firm framework" (Gibbons 1998: 19). The combined interplay between the massification of higher education and shifting practices regarding decentralised knowledge production will necessitate careful investigation into the most appropriate structures for managing and leading university futures.

In summary, the massification of university education is a powerful transformational force. First, global demand outstrips supply to such an extent that the conventional campus-based model of delivery will not be capable of adequately tackling the "greatest moral challenge of our age" (Daniel 2001a: 10). Thus, insightful innovation will be required to ensure that everyone can exercise the fundamental right to a decent education. Clearly alternative ways of providing tertiary education must be found, if the world is serious about realising the ideals of "Education for All". Second, as the industrialisation of society combined with the massification of higher education has forced the university to move closer to an industrial model of organisation, the distinctive new information age will also likely result in new forms of organisational design in the university.

1.3.3 Pervasive advances and convergence associated with digital ICTs

This section will report on the velocity of technological change but also the cost reductions that have occurred over the last quarter of a decade with regards to digital communication technologies. No technological discovery in history has demonstrated comparable degrees of growth in both communicative power and corresponding reductions in cost. At the same time these impressive developments also potentially widen and complicate the divide between advanced economies and developing societies. It is also necessary to distinguish between digital ICTs and the communication technologies that preceded them, because this is a distinctive enabling feature that has phenomenal transformational potential. However, the attribute that undoubtedly has the most potential for radical change in higher education concerns the convergence of technology between computing, telecommunications and recent developments in the cognitive sciences (see for example: Maltha, Gerrissen & Veen 1999).

Digital ICTs are the enabling infrastructure of the new global knowledge-based economy and this is why Castells (1996) has argued that the new information age is based on a technological paradigm, and because of this, it is distinctive from the industrial era that preceded it. Braga (1998) for example, also supports the view that ICTs are at the very core of the globalisation process. In view of this, it is necessary to consider the potential impact of digital ICTs on the practice of higher education.

As knowledge-driven organisations, it is not surprising that the university is likely to be influenced by the rapid advances in digital ICTs. These technologies have already "had a dramatic impact on campus research activities, including the creation of an entirely new form of research: computer simulation of complex phenomena" (Duderstadt 1999: 5). The administrative processes of the modern university also rely heavily on information technology. However, the impact of digital technologies concerning the functions of teaching and learning is less understood — yet this is the domain that is likely to change quite dramatically.

Part of the problem is that most people in and out of higher education assume that the traditional models of acquiring knowledge by delivery of the expository lecture and certification by test will still apply (Taylor & Eustis 1999). Realistically though, it is more likely "that new teaching and learning models, new modes of discourse, and asynchronous interaction will form the basis of course or program transformations" (Taylor & Eustis 1999: 69). Interestingly, large-scale asynchronous teaching systems — where the teaching-learning transaction is technologically mediated — are not a new phenomenon. The mega-universities have gained valuable experience in these pedagogical modes and consequently provide a constructive foundation for developing foresight into emerging technology-mediated teaching models.

Despite the dominance of traditional modes of face-to-face delivery, the impact of digital ICTs on the university is likely to be quite dramatic. For example, Farrington is of the opinion that "the most important consequence of the new digital media for higher education is that they make major innovations in education possible" (1999: 93). Duderstadt, contends that: "the most profound question of all involves the survival of the university, at least as we know it" (1999: 22). He foresees a positive future for the university, albeit a different one:

> *Those institutions that can step up to this process of change will thrive. Those that bury their heads in the sand, that rigidly defend the status quo — even worse — some idyllic vision of a past that never existed, are at very great risk ... The real question is not whether higher education will be transformed but rather how and by whom.* (Duderstadt 1999: 1)

The pace of change regarding technology is generally well known; accordingly the discussion of this point will be limited to a few telling examples. "Moore's Law" is often cited as an example of the velocity of technological change in the computing world. The law is named after Gordon Moore — one of the founders of Intel, the microchip giant — who said that the computing power of a chip would double every eighteen months and this prediction has held up for the last decade and "looks like it will continue to do so for the next" (Brown & Duguid 2000: 14). The Internet is reported to be the fastest growing communication tool in the history of technology. In 1999 there were 150 million users and was estimated to grow to more than 700 million in 2001 — representing a growth of 367 percent over a two-year period (UNDP 1999). Furthermore it is astounding to compare the reach of different media technologies with each wave of innovation. It took 40 years for the radio to gain an audience of 50 million users in the United States, while it took only 15 years for personal computers to reach the same number of users. In the case of the Internet, a mere 4 years was required before 50 million American users regularly used the network (Giddens 1999: 7).

The rapid pace of technological development is extraordinary yet at the same time is disconcerting because it is mainly concentrated in the highly developed economies of the world: "Global inequalities in income and living standards have reached grotesque proportions" (UNDP 1999: 104) thus amplifying the proverbial digital-divide. The digital divide refers to the widening of the gap between those who have access to digital ICTs and those who don't. The divide is usually defined between the disparities of access to technology between:

- industrialised and developing societies; and
- urban and rural communities.

The widening "north-south" divide can also be measured in respect to many different aspects: "the infant mortality rate, population growth, nutrition, per-capita income, degree of industrialization, and debt service ratio. But most of all it can be measured by the educational and technological gap between north and south" (Chung 1990: 61). The divide appears to be insurmountable given the magnitude of the problem, and developing societies seem destined to follow a disheartening "catch-up" strategy dictated by the industrialised world. Despite these problems, there is high-level commitment from developing society leaders to curb the potential devastation of the digital divide. For example, in his opening speech of the Biennial Meeting of the Association for the Development of Education in Africa, President Thabo Mbeki of South Africa voices Africa's commitment to the significant role of ICTs in Africa:

> *We **must** use, we **must** encourage the use of information technology in education, so as to link far-flung places and institutions of learning, to bridge the gap between urban and rural areas, to enable African children to advance scientifically so as to compete on an **equal footing** with the rest of the world.* (Mbeki cited in ADEA 2000: 3) [my emphasis]

Despite the depressing picture of the potential ramifications of the digital divide for developing societies — particularly when considering the sheer magnitude of the demand for higher education in these contexts — paradoxically the lack of technological infrastructure is in fact beneficial. Many developing countries now have the opportunity to "leapfrog" a generation of communications technology, without having to defend the extended life of expensive investments in legacy technology (see for example, Knight 1996). For example, there is considerable potential for leapfrogging the legacy technology of copper-based land lines as evidenced in South Africa, where the number of cell phone subscribers has exceeded the number of fixed-line subscribers (Nash 2000: 11). This is largely due to the fact that in remote areas, there is simply no fixed-line network infrastructure and the national telecommunication provider is unable to roll-out fixed-line infrastructure at a pace commensurate with the demand for telephony.

At this point it is necessary to define the concept of "Information and Communications Technology" (ICT). ICT refers to "a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information" (Blurton 1999: 46). It is also essential to distinguish digital ICTs from previous communication technologies. Digital ICTs are different because they are:

- capable of integrating multiple media into single applications, for example, voice, video and text can be presented simultaneously on the same web-page;
- interactive in the sense that digital technology can control and manage the sequence of communication, depending on user or other input thus incorporating features of "intelligent" communication;
- more open because digital formats can be interpreted by a variety of hardware platforms for example, a digital audio clip can be heard over the Internet, but can also be broadcast over analogue or digital radio systems with relative ease (see Blurton 1999: 47).

The transformational potential of the new technologies becomes evident when the distinctive characteristics of digital ICTs are interpreted in conjunction with the phenomenal reductions in cost and exponential growth in computing power. Bond (1997) analyses three powerful trends that are driving the information revolution:

- *Cost of communicating:* The transmission cost of sending digital data has decreased by a factor of 10 000 since 1975. This is largely due to the following factors:
  - developments in fibre optics, enabling considerable bandwidth at lower cost;
  - cheap electronics where powerful microprocessor-based computing has altered the economics of telephone network infrastructures by replacing electromechanical switching with smart wireless technology as witnessed by the phenomenal growth in global cellular telephony; and
  - the fact that fixed-wireless technologies are increasingly being implemented for local network access.
- *Power of computing:* Computing power per dollar invested has also increased by a factor of 10 000 since 1975. This is largely due to developments regarding integrated circuits, the increase of transistor density on microchips and significant gains in the economies-of-scale in the production of these components.

- *Convergence:* Digital technologies are replacing analog technologies. Digital technology is capable of dealing with voice, video and computer data using a single binary coding system. Therefore, digital ICT infrastructure can carry voice, video and data over the same network; whereas, in the era before convergence, independent carrier technologies were necessary for different media.

The significance of digital ICTs for education is that they promise "to change the ways in which we can impart skills and knowledge" (Dhanarajan 2000: 13) more than any previous technology. The emergence of the Internet protocols as the de-facto standard for network systems and digital equipment during 1997 and 1998 has lead to the integration and convergence of computing, broadcasting, telecommunications and consumer electronics (Seshagiri 1999). In other words, the communication of digital information over a wide variety of storage, carrier and delivery technologies is now possible. In the past, technologies were carrier and device technology dependant. For example, analogue telephone communications communicated via copper wire and received by a dedicated handset could not easily be substituted by another communication device or carrier technology. However, with the advent of Internet protocols, it is relatively easy to migrate across different communication devices such as digital telephone handset or multi-media computer using voice over Internet protocol technologies. Furthermore, where in the past analogue telephone handsets typically could only process voice, today's digital handsets can manage and display data as well. Today there are also a variety of carrier technology alternatives that can be considered, and if data is stored digitally, communication is no longer dependent on the carrier technology.

Convergence opens up huge opportunities for developing countries to accelerate the rollout of connectivity (Bond 1997). Hence different modes of communication, for example, voice and data, can be carried over the same infrastructure, eliminating the duplication of network infrastructure. The convergence of technology also means that audio, static images, dynamic images, video and text can be combined on a single delivery medium such as the Internet. This has the potential to radically transform existing pedagogical models.

The convergence of technology in recent years and the power of digital technology now makes it possible to communicate with any place around the globe using voice, text, images and video on a single medium. This means that multi-mode, multi-media learning resources and their corresponding pedagogical superiority can easily be distributed to remote locations. Fontaine (2000: 14) argues that digital ICTs may be able to deliver a higher quality of teaching and support, and she goes on to say that the "improvement may be even more pronounced in poor, isolated schools in developing countries, where infrastructure challenges might suggest otherwise" — again accentuating the possibilities of leapfrogging.

Of great significance is the fact that high quality distance learning materials can be delivered to students even in remote rural areas. There are a range of long-haul carrier technologies that can be used to provide significantly higher bandwidth and connectivity to these remote regions, especially when using asynchronous delivery models.

Certainly, it is unlikely that remote end-users will all be connected to fibre-optic cables, but 'last-mile' delivery from distributed technology hubs could use radio links for data communication or more humble off-line solutions like CD-ROM, DVD or legacy technologies including tape and print from a distributed network of technology hubs (Nash 2000). Imagine the impact that can be derived from broad bandwidth connectivity in developing societies if the money spent on new copper wire installations was rather invested in fibre-optic technology. Surprisingly, fibre-optic cables are also cheaper to maintain than copper wire although installation costs are marginally higher.

While satellite technology is still expensive, with innovative planning and significant scale, this technology can be effectively utilised in the developing society context. For example, satellite technology could be used for broadcasting digital data, particularly in times of low demand for satellite bandwidth, such as late at night. Digital multi-mode, multimedia materials could be downloaded to a vast network of technology hubs and from that point, off-line technologies could be used for the "last-mile". It is also possible that the cost of communication using new low-orbiting satellites will be more affordable.

Many conventional educational institutions often underestimate the potential of the new ICTs because they are merely using them to distribute traditional classroom teaching to remote sites. Consequently, modern technologies are often used to entrench artisan-based traditions of professing knowledge, rather than capitalising on the huge pedagogical potential of ICTs for asynchronous delivery. When compressed video was introduced to education there was "little deviation from the instructor-led model of classroom learning" (Fontaine 2000: 14). The only difference was that learners could now listen to their instructor from a different place. The problem with this "more-of-the-same" strategy — despite the fact that digital ICTs enable us to transcend geographical distances — is that it does not recognise the huge transformational potential regarding pedagogy that is now possible because of the convergence among telecommunications, computing and new developments in the cognitive sciences associated with digital ICTs.

In less technical terms, the convergence of technology is summarised by a concept which Eisenstadt (1995a) calls the "knowledge media". It refers to the convergence of computing and telecommunications but is a valuable concept because it also includes the convergence of recent developments in the cognitive sciences. The knowledge media is closely related to technical advances. More importantly, however, the pedagogical potential of capturing, storing, imparting, sharing, accessing, creating, combining, transforming and synthesising knowledge in ways that simply were not possible before are often overlooked (see for example Duderstadt 1999; Daniel 1999e).

The concept of the knowledge media refers to something that is qualitatively different from what has gone before. The knowledge media represents a powerful transformational force in higher education because of its inherent qualities to change the relationship between people and knowledge in a qualitative way. The knowledge media have the potential to radically improve "our ability to transmit and manipulate symbols — which is at the heart of the academic endeavour" (Daniel 1999e 13). This is why Daniel concludes that: "the knowledge media are such a quantitative advance, such a quantum leap, that they represent a qualitative change... Complacency is not in order. This is going to change universities" (1999e: 13).

Numerous authors allude to the potential for fundamental change in the provision of higher education, resulting from the adoption of DE technologies on campus (for example: Bates 1997b; Christensen, Aaron & Clark 2003; Katz 2002; Katz & Oblinger 1999; Laurillard 2002; Oblinger & Kidwell 2000; & Peters 2002). Evans & Nation (2003: 777) refer to the reinvention of DE itself as a result of technology-enabled change.

Therefore, in conclusion, the new digital ICTs certainly have the potential to transform the provision of higher education. The magnitude of this transformation is made possible by the convergence associated with digital ICTs but also by the reductions in cost and corresponding increases in computing power. There are both opportunities and threats concerning questions about the digital divide for developing societies regarding the pervasive advances in digital ICTs. Therefore it is imperative that leaders and policy-makers develop foresight into DE futures.

1.3.4 The phenomenon of mass open distance learning provision

The purpose of this section is to highlight the most important dimensions of the experience and success of the mega-universities within the context of the problem formulation of the study. The significance of the mega-universities is that they have acquired considerable experience in the provision of university-level distance education (DE) — that is, technology-mediated teaching systems. No other institutional form has obtained comparable levels of dedicated DE experience pertaining to the specific organisational, pedagogical and process requirements associated with university-level open distance learning (ODL). Furthermore, apart from their DE experience, they also have first-hand knowledge of operating at significant scale. Hence, the experience of the mega-universities, which has matured over the last 60 years, is an important source of tacit and codified knowledge that can be utilised in the generation of scenarios on the future of distance learning at campus-based institutions.

In this study, the large-scale, DE providers are not presented as an alternative model for the future of DE technology at campus-based institutions. The way technology influences DE delivery at these institutions is likely to evolve on a different path when compared to campus-based institutions. However, the pedagogy and cost models associated with the design, development and delivery of DE learning materials differs from that of face-to-face teaching. Consequently the experience of the large-scale DE institutions will provide valuable insights into the systems, processes and costs associated with asynchronous teaching at face-to-face institutions..

In this section, the concept "mega-university" will be revisited and the mega-universities of the world will be introduced. The four foundational factors underpinning the success of the mega-universities will also be summarised in this section.

According to Daniel, "many judge that the Open University was the most important innovation in higher education of the 20th century" (2000c: 1). The British Open University — one of the mega-universities of the world — was an important innovation because it was designed from its inception as an open learning system. It has successfully combined the challenges of access and quality using an approach that can be scaled up in way that significantly reduces the cost of provision without compromising the quality or core values of the university. When taking the global crisis in tertiary education into account, the large open learning systems associated with the mega-universities are an important model for university provision in the future.

"Mega-university" is a concept coined by Daniel to refer to the large open universities found in different parts of the world that have more than 100 000 enrolments (see ICDE 1995 and Daniel 1999a). In 1999 there were 11 mega-universities in the world collectively enrolling about 3 million students among them, and they are listed in Table 1.3. By 2006, the number of mega-universities had increased to 16 representing a 45% increase in the number since 1999 (see Table 1.4). Collectively the mega-universities now cater for about 8 million students, showing an increase of 192% for the period of review (approximately an annual increase in excess of 25% per annum).

As indicated earlier in this chapter, the concept "mega-university" as it is used in this thesis should not be confused with the emerging alliances and partnerships among campus-based institutions that have resulted in collective student numbers exceeding the arbitrary 100 000 enrolment threshold. Rather, the concept "mega-university" is used in the context of Daniel's use of the term referring to the large providers that teach using distance methods. In other words, the DE delivery modality is the main reason for singling out these institutions in the problem formulation of this study, yet their respective size is also an important feature with regards to operating at scale.

One of the problems associated with trend analysis in distance education is that global statistics tracked by agencies like UNESCO do not differentiate between face-to-face and DE forms of provision. Consequently there are no reliable databases for analysing international trends associated with DE delivery around the world. The published data on the mega-universities, does nonetheless provide some indication of the expansion of distance forms of teaching in the world in addition to the various studies cited in the thesis.

Table 1.3 Mega-universities of the world (1999 publication)

Name of institution	Country	Enrolment	Budget $US million	Unit cost[6]	DE Founding date
Anadolu University	Turkey	577 804[2]	30[5]	10	1982
Centre National d'Enseignement à Distance	France	184 614[1]	56	50	1939[7]
China TV University System	China	530 000[1]	1.2[4]	40	1979
Indira Gandi National Open University	India	242 000[2]	10	35	1985
Korea National Open University	Korea	210 578[2]	79	5	1982[8]
Open University	UK	157 450[2]	300	50	1969
Payame Noor University	Iran	117 000[3]	13.3	25	1987
Sukhothai Thammathirat Open University	Thailand	216 800[2]	46	30	1978
Universidad Nacional de Educación a Distancia	Spain	110 000[2]	129	40	1972
University of South Africa	South Africa	130 000[2]	128	50	1946[9]
Universitas Terbuka	Indonesia	353 000[2]	21	15	1984

(Source: Daniel 1999a: 30&31)

Notes:

1. 1994 figure
2. 1995 figure
3. 1996 figure
4. Central (CCRTVU) unit only
5. Open education faculty only
6. Unit cost per student as a percentage of the average for other universities in the country (approximate).
7. CNED is not a university in the traditional sense and teaches programmes ranging from primary school to postgraduate courses. Furthermore, many CNED students take correspondence courses in preparation for examinations set by other bodies.
8. As the Korea Air and Correspondence University
9. Founded as the University of the Cape of Good Hope in 1873, but transformed to a single-mode DE university in 1946

When analysing the growth in the number of mega-universities over time, exponential growth followed the inception of the British Open University in 1969 with 12 of the 16 mega-universities founded after this date — and 7 of them during the 1980s (see Table 1.4).

Table 1.4 Mega-universities of the world (2006 update)

Institution	Country	Enrolment	Number of Full-time Academic Staff	Number of Part-time Academic Staff	DE Founding date
Allama Iqbal Open University[1]	Pakistan	456,126	145	23,000 (tutors)	1974[9]
Anadolu University[1]	Turkey	884,081	1,729	653 (tutors) 300 (lecturers)	1982
Centre National d'Enseignement a Distance[2]	France	350,000	n/a	n/a	1939[10]
China Central Radio and TV University[1]	China	2,300,000	52,600	31,500 (tutors)	1979
Dr. B.R. Ambedkar Open University[7]	India	450,000	n/a	n/a	1982
Indira Gandhi National Open University[1]	India	1,013,631	339	35	1985
Korea National Open University[1]	Korea	196,402	271	108 (tutors)	1982[11]
Open University[1]	UK	203,744	1,169	7,995 (Associate lecturers)	1969
Payame Noor University[3]	Iran	467,000	n/a	n/a	1987
Shanghi TV University[1]	China	101,218	n/a	n/a	1960[12]
Sukhothai Thammathirat Open University[1]	Thailand	181,372	375	n/a	1978
Universidad Nacional de Educación a Distancia[4]	Spain	110,000	n/a	n/a	1972
University of Phoenix Online[6]	USA	143,846	n/a	n/a	1976
University of South Africa[5]	South Africa	250,000	1305	17	1946[13]
Universitas Terbuka[1]	Indonesia	222,068	762	3,600 (tutors)	1984
Yashwantrao Chavan Maharashtra Open University[8]	India	932,500	n/a	n/a	1989

(Source: Daniel, Mackintosh & Diehl: In press)

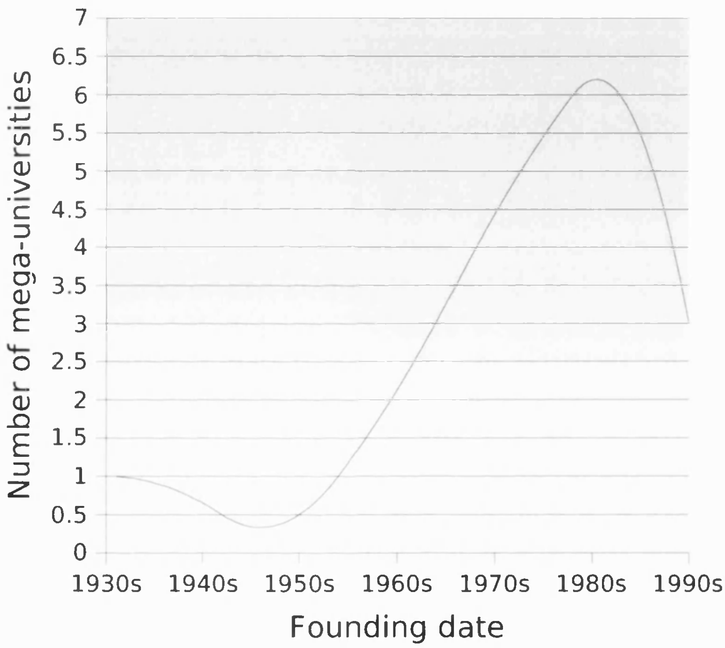
Notes

1. (Jung, 2005)
2. (Centre National d'Enseignement a Distance, 2006)
3. (Payame Noor University, 2006)
4. (Daniel, 1999, p. 30 & 31)
5. (University of South Africa—UNISA, 2006)
6. (Bacsich, P., 2005)
7. (Dr. B. R. Ambedkar Open University, 2006)
8. (Yashwantrao Chavan Maharashtra Open University, 2006)
9. Originally a Language Institute before becoming a university
10. CNED is not a university in the traditional sense and teaches programmes ranging from primary school to postgraduate courses.
11. As the Korea Air and Correspondence University
12. Closed down during the "Cultural Revolution" and resumed in 1979
13. Founded as the University of the Cape of Good Hope in 1873, but transformed to a single-mode DE university in 1946

With reference to Table 1.4 above, 4 of the recent additions to the mega-university list are located in the developing world, and one new addition based in the United States. The University of Phoenix Online represents the first for-profit university on the mega-university list. It is also interesting to note the relatively large proportions of part-time academic staff that are utilised at these DE institutions alluding to the the division of labour as a characteristic of this delivery modality.

It is illustrative to plot the founding dates of the mega-universities over time (see Figure 1.6). When looking at Figure 1.6 there are noteworthy similarities concerning the structure and form of this graphic and Handy's (1994) sigmoid curve. Figure 1.6 suggests that the mega-university growth-curve is nearing its inflection point. This trend suggests that the particular model of DE delivery associated with the mega-universities may not be the model for the future and that the influence of disruptive technologies may necessitate the innovation of a new sigmoid curve. Consequently, this situation is one of the possible scenarios that must be examined for the future – namely that new mega-universities will not be instituted at the same rate as that observed during the 1980s, notwithstanding the potential of evolving ICTs to enhance and support the mega-university delivery model.

Figure 1.6 Growth rate in number of new mega-universities



With reference to Figure 1.6, the number of new mega-universities founded during the 1990s is an illustrative estimate and is more than likely overstated, assuming that there will be institutions which were founded in the 1990s that will attain mega-university status some time in the future. In 1995, when the first study reporting on the mega-universities was published (ICDE 1995), there were 10 mega-universities identified. The revised edition of Daniel's (1999a) seminal text dealing with the mega-universities and the knowledge media (first published in 1996), identified 11 mega-universities, and today there are 16 mega-universities. Certainly there will be a number of existing institutions that may have exceeded the 100 000 enrolment threshold since this publication, but the global trend of starting *new* mega-universities certainly reached its peak during the 1980s.

Indeed there are a number of rebuttals that can be forwarded to set aside the argument that the mega-universities have already reached the peak of the sigmoid curve. For instance, the 100 000 enrolment criterion is an arbitrary classification that does not reflect the phenomenal growth in DE delivery in terms of the multitude of single-mode ODL institutions that do not yet meet the 100 000 enrolment threshold. Consequently, the lead-time required for new ODL universities founded during the 1990s to reach the mega-university status has not yet elapsed. Alternatively, it could be argued that the absolute number of mega-universities is too small to use as a basis for analysing trends. Also, using the number of new mega-universities initiated as the basis for plotting the curve does not reflect the steady growth of student numbers enrolling at these institutions. Therefore, student numbers would be a more reliable indicator of this trend.

These are valid arguments, but in the absence of proper global statistics distinguishing between DE and face-to-face forms of provision, it will be difficult to substantiate the argument either way. However, although DE as mode of delivery is growing considerably, the mega-university as institutional form is not — insofar as available information about the foundation of new mega-universities is concerned. This trend is substantiated further by the growing competition in DE provision. In 1990 only a small proportion of conventional universities offered distance learning courses, while by the year 2000, "no self-respecting university president can admit to not offering courses online" (Daniel 2000c: 3). This trend, enabled by recent advances in technology, may substantiate the business notion in some circles that 'big is bad and small is better'. The essence of the argument is that "smaller organizations generally are more flexible and quicker to react than large ones" (Davis & Botkin 1994: 117). These authors continue by saying that "rapid technological change favors designs that keep organizations small enough to be quick yet large enough to have leverage" (1994: 117).

As inferred earlier, the practice of DE is not limited to the mega-universities. There are numerous single-mode national open universities throughout the globe that do not meet the 100 000 criterion: Athabasca University in Canada; FernUniversität in Germany; the National Open University in Taiwan; the Open University of Hong Kong; the Open University of Israel; the Open University of Tanzania; the Open Universiteit in the Netherlands; the Open University of Sri Lanka; Universidad Estatal a Distancia in Costa Rica; and Universidad Nacional Abierta in Venezuela are some examples. We must not forget about the Australian Universities that pioneered dual-mode systems, like Deakin University and Monash University. These days, almost every residential university campus has a department of external studies or a distance education centre to offer some or all of their courses using distance education modes. There are also dedicated open learning institutions in the public polytechnic sector, for example the Open Polytechnic of New Zealand. The mega-universities are, nonetheless, an important focus of the study concerning the future of DE because they "operate differently from other universities in many ways ... [and] they show that a different approach to teaching can be more successful than lecturing" (Daniel 1999a: 30).

Perhaps the most compelling dimension of the success of the "open university" ideal lies in the philosophy of its openness. Walter Perry, the founding Vice-Chancellor of the British Open University, articulated the vision of the University at its inaugural ceremony in 1969 as being "open as to people, open as to places, open as to methods and, finally open as to ideas" (cited in Daniel 1995:400). In effect this meant that prerequisite qualifications for undergraduate study were removed thus breaking the "historic — and insidious — link between quality and exclusivity in higher education" (Daniel 2001a: 6).

The managerial success of providing distance teaching at scale is the result of the unique combination of four main factors:

- First, developing excellent multi-media study materials that are designed and developed by multi-skilled professional course teams. Daniel sees the teamwork that distance teaching involves as the "greatest operational difference between distance teaching and classroom teaching" (2001b: 4). The team-approach has implications for the specialised skill requirements of the mega-universities as well as for the organisational design of the enterprise based on the division of labour and special process requirements associated with the DE design and development process.

- Second, providing individualised support to learners by adjunct faculty members who are trained to work with adults. Student support individualises the learning experience over and above the standardised course materials, which are uniform for all the learners. For instance, the students studying at the British Open University get strong personal support because every 20-25 learners is assigned a dedicated tutor in their area through a decentralised student support system.
- Third, quality service to the student which requires excellent logistics and administration. When operating at scale, robust logistics and administration is essential to ensure that: students receive their material on time; the systems support smooth and efficient registration; assignments are processed quickly; examination venues are planned and properly supervised; not forgetting the requirements for accurate and efficient systems of record-keeping.
- Finally, faculty members who remain actively involved in research, distinguishing the mega-universities from commercial DE providers. Also, pedagogically speaking, the research activities of faculty members helps to promote the intellectual excitement which students find attractive in their learning.

Capitalising on economies of scale in conjunction with the four factors listed above, the mega-universities have achieved unprecedented success in managing the eternal triangle of access, quality and cost, and this warrants special investigation particularly in the light of the three fundamental forces that were discussed earlier in this problem formulation. The dynamics between the mega-universities and the eternal triangle will be discussed in the following section.

1.3.5 Managing the mega-universities and the eternal triangle

The perpetual challenge for all universities is to effectively manage the eternal triangle: to widen *access*, improve *quality* and reduce *costs* (Daniel 2001a). The large-scale teaching systems of the mega-universities have achieved considerable success in managing the eternal triangle and the reasons for this success are briefly introduced here as they may provide insight into the evolving futures of DE.

The open universities have improved access in two significant ways: First, by basing practice on a philosophy of removing traditional barriers of access concerning prerequisite entrance qualifications. This dimension of the philosophy of "open learning" is based on the humanistic ideals that every individual has the fundamental right to learn. (This will be discussed in more detail in Chapter 2 of the thesis as the compelling vision that has directed the success of the open universities.) Second, the DE method itself promotes wider access, for example: working adults can enrol at university without having to leave full-time employment to attend residential classes or abscond from family responsibilities because students can study at times and places that are more convenient, depending on their personal circumstances; additionally because the mega-universities operate at scale, DE courses are usually cheaper than their residential counterparts and therefore a university education is more affordable for many learners.

The collective enrolment figures of the mega-universities unequivocally justify their success on the access dimension. More than 8 million learners are studying through 16 institutions. When compared to the conventional campus-based model, this mode would require more than 400 sizable universities to accommodate the same number of students.

The mega-universities have demonstrated that they are *capable* of providing quality pedagogy that is consistent. First, the use of multi-skilled professional teams including academic content experts, instructional designers, graphic artists, multi-media experts and editors combined with a rigorous process of design, development and evaluation should render better quality material than an artisan approach of professing knowledge where a single individual does almost everything. Furthermore, because the same materials are used by a large number of students usually over more than one academic period, quality in ODL is more consistent when compared to classroom teaching because it is not directly exposed to the subjective dynamics of individuals in the classroom situation.

The development of high quality ODL materials is an expensive business and, unless this investment can be spread over a large number of learners, it will not be possible to build quality into DE teaching in a sustainable way. Therefore quality of ODL is *not* necessarily a characteristic of the distance teaching method, but rather a product of the processes implemented in the design and development of the learning resources. For this reason there are numerous examples of poor pedagogy and questionable quality in DE, despite its inherent potential for better quality.

Quality is an illusive concept, therefore, an independent assessment concerning the question of quality in large-scale ODL systems is required. In this regard, the higher education system in the United Kingdom has a state-run system for assessing the quality of teaching. The teaching of the British Open University is ranked within the top 10 percent of universities in the United Kingdom according to this state run system of quality assessment (Daniel 2001: 6). This ranking includes the elite British universities, and the Open University is well up on the list regarding the quality of its teaching. Clearly, the mega-universities are capable of consistent and high quality teaching. However, this does not guarantee that all mega-universities achieve these levels of quality. What is required is the judicious implementation of the four success factors discussed previously in Section 1.3.4.

With reference to Table 1.3, the unit cost of the mega-universities expressed as a percentage of the average unit cost of campus-based universities in the same country is about 50 percent or less than the unit cost at conventional universities. The absolute cost of providing quality distance education is considerable, yet the model is scalable and with sufficient numbers, significant unit cost reductions can be achieved. For example, the cost per graduate of the British Open University for undergraduate degrees is between 39 percent and 47 percent (and between 55 percent and 80 percent for honours degrees) when compared to conventional universities in the United Kingdom (Daniel 1999a: 39). Similarly, in South Africa, the state allocation to that county's mega-university (Unisa) is approximately 10 percent of the total allocation to the entire university sector, yet Unisa provides teaching for 32 percent of the total number of university students in South Africa.

By operating at scale and implementing the four factors of success discussed in the previous section, the large-scale ODL providers are capable of attaining competitive advantage on the dimensions of access, quality and cost. This requires insightful management of complex systems and the challenge for the leadership of all universities today, is to establish how the major transformation forces of the global knowledge society, massification of higher education and the new digital ICTs will impact on the dynamics of the eternal triangle.

1.3.6 Summary

With reference to Figure 1.4, the problem formulation has argued that the following three generic trends will influence the future of higher education, in general, and DE, in particular: global knowledge society; massification of higher education; and pervasive advances and convergence of technology in ICTs. How these forces will impact on DE futures of individual institutions will depend on the interplay of the total dynamic system — hence, the need for conceptual modelling. This research project has opted for scenario planning as a conceptual modelling technique. In scenario planning language, these factors are taken to be the change drivers. The dynamic interplay among these factors will influence future strategies of university-level DE with specific focus on managing the eternal triangle of access, cost and quality. In summary it is suggested that:

- Despite the powerful forces of globalisation in the economy, the provision of large-scale ODL has not changed significantly since the design, development and delivery approaches pioneered by the British Open University. At the same time, notwithstanding the expansion of DE at conventional universities, e-learning has thus far failed to change the way academics teach at campus-based institutions (Zemsky & Massy 2004). However, the probability for change is plausible particularly if new modes of educational delivery emerge as a result of the potential of the digital ICTs;
- Shifts from Mode 1 to Mode 2 knowledge production means that universities will need to shift away from the traditions of discipline-based structures and innovative new ways of engaging in a distributed knowledge production system, combined with an institutional shift towards emphasising knowledge reconfiguration. This together with the potential of globalisation and the power of today's digital ICTs, creates exciting opportunities for those planning to be involved in DE in the future.
- The pervasive advances in digital ICTs combined with the phenomenon of convergence have the potential of transforming the pedagogy and the institutional configuration of DE providers in a significant way because it is now possible to do things that were not possible before;
- The mega-university's successes of the past in managing the constraints of the eternal triangle could provide useful insight for generating future scenarios for managing DE futures at conventional universities, taking into account the context of the dynamic system associated with the three components of the eternal triangle.

These are important factors to be considered regarding the research reported in this thesis. It is a complex environment and the analysis and methodologies adopted to move forward on these perplexing questions must avoid the strategic pitfall, frequently observed in many difficult and multifaceted environments — that is, to "forget present complexity in the name of future simplicity" (Readings 1996: 129).

1.4 Research questions and methodology

Drawing on the inductive analysis preceding this section a high-level overview of the study is now provided with specific emphasis on *how* the main objective of the research will be achieved, namely to develop plausible scenarios regarding technology strategies for university-level DE at campus-based institutions. The study is directed by five research questions. The research questions encompass both the objects of study as well as the embedded methodology employed. Where necessary limited justification of the underpinning rationales is provided. Furthermore, the structure of the thesis is also derived from the five core research questions. Accordingly the structure of the thesis is dealt with in this section.

The objective of this study is to establish the value of scenario planning — a conceptual modelling tool — for exploring DE futures at campus-based univeristies. In the spirit of Drucker's assertion to prepare for the "future that has already happened" (1998: 16), the study begins with the identification and conceptual scrutiny of major events that have already happened. Three driving forces that have the potential for change in higher education were identified and analysed:

- globalisation and the knowledge society;
- massification of higher education;
- pervasive advances and convergence in digital ICTs.

These are the change drivers or "predictables" which are part of the conceptual building blocks used in scenario planning. It is argued that the dynamic interplay between these factors will influence both conventional campus-based institutions and the mega-DE universities. However, the way in which future strategies and pedagogical models for face-to-face and DE forms of educational delivery evolve are likely to be different. For example, large-scale university level DE did not exist prior to the era of industrialisation, whereas the conventional campus-based university was already an established institution long before the onset of industrialisation. In other words, the foundations of these two delivery modalities are rooted in two distinctive eras of societal evolution, agrarian and industrial. For this reason, the scenarios will be developed from the starting point of a campus-based university incorporating the research and experience gained from the large-scale DE providers. The inclusion of this DE research represents a unique contribution to the knowledge base of scenario planning in HE.

In line with contemporary management thinking about strategy innovation, the study will generate conceptual *foresight* concerning plausible futures for DE provision in an attempt to provide a test-bed for future strategic planning.

Day (2001) describes foresight as a family of processes intended to capture the dynamics of change by placing today's reality within the context of tomorrow's possibilities. The purpose of "foresighting" is not to predict the future, but rather to gain a better understanding of the complicated array of strategic alternatives facing organisations today and how these can be streamlined by looking at tomorrow's opportunities. In this way, the risks of becoming trapped in existing operational complexity are reduced. There are two significant reasons why strategic innovation is a powerful approach to compliment strategic planning:

- First, strategic innovation promotes "competitive advantage[2]" because futures are proactively generated as opposed to organisations responding to the destiny of externally imposed circumstances;
- Second, it enables organisations to plan for alternative futures from a "clean slate" base-scenario so as to avoid the conceptual constraints of legacy operations. Only once reasonable clarity of plausible futures is obtained, do the transformational implications of existing operations come to bear.

The concept of "knowledge innovation" refers to a process of turning the future into an asset, which implies proactively creating opportunities and "making waves of innovation in organizations and then riding them into the future" (Edvinsson 1997: xix). Hamel encapsulates the central tenet of this thesis and argues that the "big challenge in creating the future is not predicting the future, but imagining a future that is plausible — the future that you can create" (2000b: 11). This requires leaders to do two things: first, reinvent the existing competitive environment in which a particular industry operates;

---

2 The concept of "competitive advantage" is not used here in the traditional entrepreneurial sense of ensuring the future success of an individual enterprise at the expense of another enterprise in the same industry. It is used in the more holistic sense of securing the future of the important academic practices of research-led education when faced with growing threats from the for-profit university sector.

and second, create new space that satisfies needs that enterprises do not realise they have (Hamel 2000b 11). For these reasons this study will develop alternative scenarios for the future by applying the art and skills of conceptual thinking so that new plausible and sustainable futures for DE teaching systems can be evaluated.

The second bullet listed above concerns the question of marrying the integration between strategic and operational thinking in ODL. This necessitates the skill of being able to keep a difficult balance between operational pragmatism and the successful implementation of innovation in the organisation.

There is a dangerous feedback loop where operational problems incorrectly drive the establishment of a new institutional vision. There is a constant risk for pressing operational issues to cloud the establishment of a sustainable and shared vision for the future. The risk of operationally-driven "innovation" is easily disguised under the banner of technological advancement even though these strategies are questionably driven as "technology-push" initiatives. This is found where future directions are dictated by the seductive fascination of the new technologies at the expense of what we know (and are learning) about how humans learn best. Also, new technologies can easily disguise or be used to entrench the way things have been done in the past.

Ideally, strategic thinking should be driven by a shared institutional understanding of anticipated ODL futures (conceptual scenarios) and how innovation in ICT can support what we are learning about learning. The art of maintaining the balance between operational issues and strategic thinking requires that operational changes and decisions are taken in such a way that they will facilitate a smooth transition towards the anticipated future of the institution. Adopting this approach, the effective operation of the existing institution is supported in parallel with the planned strategy of the organisation. However, in the absence of conceptual models of realisable futures, this transition is more difficult to manage..

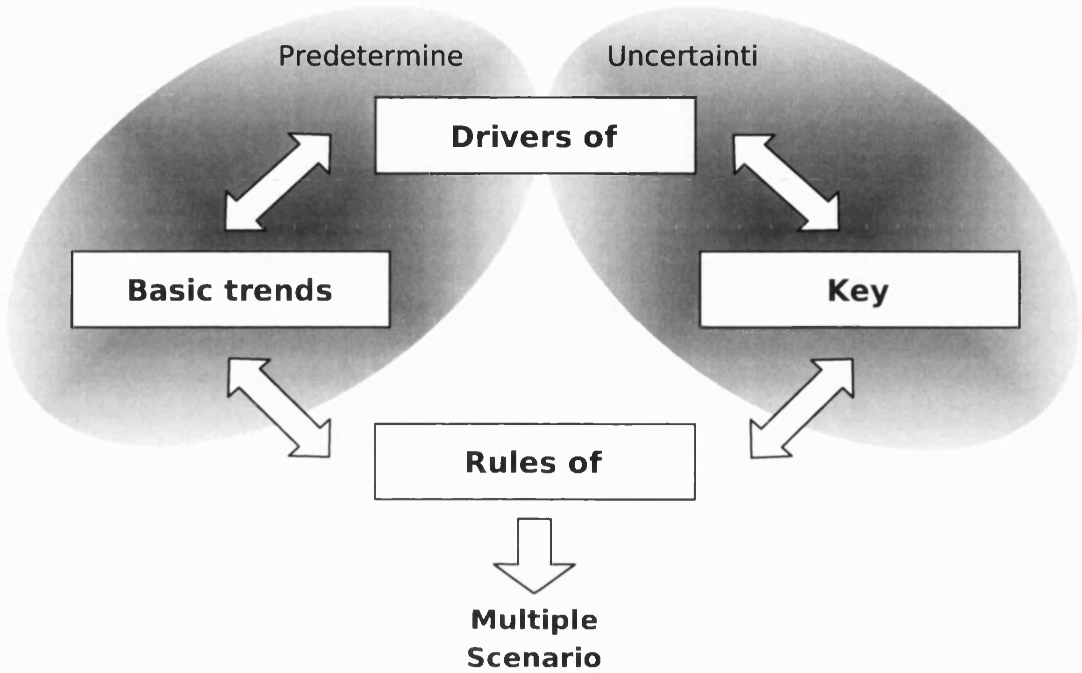
The study is divided into five major research questions and each question corresponds with the respective chapters of the thesis. In addition, the five core research questions mirror the structural elements of a scenario. Typically a scenario is based on structural elements differentiating the uncertainties from the predetermineds (see for example Mercer 1995; Schoemaker 1995; Van der Heijden 1996). These structural elements are represented graphically in Figure 1.7, which attempts to illustrate the dynamic interaction among the predetermineds and uncertainties of the scenario building process.

The uncertainties and predetermineds can be subdivided into the following categories:

- *Drivers of change* which are the factors "which will act to change the future" (Mercer 1995: 34). These drivers were discussed in the problem formulation section of Chapter 1;
- *Basic trends* which delineate the environmental context and include the current beliefs about how the world operates, the trends and trajectory of the specific industry concerned and can be summarised by the notion of the existing "rules of the game". The basic trends considered for this thesis are divided into two categories: (1) the nature of distance education provision and its corresponding requirements to be covered in Chapter 2 of the thesis; and (2) the general trajectory of the evolution of DE practice in the higher education sector that will be dealt with in the first section of Chapter 3;
- *Key uncertainties* are those issues of which the outcome is not known, but at the same time, could have a significant affect on the outcomes that the scenarios are attempting to anticipate. The remainder of Chapter 3 is dedicated to analysing the key uncertainties of this study;
- *Rules of interaction* provide a viable framework where the drivers of change, basic trends and key uncertainties interact with each other so that the scenarios

are internally consistent and plausible. These are summarised in Appendix A of the thesis.

Figure 1.7 Conceptual building blocks for scenarios



The key research questions of this study are introduced below:

Question 1 (see problem formulation of Chapter 1)

What are the driving forces that are likely to influence the transformation of higher distance education in the future and how significant are these drivers of change likely to be?

In spite of the growing awareness of the social and economic forces that will influence the future trajectory of the university, "many within the academy still believe that change will occur only at the margins of higher education" (Duderstadt 1999: 16). In response to this research question, these forces were examined as part of the problem formulation of the study within the context of the rapid state of flux associated with the change phenomenon. A number of scholars believe that the combined effect of these forces have the potential to transform the practice of higher education (see for example Barnett 1997a, 1997b, 1997c; Drucker 1997a & 2000; Duderstadt 1999; and Gibbons 1998). Based on the analysis in the problem formulation, it is concluded that the collective effect of these social and economic forces potentially represent a discontinuity with regard to the future evolution of DE in higher education, the magnitude of which depends on how the university succeeds with effectively implementing knowledge innovation strategies.

Question 2 (see Chapter 2)

What can we learn from the history of DE and large-scale ODL provision, with particular reference to its defining characteristics and does this provide insight for building future scenarios of this form of education provision?

This research question focuses attention on whether or not the teaching-learning systems associated with large-scale ODL provision are systemically and pedagogically unique. The answer to this question — and corresponding validation thereof — will necessitate a comprehensive analysis of the defining characteristics of DE, in general, and large-scale ODL, in particular. The large-scale DE providers are society's most sophisticated examples of systems purposefully designed for technology-mediated learning. This research experience provides the framework for building scenarios on the implementation of DE technologies at campus-based universities by taking into account the unique processes and cost behaviours associated with asynchronous delivery.

Question 3 (see Chapter 3)

What uncertainties or factors could have a significant impact on future DE delivery systems and innovation, particularly with reference to those factors where the outcome is unknown?

With particular reference to preparing for the future in the contemporary context, the factors which most bewilder managers are "rooted in the technological uncertainties, ambiguous market signals, and embryonic competitive structures that distinguish emerging from established technologies" (Day & Schoemaker 2000: 4). Whereas industry trends, processes and markets are usually well defined for established technologies — emerging technologies often result in " a fog of ambiguity" (Day & Schoemaker 2000: 4). This is where scenario planning can assist with mapping futures through the fog. Similarly, volatile DE markets resulting from unprecedented growth and participation in DE by most tertiary education providers combined with the disruptive potential of emerging technologies is contributing to the fog of uncertainty regarding technology strategies in the university sector.

Scenario planning is a technique that is specifically designed to gain a better understanding of the future to promote the efficacy of strategic planning in complex and uncertain environments. Uncertainties are therefore an integral component of a scenario, and the question above focuses the attention on specific aspects of the "unknown and unknowable future" (Marsh 1998: 48). Marsh stresses that uncertainty "isn't *not* knowing what tomorrow will be like" (1998:44) but that uncertainty concerns not knowing which trends and dynamic combination of trends will make up the future.

Thus Chapter 3 focuses on selected uncertainties as part of the conceptual building blocks of the scenario development process. However, scenarios must be believable and internally consistent; therefore, the "plausibility" of the identified uncertainties must necessarily also be justified.

Question 4 (see Chapter 4)

What innovation alternatives (scenarios) can be derived or generated from the conceptual building blocks analysed in the thesis and what are the implications of these scenarios for evolving DE pedagogy and those who are likely to benefit from alternative scenarios?

This question directs attention at the application of the techniques of knowledge innovation to develop foresight about DE futures, using the conceptual building blocks associated with the first three research questions. However, the purpose of building such a scenario is not to predict the future, but rather to gain a better understanding of future events that could play out in dynamic and complex situations. The value of scenario planning is that it facilitates strategic leadership because you can focus on the organisational implications of fundamental transformation without corresponding increases in post-decision risk. Should a specific scenario not turn out as anticipated, the organisation would not have lost much. Conversely, should a given scenario evolve as expected, the organisation would have gained considerable strategic advantage because it is ahead of the game and would already be prepared for the nature and extent of the organisational requirements for the new context.

It is not possible within the confines of this thesis (nor is it advisable) to try to build a few scenarios that attempt to cater for every eventuality associated with DE futures. The purpose of scenarios as a strategic management tool is not to predict the future; but rather to promote understanding about the future concerning the dynamic among important strategic variables. Hence, it is necessary to focus on a particular dimension or perspective. The dominant focal area for the scenarios of this thesis concerns the probable futures of DE delivery systems within the university sector taking into account the factors analysed in the problem formulation above.

Eisenstadt reiterates that "computing and telecommunications technologies are converging, ... their futures are irrevocably intertwined, and that individually and together they've *already* changed your life" (1995b: 1). As suggested earlier, the knowledge media enable the capturing, storing, imparting, sharing, accessing, creating, combining, transforming and synthesising of knowledge. It is conceivable that learners can have "professional-quality graphics, text, movies, videos, and audio, all interlinked and cross-referenced in useful ways" (Eisenstadt 1995b: 1) — all in the privacy and comfort of their own personal computer terminals. This picture, from a pedagogical perspective, differs qualitatively from what has gone before, and it is therefore necessary to analyse what this may mean for the strategic futures of universities engaged in DE modes of delivery, particularly from the perspective of evolving modes of learning and the management thereof.

Thus chapter 4 will build three alternative scenarios based on the dynamic associated with the variables analysed in the preceding chapters focusing, in particular, on how DE technology futures may impact on the values of the university as institution as well as the potential trade-offs among them.

Question 5 (see Chapter 5)

What lessons can be learned from applying scenario planning as a tool to assist with the strategic management of university futures in relation to the adoption of DE technologies?

The purpose of this study is to develop foresight into the implementation of DE technologies in the university sector by applying the technique of scenario planning. Drawing on contemporary thinking associated with strategic innovation in the management literature, the scenarios will interrogate alternative futures so that university leaders can create opportunities and develop organisational ability to be ahead of change instead of adapting to change (Drucker 1999).

The key issue for university leaders is whether or not alternative DE futures will result in trade-offs among the foundational values of the university as institution.

As indicated earlier in the problem formulation (see Section 1.3) there is much speculation about the future of the university as we move into a global knowledge economy in conjunction with the adoption of DE technologies on traditional university campuses.

This chapter will compare outcomes derived from the research work in generating the different scenario storylines (Chapter 4). A comparative analysis of the these scenarios, should highlight the strategic implications for university practice associated with the adoption of DE technologies under different circumstances. Moreover, this analysis will facilitate reflection on the organisational implications when preferring one strategy above another.

The concluding chapter will explore the value of scenario work as a strategic planning tool to assist leaders in promoting sustainable futures for the university as institution.

In conclusion, the research questions of this study and corresponding chapters can be summarised as follows:

- *Why* is transformation in the tertiary sector looming with particular regards to ODL provision?
- *Where* should thinking about the future begin? — In other words, what can we learn from the relevant experience as a starting point for building scenarios on the future of DE provision?
- *What* are the major uncertainties that are likely to have the most significant impact on the future of DE delivery systems at university-level?
- *What* plausible alternatives can be generated for the future of ODL provision?
- *What* are the implications for society and the university with regard to the implementation of the DE futures anticipated above, even though you cannot predict the future?

The bullets listed above are certainly an oversimplification of the complexities of this study, but nonetheless help to summarise the structural logic of the thesis.

1.5 Limitations of the study

This chapter is concluded by a list of the major limitations of this study. The limitations will also assist the reader in gaining more clarity on the specific focus of the research.

First, the focus of this study concerns DE futures for conventional campus-based universities. However, the mega-universities have acquired extensive experience of this distinctive institutional form of provision and must therefore be analysed before proceeding with further scenario planning work. Notwithstanding the necessity for analysis of the mega-universities, this study is not a comparative analysis of these institutions. Consequently, detailed discussions and comparisons of the individual mega-universities will not be covered in the thesis. However, where appropriate, relevant details of specific mega-universities will be discussed in support of the arguments. The mega-universities are unique because of their size, specific processes and specialised organisational structures and in the past they have been the dominant institutional exemplar of DE delivery. Any planning work on DE futures must take this experience into account.

Second, the prime purpose of this study is to develop foresight into the future using the techniques of scenario planning. Typically, in the business world, strategic thinkers would develop a multitude of different scenarios based on a variety of different focal points and different perspectives to gain a better understanding about the future. However, scope limitations of the thesis will not permit the development of a multitude of different scenarios. These scope limitations have necessitated that the prime focus of the scenarios for this thesis will be restricted to the transformational imperatives associated with the values of the university and evolving pedagogy in DE. However, the scenarios will be based on extensive conceptual analysis of their respective conceptual building blocks. Thus, the development of additional scenarios is an area for further research.

Third, the nature of strategy innovation is conceptual (Hamel 2000c) and favours Mode 2 forms of knowledge production. Consequently, from a methodological perspective, foresight cannot be rooted in the traditions of empiricism. In fact, knowledge innovation can actually be deprived of insight when trapped in the data (Hamel 2000c). Furthermore, this is not a study of strategic management in higher education. It focuses on the technique of scenario planning as a systematic approach to generate foresight into uncertain DE futures. However, these limitations should not be misinterpreted as a licence for conjecture, and this has resulted in increasing the extent of the analysis and corresponding discourse in the absence of the more economical approach associated with analysing hard empirical data. The study is characterised by rigorous intellectual scrutiny and the plausibility of each scenario necessitates extensive analysis and discussion.

Finally, the question of pedagogical equivalence and/or pedagogical differences between distance and face-to-face forms of provision will not be dealt with as a central theme of this research project. The pedagogical effectiveness of ODL methods is an important question, particularly with regard to emerging practices of e-learning over time and space at both conventional campus-based and DE institutions. Therefore, where appropriate, these differences will be questioned and evaluated, but not from the primary objective of establishing a definitive answer to the question of verifying the pedagogical equivalence (or not) among alternative forms of delivery. Again this is an ongoing area of research.

The transdisciplinary nature of this study complicates the design and scope of the study. On the one hand, the core research questions should not be constrained by classical discipline-based boundaries. Yet, the thesis is submitted within the disciplines of leadership and management, and this must be taken into account regarding the delimitations of the study. Therefore the limitations described above should not be interpreted as transgressions of the principles of transdisciplinary study, but rather as pragmatic constraints necessary because of the limitations in scope of the thesis.

Chapter 2

The unique requirements of large-scale distance education provision

2.1 Introduction

This chapter examines the unique requirements of large-scale ODL provision. Providing DE at scale has specialised pedagogical, systemic and organisational requirements that differ from those associated with traditional campus-based delivery systems. Some DE scholars argue that large-scale ODL is structurally different from conventional face-to-face education, and consequently, the reasons underpinning this postulate require further investigation.

The unique requirements of DE systems are a foundational point of departure for the research work reported in this thesis. From the perspective of scenario planning the specialised requirements of large-scale DE systems will be dealt with as a *predetermined* factor for the scenarios that will be built in Chapter 4 of the thesis. A predetermined factor is a substantive characteristic that will influence each scenario in the same way. Conversely, *uncertainties* are factors that will play out differently for each scenario that is developed. The distinction between "predetermineds" and "uncertainties" will be illustrated in more detail in Chapter 4. However, for now, it will suffice to accept that if the operational requirements associated with the provision of DE are unique, then it follows that these requirements will influence the structures, processes and pedagogy of those institutions involved with DE provision.

A critical question that is more closely related to the classification of a scenario "uncertainty" concerns the notion that the advent of large-scale DE systems was the consequence of the new societal era of industrialisation. This raises an additional "uncertainty" dimension to be considered when building alternative scenarios: whether the contemporary expansion of distance learning provision (now possible because of digital ICTs in a global knowledge economy) represents a new societal period of educational delivery.

A sensible way to analyse the unique characteristics of DE is to critically review the evolution of the ODL knowledge base. ODL, comparatively speaking, is a relatively young field of academic endeavour, with regular scholarly contributions only first appearing during the 1960s. However, today there are more than a dozen dedicated research journals specialising in this area of academic interest.

Despite considerable academic activity in DE over the last 50 years, there is some debate in the literature whether ODL is a discipline in its own right.
Holmberg (1997), for example, refers to DE as a separate kind of education that can only be understood and explained, to a limited extent, in terms of conventional educational theory. He regards DE as "a separate field of scholarly study" (Holmberg 1997: 36) and describes it as an independent academic discipline. On the other hand, Nicoll and Edwards conclude that:

> *Open learning is not itself a discipline. It does not have its own rules of knowledge formation as do established disciplines and reflexively it exemplifies the multi- and inter-disciplinarity it tends to support. Like its bigger sister, education, it draws together people with interests in, for instance, the media, psychology, sociology, language and communication.* (1997: 22)

Whether this is the result of the relative infancy of DE as a field of academic endeavour or whether this represents a condition of post-enlightenment discourse is difficult to establish — although the dynamic between both factors is likely to have influenced the characteristic "openness" of the discourse in the field. Early DE research, in particular, was "overwhelmingly positioned within a modernist meta-narrative" (Nicoll & Edwards 1997: 15). Later research showed a diversity of critical perspectives. Notwithstanding its characteristic openness, the body of knowledge reported under the banner of ODL has demarcated "boundaries" of what is generally considered to be legitimate DE knowledge, and yet at the same time, is deconstructing its own boundaries as evidenced by recent interjections of, for example, globalisation and post-fordism into the discussion of ODL.

The resulting epistemological ambivalence pertaining to the assumptions underpinning the research reported in this thesis necessitates detailed discussion. A simple statement of the assumptions is no longer adequate in today's world of intellectual discourse. In fact, the very notion of underpinning contemporary research with definitive statements of the research assumptions can readily be deconstructed. The purpose of this chapter is not intended to delimit further development of the discourse within the confines of a predetermined meta-narrative. Rather, it sets the stage for the cognitive dissonance that is required to make some sense of the unfolding futures in ODL. This is undertaken with the understanding that the complexities falling outside these demarcated ODL boundaries and corresponding assumptions will continue to influence the discourse on this stage and vice-versa.

Assuming a point of departure that ODL is a unique form of higher education provision suggests that there are a number of characteristics, which may differentiate the large-scale DE providers from conventional face-to-face universities. This point of departure is particularly relevant to questions of how digital ICTs may impact on the future of the university.

In an era where digital ICTs provide opportunities for *all* universities to offer their programmes anywhere and anytime, it is necessary to interrogate the characteristic features of DE and to establish whether the particular form of DE practiced by the large-scale single-mode providers differentiates itself from ICT-enhanced forms of educational delivery now emerging at many residential universities. This analysis is critical with regard to understanding the nature of competitive advantage in DE markets of the future as a basis for scenario planning as well as to identify the core organisational competencies that will be required of DE provision in the future.

These introductory paragraphs suggest two dimensions of analysis based on the following thematic questions:

- What are the defining characteristics of DE when compared to face-to-face forms of delivery, and is it important to know the difference?
    - How has distance education evolved with specific reference to the history of the practice of university-level DE?
    - What vision has guided the continued growth and success of DE?
    - Corresponding with the pervasive advances in digital ICTs, numerous forms of DE are now emerging, thus raising the question of how do you distinguish between the myriad of DE alternatives that can be observed in contemporary practice?

- Is distance education a consequence of the broad societal era associated with the industrialisation of society?

The primary questions above represent a bi-dimensional analysis that will be used to validate the assumption that large-scale DE provision is unique when compared to conventional education. The structure of the discussion will be based on this division.

The first question above requires an investigation into the definitions and descriptions of DE practice that have been reported in the ODL literature and is subdivided further into two parts: First, an historical analysis of three significant university-level prototypes will be conducted with the view to understanding the strategic vision that has guided the development of DE at the university level; Second, the thesis requires a conceptual framework to differentiate between multiple forms of DE that are now emerging, specifically as a result of the pervasive advances in digital ICTs. Apart from the potential utility value of this framework for subsequent chapters in the thesis, the development of this conceptual framework will assist in identifying the nuances of contemporary DE practice.

The final question, and second phase of the analysis, will direct attention to the notion that DE is a distinct form of education that is structurally different from face-to-face education thus representing a new era of educational delivery. It is a complex and contested debate requiring detailed analysis. It is largely based on the research work of Otto Peters first published in 1967 and 1973, but will also include an analysis of the more recent interjections of Fordism, neo-Fordism and post-Fordism in the field of ODL discourse. Peters introduced a line of reasoning previously unreported in the DE literature: that DE is the most industrialised form of teaching and learning resulting in what Keegan has described as "a radical separation of distance education from other forms of education" (1980: 15).

The discussions in this introductory section, although cursory, have highlighted the complexity of the debate suggesting that a holistic analytical approach is more appropriate than an inward-looking descriptive analysis of DE. In this way the analysis will be able to deal with the interactions and relationships within a complex system.

2.2 The defining characteristics of DE and its corresponding uniqueness

Today, almost every tertiary education institution is involved with varying degrees of DE delivery in their respective systems. Until now, the single-mode DE institutions and the Australian dual-mode systems dominated this form of provision. The prolific expansion of DE provision extends well beyond the confines of the traditional DE providers, and this growth can be attributed to the interplay among the following factors:

- advances in technology, particularly digital ICTs, which are now removing the traditional barriers of entry into the DE market;
- rapidly growing demand for increased access to higher education because of the unprecedented global population expansion, significant increases in the global output from an improved secondary education system and the economic demands for a skilled workforce requiring a tertiary education qualification as prerequisite for employment;
- increasing demands for lifelong learning associated with the evolving knowledge-based economy;
- developments associated with the commodification of knowledge, particularly in the corporate university sector, which also prioritise DE systems as an appropriate vehicle to develop this expanding educational market.

Within this context of the increasing growth of DE as a mode of delivery, this section will focus on the first thematic question (and corresponding sub-questions) posed in the introduction of this chapter:

What are the defining characteristics of DE when compared to face-to-face forms of delivery, and is it important to know the difference?

First a few introductory comments are provided before proceeding with an overview of how the question will be answered. This question alludes to the characteristic uniqueness of traditional DE practice. However, given the rapid expansion of DE methods in education, particularly when most education providers are likely to use varying degrees of DE in the future, it might seem inappropriate to argue that DE is a unique form of educational delivery. Hitherto, the dedicated DE institutions have largely provided this type of education. However, this thesis will demonstrate that the reasons underpinning the uniqueness of DE are also pedagogical, sociological and organisational in nature and are not necessarily dictated by any particular institutional form or specific technology. Complicating the debate is the fact that the specific requirements of DE processes will have implications for the form and structure of the organisation. Conversely, the existing organisational structure of providers beginning to augment their delivery with ODL will also influence the boundaries within which the variety of DE alternatives can effectively be achieved. Hence, this will influence the trajectory of future DE development.

The trend associated with conventional face-to-face institutions now using ODL approaches for a substantial component of their delivery system is often referred to as the convergence of distance and conventional education (see for example Tait 1999: 141). Unfortunately, "convergence" is a slippery concept and open to misinterpretation and abuse. It is an error of logic to necessarily assume that the concept of "convergence" infers that DE and conventional education are moving towards the same point because now it is possible for DE to become more like face-to-face provision as a result of the enabling potential of ICTs vis-à-vis synchronous digital communication and dialogue. Such a view represents a narrow view of the potential evolutionary path of educational advancement because, in this example, new technologies are being used to mimic the artisan practices of face-to-face instruction. However, if the notion of "convergence" refers to a future sociological and pedagogical ideal regarding the establishment of a new paradigm of educational delivery that both conventional and DE are striving towards, then use of this concept is more in line with the framework of this study.

Returning to the proposed overview of how the thematic question stated above will be answered, it is clear that this will not be a simple and straightforward exercise. Consequently, the answer to this question will require a detailed and thorough interrogation of the practice of distance education, covering the variety of DE alternatives now practiced, in order to illustrate the differences between small-scale and large-scale provision of DE. In addition it will also be necessary to explain the sociological and pedagogical differences between DE and conventional face-to-face forms of provision because this is a critical differentiating feature of future DE practice, particularly with regard to the evolutionary state of different forms of educational provision. In justification of the detailed nature of this analysis, the following reasons are provided:

- I have assumed that the readers of this thesis will include scholars who are not necessarily familiar with the history, theory and practice of ODL;
- I will argue that DE is a unique form of delivery that has specialised requirements that are different from contiguous forms of higher education. Given the complexity of this debate combined with the controversy relating to this question, a detailed temporal analysis of DE will therefore be required;
- There is a growing perception that the distinction between DE and contiguous forms of provision is blurring because of modern digital ICTs. The validity of these assertions must be interrogated because this is a foundational point of departure for determining future technology strategies for institutions involved in ODL and, therefore, also requires a comprehensive analysis of DE; and
- Within global distance education practice, there are a variety of DE delivery alternatives that are sufficiently diverse to warrant specific strategies, and the implications for the management of these different types of DE institutions must be highlighted.

A popular description of DE is introduced below. Notwithstanding the apparent appeal of this definition, it is not sufficiently comprehensive to explain the defining features of large-scale provision, but is nonetheless a useful starting point for the analysis.

> DE can be described as a form of planned educational delivery where the act of teaching is separated from the act of learning in time and/or space. In other words, the learning takes place at a different time or a different place from the act of teaching.

This popular understanding of the concept of DE therefore includes both asynchronous delivery (different time and different place, for example, correspondence education) and synchronous delivery (same time but different place, for example, the distributed classroom model where classroom teaching is distributed to remote locations using broadcast or video-conferencing).

Despite the advantages associated with the clarity and simplicity of this description of DE, it is not sufficiently comprehensive to accommodate the analytical requirements of this study. Emerging forms of university-level DE delivery are now possible because of the capabilities of digital ICTs to offer teaching anywhere, anytime. For example, in terms of the qualification of time-space separation in the tentative description of DE above, the practice of a conventional residential university who provides remote access to learning resources for full-time campus students using the Internet, would qualify as DE. However, this example of technology-enhanced learning (even though it meets he requirements of the general DE description above) is not generally perceived to warrant classification of these institutions as DE institutions. Hence, the perceptions associated with the view that the distinction between DE and contact teaching is blurring.

Furthermore, this general description of DE does not illustrate significant pedagogical differences between certain forms of DE and contact teaching with particular reference to modes of learning. For example, in correspondence forms of DE, the dominant mode is learning by reading, whereas in contact forms the dominant mode of learning is listening in face-to-face dialogue between instructor and student (Peters 1998:9).

Arguably, the most significant metamorphoses that has the potential for radical change concerning the strategic futures of the large-scale DE providers concerns the possibilities of providing multi-mode, multi-media learning opportunities and to scale these up to levels of cost-efficiency, previously not possible. At the same time digital ICTs are removing the traditional barriers of entry into DE for face-to-face institutions because economies can be achieved at significantly lower enrolment levels. This is an important reason why Daniel (2000a) advises that universities must revisit their missions, values and purposes in order to prepare for the Internet revolution. He says "if we do our job well the Internet could indeed become the most revolutionary innovation in education since the invention of printing with moveable type" (Daniel 2000a: online). Therefore, it is critical that this examination of DE not be limited to a descriptive analysis of the traditional time-space dimensions as inferred by the generic description of DE given. Rather any accurate description of DE should also include a foundational understanding of anticipated changes concerning pedagogical modes of learning within the context of the evolution of distance learning in higher education.

Notwithstanding the shortcomings illustrated above, this description of DE is nonetheless a useful introductory description because it emphasises that DE, per definition, is technology. The separation between teacher and learner in DE necessitates that the teaching-learning process is technologically-mediated. Immediately we can discard the misconception that only the new forms of ICT enhanced learning represent technologically mediated learning because the older and more humble forms of correspondence DE have developed a well-founded understanding of the nature and organisational requirements associated with technology-mediated forms of learning. Accordingly, there is a considerable research base that can be consulted with the view to understanding important managerial dynamics of DE futures.

The following structure will be used in this section to examine the essential defining characteristics of DE:

- *Describing the evolution of open distance learning practice.* In this part, the definitional debate associated with the early ODL literature is investigated to understand the distinctive characteristics of DE and how our understanding of the concept and practice has evolved. The dynamics of the relationship between DE as form of educational delivery and the philosophy of "*Open Learning*" as a directing evolutionary force will also be explained. At the same time, it will be possible to articulate significant aspects of DE practice, with the view to establishing the foundations for a classification framework for analysing hybrid forms of DE institutions.
- *A pedagogical framework for contextualising hybrid forms of ODL practice.* Today there is an increasing variety of DE delivery alternatives, and a robust framework is required for analysing contemporary and future ODL practice. Such a framework will be based on the interplay between the characteristic organisational features and the pedagogical implications relating to the functions

of DE teaching systems. This is necessary in order to understand the specific structural dynamics of the mega-universities.

The analysis of the fundamentals of DE in this section will provide valuable inputs for the conceptual foundations of the different scenarios that will be developed in this thesis. In this way a range of probable futures can be generated, which are both well-founded and plausible.

2.2.1 Describing the evolution of open distance learning practice

The evolution of distance learning can be explained from both a *pragmatic* as well as a *visionary* perspective. These two perspectives represent a delicate but dynamic tension between what we know is possible from experience and what we believe to be possible with the advent of new and evolving technologies. Evidence of this strategic tension can be found when analysing the development of DE practice over the last five decades. Understanding the dynamic of the tensions between rational pragmatism and visionary innovation is critical with regard to the art of successfully managing and creating strategic futures for ODL universities. Accordingly, this tension is a central theme of this thesis. The discussions here will provide a conceptual foundation for the research that follows in the rest of this work regarding scenario planning and the management of strategic futures of providers involved with DE technologies.

This section will analyse the history of the development of university-level DE from the perspectives introduced above:

- the pragmatics of DE; and
- the vision that has directed the evolution of DE.

The analysis will describe what DE is in practical terms, but it will also show how a compelling vision has directed the development of university-level ODL. The discussion will begin by defining the practice of DE proceeding to highlight the complexities of defining its practice, thus representing the pragmatic and operational component of the analysis. In the second part of this section, the philosophy of open learning will be introduced and discussed as the vision that has directed the evolution of the large-scale ODL universities.

The innovation associated with the foundation of single-mode university DE represents a radical shift from the traditions of face-to-face provision. The corresponding scholarly development of DE as a field of study contains both elements of rational pragmatism and visionary innovation. Early intellectual work in the field of DE was predominantly informed by rationalising DE practice from the perspective of existing conceptual frameworks of classical face-to-face education. Therefore most of the early definitions of DE were based on a comparative analysis of the similarities and differences of DE and traditional contact teaching. At the same time DE futures were influenced by the vision of promoting learner autonomy and independence in higher education, largely attributable to the visionary work of Charles Wedemeyer (see for example Wedemeyer and Childs 1961; Wedemeyer 1981). Most of the philosophical ideals of learner autonomy and independence now associated with DE are encompassed in the concept of "open learning" which received considerable scholarly attention during the late 1980s and early 1990s.

As suggested above, the differentiating characteristics of DE are intrinsically embedded in the dynamic relationship between the rationalisation of its practice and the philosophy of learning that directs it. As we approach what some strategists view as a new era of societal evolution predicated by the interplay between the global knowledge society and pervasive advances in digital ICTs, it is worthwhile to interrogate the historical dynamic between rational pragmatism and visionary innovation in ODL. This will provide a powerful conceptual framework for creating and managing new horizons for institutions involved in DE.

The pragmatics of defining DE practice

The practice of distance education is hardly a new phenomenon and there are references to correspondence study as early as the 1720s (Holmberg 1989:1). Some authors refer to St Paul's letters to the early Christian community as an example of distance teaching and thus a forerunner to organised correspondence teaching (see for example, Daniel 1999a:48).

However, DE as a field of intellectual study has only developed in recent times. Peters (1997:85) points out that in the 1950s, Charles Wedemeyer and Gayle Childs were virtually the only two people who dealt with DE in a scientific way. Academic interest in DE burgeoned in the 1960s but developed slowly (Peters 1997:85), corresponding with the growth of DE as a form of mainstream tertiary education provision. Since the 1980s, however, the theoretical study of DE has grown exponentially, corresponding with the foundation of numerous single-mode ODL universities around the world. John Bååth's prediction that "it will not remain very long until distance education has obtained a rather solid theoretical basis" (1981:219) has come true, considering that, around the globe, there are numerous scholarly journals dedicated to the study of DE and ODL.

The literature of the early 1980s can be described as the era of the definitional debate when many practitioners and theorists were trying to get an intellectual grip on this particular form of educational provision. This definitional debate was largely informed by a descriptive analysis of DE practice and was, with the exception of the research of Otto Peters, essentially a comparative rationalisation by contrasting the practice of DE with the existing conceptual framework of face-to-face forms of provision. Keegan's (1980) synthesis of the early definitions of distance education provides a good starting point for defining DE practice.

In 1980, Desmond Keegan conducted an analysis based on the early publications and generally accepted definitions of DE at the time and proposed a six component definition of DE. Keegan proposed the following six characteristics as essential for any comprehensive definition of DE:

- separation of teacher and learner thus differentiating DE from face-to-face education;
- influence of an educational organisation especially in the planning and preparation of learning materials hence distinguishing DE from private study;
- use of technical media;
- provision of two-way communication;
- possibility of occasional seminars;
- participation in the most industrialised from of education" which if accepted results in a radical separation of DE from other forms of provision (Keegan 1980:21).

Keegan's six component definition of DE was based on an analysis and synthesis of the following descriptions of DE:

> *The term 'distance education' covers the various forms of study at all levels which are not under continuous, immediate supervision of tutors present with their students in lecture rooms or on the same premises, but which, nevertheless, benefit from the planning, guidance and tuition of a tutorial organisation.* (Holmberg 1977:9)

> *Distance teaching may be defined as the family of instructional methods in which the teaching behaviours are executed apart from the learning behaviours, including those that in a contiguous situation would be performed in the learner's presence, so that communication between teacher and learner must be facilitated by print, electronic, mechanical or other devices.* (Moore 1973:664)

> *Distance teaching/education (Fernunterricht) is a method of imparting knowledge, skills and attitudes which is rationalised by the application of division of labour and organisational principles as well as by the extensive use of technical media, especially for the purpose of reproducing high quality teaching material which makes it possible to instruct great numbers of students at the same time wherever they live. It is an industrialised form of teaching and learning.* (Peters 1973:206)

The first two definitions of Holmberg (1977) and Moore (1973) specify the characteristic separation of teacher and learner that was introduced in the general description of DE supplied at the beginning of this section — the time-space separation of the teaching-learning process. In addition, Holmberg's (1977) definition above also establishes the institutional requirement of an educational organisation to cater for the specific planning needs associated with DE. Moore's (1973) definition highlights the necessity of technical media to facilitate interaction between teacher and learner because of the characteristic separation of the teaching-learning process in DE. Thus Keegan (1980:21) included the following components as essential requirements for a definition of DE:

- separation of teaching and learning;
- the influence of an educational organisation;
- use of technical media;
- and provision of two-way communication.

Apart from Keegan's synthesis and proposed definition of DE, he was also responsible for introducing the English-speaking world to the remarkable insights of the German scholar, Otto Peters who originally published his findings only in German. (The first comprehensive translation of Peters's early work into English was only published in 1994 —see Peters 1994— notwithstanding the fact that Peters's significant discoveries were first published in 1967.)

One of the contentious areas in the definitional debate concerns whether a definition of DE should allow for the possibility of face-to-face meetings between teacher and students. For example, a conventional residential university can teach the largest component of a course using distance forms of provision combined with a two-week block of full-time contact teaching which roughly equals the number of contact hours a face-to-face student would ordinarily have received in a full-time residential course. Should learners participating in this example be classified as residential or DE students? Keegan overcomes this dilemma by drawing on the French Government's 1971 law to regulate the conduct of distance education in its territories (Keegan 1980:15). The definition of distance education accepted by this law includes "the possibility of occasional seminars or meetings between student and teacher" (Keegan 1980:15). Consequently, Keegan accepts the possibility of occasional meetings in his six-component definition of DE and this is validated by the practice of occasional meetings between students and tutors in many DE systems.

The question with reference to deciding on the "acceptable" level of contact hours in a definition of distance education should not be trivialised as academic nitpicking. For practical purposes, the cost of contact sessions in large DE systems is variable and therefore increases proportionally with the number of participating students in the system. Considering that many national DE institutions are funded at lower levels per student when compared to the levels of funding for traditional residential universities, the ratio of contact hours to notional study hours is an important ratio[1]. For example, the nationally funded single-mode DE institutions in South Africa cater for 34% of the total learners in the tertiary education system in South Africa, yet only receive approximately 10% of the national budget allocation for tertiary education (Daniel & Mackintosh 2003).

The comparative levels of funding between contact and DE forms of provision will naturally influence the extent of contact hours for occasional meetings in DE systems. Consequently, from a financial perspective, the level of contact hours expressed, as a ratio of the total number of notional study hours of a particular course is a significant ratio when determining the basis for funding public DE institutions. However, it is difficult to argue that the absolute level of contact teaching versus notional study hours is a defining feature of DE. Furthermore, as the application of digital ICTs increases in all forms of educational provision, with particular reference to the opportunities for providing learning opportunities anytime and anywhere, public expenditure policy concerning the basis for differential funding between DE and contact forms of provision will necessitate careful investigation.

Returning to the three DE definitions cited earlier, Peters's (1973) definition of distance education is noticeably different from the others because it does not attempt to describe DE in contrast to the conceptual framework of face-to-face teaching. Rather, it describes DE from the perspective of the industrialisation of society and argues that this is the differentiating feature of DE. Peters observed, for example, the rational division of labour, rationalisation of organisational principles, mechanisation and mass production in DE systems and concluded that DE "is the most industrialised form of teaching and learning" (Peters 1989:7).

Keegan recognises the potential significance of Peters's early definition and points out that if his definition "or any elements of it, is accepted, a radical separation of distance education from other forms of education is effected" (1980:15). Keegan also anticipated the potential polemic associated with a view that DE is a different form of education by suggesting that this is "a possibility unpalatable to many" (1980:34) but nonetheless included the participation in the most industrialised form of education as a characteristic in his original six-component definition of DE (with a corresponding qualification that this characteristic is included only "if accepted" by the reader).

Keegan's predictions with regard to the "unpalatable" nature of accepting the industrialisation of education as a defining characteristic of DE proved true, given the debate that followed (see Rumble's summary: 1989a). For example, Garrison and Shale criticised Keegan's definition as being "too restrictive in its view that distance education is an industrialised form of learning" (1987:12). However, in 1986 Keegan had already backed down from his original position and no longer insisted that the participation in the most industrialised form of education was a defining feature of DE, but still suggested that large-scale distance education systems contain industrialised features (1986:50). Also, in Keegan's (1988:10) response to the Garrison and Shale article, he no longer included the "most industrialised form of education" criterion in his definition of DE.

[1] Notional study hours includes: the total learning hours associated with contact sessions; time required for studying and assimilation of learning content; time for assignments and learning tasks; time for examination preparation and actual examinations.

Clearly, from the discussion above, DE as an industrialised form of education is not a popular defining feature of distance education provision. However, in the case of mass DE provision the industrialisation of the teaching-learning process as a differentiating feature cannot simply be disregarded. Consequently, the polemic associated with Peters's view of industrialisation in DE requires further interrogation, and will be discussed later in this chapter.

In a more recent publication, Moore and Kearsley (1996:2) define distance education as follows:

> *Distance education is planned learning that normally occurs in a different place from teaching and as a result requires* ***special*** *techniques of course design, special instructional techniques,* ***special*** *methods of communication by electronic and other technology, as well as* ***special*** *organizational and administrative arrangements.* [my emphasis]

The particular significance of this definition concerning the management of DE education systems is the emphasis it places on the specialised requirements of DE which covers the full spectrum of ODL practice including planning, course design, instructional methods and communication, but most importantly the special requirements concerning organisational design and management.

I am now in a position to partly answer the central questions posed at the beginning of this section: What are defining characteristics of DE when compared to face-to-face forms of delivery, and is it important to know the difference?

The practice of DE has specific implications for the tutoring organisation with regard to the planning, design, development and delivery of distance learning and the special requirements of DE are therefore a defining feature of ODL organisations. The necessity for technical communication media to bridge the time-space barrier is also a distinguishing feature of DE and this has both process and organisational implications for ODL institutions. Finally, the provision of two-way communication is essential in DE systems; otherwise, the institution concerned could not be classified as an educational institution. However, the characteristic of two-way communication in DE does not differentiate it from face-to-face forms of provision, but the time-space separation does have significant implications concerning the methods of achieving two-way communication in DE.

Regarding the question: Is it important to know the difference between DE when compared to face-to-face provision? Clearly, the answer is unequivocally '*yes*'. The organisational requirements of DE systems are different, and therefore it is necessary to understand these differences when dealing with the management and leadership of DE institutions. As we move deeper into the knowledge society and attempt to innovate new ODL delivery systems, understanding these differences will become a critical success factor in managing strategic ODL futures.

The definitional debate has subsided with the corresponding growth of the DE research base over the last five decades. With the advent of digital ICTs and large numbers of conventional face-to-face institutions augmenting their delivery systems with various forms of DE provision, the definitional debate is resurfacing in some publications without adequate knowledge or recognition of the state of global best practice in this field of study. Sadly, "there is much ignorance among many in education as among those outside it, about what distance education can do and cannot do, what does and does not constitute good practice in distance education, its efficiencies and governance" (Dhanarajan 1999:xiv). It is imperative that the management of strategic futures in ODL recognise the research base in DE; otherwise, the real opportunities associated with the future pedagogical potential of digital ICTs for society will be lost in the name of the digital equivalent of 'reinventing the proverbial wheel'.

The vision of open learning

In many respects, the philosophy of open learning represents a vision that has driven the evolution of distance education practice. John Daniel correctly points out that the conflation of the concepts of "open learning" and "distance education" into the single descriptor of "open distance learning" has created much confusion about the goals of ODL (Daniel 1999b: 293). The conflation has also generated misunderstandings concerning the meaning of open learning. The "conceptual fuzziness" (Daniel 1999b: 292) associated with the concept of "open distance learning" necessitates some elucidation of the meaning of open learning but also, it is necessary to indicate how this concept has been a visionary innovation that has steered the evolution of DE practice.

"Open learning" refers to "the general aim of opening up education and training more widely" (Daniel 1999b:292). It is a "slogan" (Rowntree 1991:22) that is closely associated with DE as there are many ways in which DE systems can make learning more open because of the nature of its method. For example, DE can increase access to education for learners who are unable to attend residential institutions, and learners have greater freedom of choice concerning the time and place of study – and therefore it is more "open" than conventional face-to-face delivery. In fact, many of the single-mode DE universities call themselves "open learning" institutions instead of "distance education" institutions, for example: the British *Open* University, the *Open* University of the Netherlands, the *Open* University of Tanzania, and the *Open* University of Hong Kong. However, notwithstanding the philosophy underpinning the practice of these different institutions, the concept "open learning" is often incorrectly used as a synonym for distance education – thus erroneously referring to the method of teaching rather than a philosophy which promotes openness concerning access to courses; freedom of choice regarding when, how and what to study; and openness concerning methods and criteria of assessing learning progress and achievement.

Lewis defines open learning as follows:

> *Open learning has two main thrusts: enhanced student access; and the development of student autonomy. These are achieved through widening student choice over aspects of the learning process. Choice may be widened over the time and place of study ... (and) over the curriculum itself, once access has been gained: choices, for example, of content, pace, method, media and assessment. These curriculum choices develop great autonomy: through the structured and supported exercise of choice in their learning, students work more independently.* (1997: 3)

As in the case of defining DE, the concept of "open learning" became the focus of a rigorous and highly emotive debate in the literature of the late 1980s and early 1990s (see for example, Lewis 1989a & 1989b, Lewis 1990, Paine 1989 & 1990, Rowntree 1992 and Rumble 1989b). Evans and Nation, writing from Australia, refer to the passion in the search for intellectual clarity associated with the variety of concepts used in the field:

> *We had hoped that the era of definitional disputes had passed and that our own relaxed attitude to nomenclature in our own field may have been becoming the norm. The terms "distance education", "external studies" and "open learning" are all suitable to us as broad descriptors of the enterprise within which we work. ... The situation in the United Kingdom seems to be different: "open learning", it appears from afar, is literally the rage* (1989:37).

In the late 1980s, "open learning" was being "trumpeted as the latest development in training, and the newly established Open College was trying to set itself up within the UK as something distinctive from the 'has been' Open University" (Rumble 1997a:181). Sparking the dispute, which was later to become known as the Rumble-Lewis debate, were assertions by Lewis that open learning should "not be confused with distance education or even worse with correspondence education" (Lewis 1989b:257). Lewis contended that distance learning and correspondence education implied "a thin educational experience delivered to isolated learners deprived of those interactions supposedly normal in conventional classrooms" (Lewis 1989b:257). Rumble argued that Lewis had failed to recognise the richness of many examples of DE, and, at the same time, had also failed to acknowledge "the poverty of some so-called open learning provision" (Rumble 1997a:182).

Open learning is a philosophy that can be applied to both face-to-face and distance forms of provision as well as university and corporate training environments and there are examples of "openness" and "closure" in all these educational endeavours. In Rumble's initial published response to Lewis's assertions from the corporate training perspective, he concluded that:

> *The term "open learning" is now being used as a banner to describe systems which are anything but open. This is monstrous misuse of language which needs to be stopped now. Access is about individual learners, not about corporate providers; openness is about structure and dialogue, not about instrumental training. This is not to deny the importance of corporate training. But corporate training is not open in important senses of the word as applied (as an adjective) to learning systems.* (1989b:33)

Therefore, "open learning" is not a concept which is necessarily indicative of the institutional method of learning provision, but rather refers to the philosophy that underpins a wide variety of forms of educational provision. With particular reference to university-level distance education, there are degrees of openness in each system. For example, the British and Dutch open universities succeeded in opening access to university education by not specifying minimum entrance qualifications. In this way, higher education opportunities are opened for prospective university students, who were not able to meet the minimum entrance qualifications usually associated with degree study at traditional universities. In this example, the openness is not related to the method of DE provision, because conventional face-to-face institutions could also open access by not specifying minimum entrance requirements for degree study. Alternatively, university systems can also be more open where students have greater freedom to select and structure their own individual curriculum. For example, Empire State College, one of the constituent colleges of the State University of New York, runs a system where students negotiate individualised degree programmes, thus customising the degree curriculum according to individual requirements as well as learner choice concerning delivery method including both contact and distance provision (Granger 1990). Certainly, it is easier to provide individualised degree programmes when using the DE method of provision, but this level of autonomy concerning student choice in curriculum is not necessarily limited to distance forms of provision.

I have suggested that there are degrees of openness in all systems and that in some respects it may be easier to provide increased levels of openness in DE forms of provision. However, within DE education systems, there are trade-offs regarding delivery alternatives with particular reference to attaining the ideals of open learning. For example, the Unisa delivery system demonstrates characteristics of openness regarding learner choice in curriculum because the University offers approximately 2000 degree year courses (Daniel & Mackintosh 2003), when compared with the British Open University who offers less than 200 degree courses (see Rumble 1995b). However, the Unisa system is closed when compared to the levels of individualisation through dialogue that is possible in the decentralised tutoring system of the British Open University. Therefore, although degrees of openness exist in all systems, there are also trade-offs whereby increased openness in one dimension may inhibit the openness in another area of the system.

I have also suggested that the philosophy of open learning is a vision that has directed the evolution of distance education, and that this vision will continue to guide the strategic futures of DE institutions. The vision and foresight of Charles Wedemeyer's work shows remarkable similarities with the ideals of contemporary open learning philosophy introduced above.

Wedemeyer's philosophy was led by the belief that every individual has the fundamental right to learn; in other words, access to education should be open. To attain this goal, Wedemeyer realised that education had to break the barriers of time and space by separating teaching and learning so as to extend access to adult learners who otherwise would not have been able to obtain a higher education through conventional residential institutions (Keegan 1992:77). Wedemeyer argued that the humanist ideals of education for all could only be achieved if delivery modes could succeed in significantly increasing the levels of access. Furthermore, he suggested that increased access could, realistically, only be achieved by separating the teaching and learning behaviours so that they are carried out apart. Hence, Wedemeyer coined the concept of 'independent study' and defined it as follows:

> *Independent study encompasses several teaching-learning arrangements in which teachers and learners carry out their essential tasks and responsibilities apart from one another, communicating in a variety of ways.* (Wedemeyer 1978:2114)

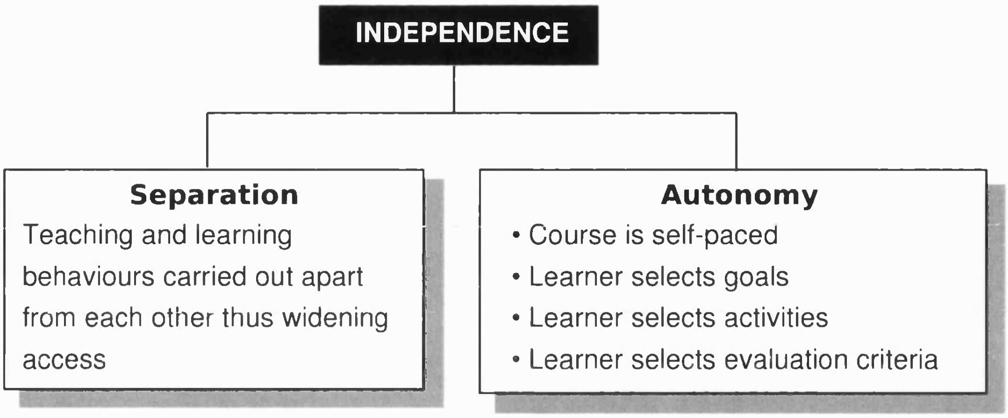
There are obvious similarities between Wedemeyer's concept of independent study and the definition of distance education. However, the significance of Wedemeyer's concept of independent study is that it originated as a response to the pedagogical vision of realising the right of every individual to learn and was not merely an intellectual attempt to describe a particular method of educational delivery. In other words, Wedemeyer's work in DE was purposefully driven by the vision of his humanist philosophy. He correctly prioritises pedagogy above the technology of distance education and places the learner at the centre of the educational universe as clearly expressed in the following statement:

> *Perhaps no tenet of education is more widely held or more frequently expressed than that education must be centred in the individual.*
> (Wedemeyer & Childs 1961:13)

Wedemeyer's concept of independence was not limited to the establishment of independent study as a method of delivery but was also founded on the ideals of establishing and promoting greater learner autonomy. He suggested that there are two dimensions of independent study, namely, separation and autonomy (see Figure 2.1).

With reference to Figure 2.1, separation refers to the teaching and learning that is carried out apart from each other and is therefore the primary enabler regarding the widening of access. The autonomy dimension represents the learner's freedom concerning decisions about their learning that is possible to achieve with independent study, thus placing the learner at the centre of the educational transaction.

Figure 2.1 Wedemeyer's dimensions of learner independence



Wedemeyer proposed three aspects of learner autonomy:

- that courses should be self-paced;
- that learners should be able to follow their own path of study within a course;
- that learners should have the freedom to choose the goals of study, the activities that will lead to the attainment of these goals and freedom in the selection of evaluation criteria (in Keegan 1992:77).

Clearly, these levels of learner autonomy would not be possible with conventional contact forms of provision, hence Wedemeyer's proposals for independent study where the separation of teaching and learning enables the attainment of the dimensions of learner autonomy listed above. As mentioned earlier, there are degrees of openness in all distance education systems, and many of the dimensions of learner autonomy envisaged by Wedemeyer have been implemented with varying degrees of success by a number of the ODL providers. However, there is not a single system that has succeeded in implementing all the dimensions of learner autonomy to their full extent, simultaneously.

The pedagogical potential associated with the new digital ICTs and corresponding systemic transformation that will be required of large ODL systems, may, for the first time, be able to realise the ideals of learner autonomy in ways that were previously not possible. Consequently, Wedemeyer's vision will continue to be a guiding force in establishing the strategic futures of ODL institutions.

Before concluding this section, a brief chronology of the events associated with the relationships of Wedemeyer's thinking and three influential university-level DE initiatives is provided to demonstrate how learner independence and autonomy have strategically steered the evolution of distance learning in higher education. The relationships between Wedemeyer's vision and the following three DE prototypes will be discussed:

- The foundation of Unisa as the world's first single-mode DE university in the world, in 1946 (Daniel & Mackintosh 2003);
- The Articulated Instructional Media (AIM) project led by Charles Wedemeyer at the University of Wisconsin and funded by the Carnegie Corporation from 1964 to 1968 (Moore & Kearsley 1996);
- The foundation of the British Open University in 1969 (Daniel 1999a).

In 1946, Unisa began teaching at a distance and is, therefore, the oldest single-mode distance-teaching university in the world (Boucher 1973). The University that was eventually to become Unisa was actually founded in 1873 as the University of the Cape of Good Hope. It was originally an examining university incorporating a number of colleges that were responsible for providing tuition. After the Cape of Good Hope had become part of the Union of South Africa early in the twentieth century, the University was renamed "The University of South Africa" in 1916. Under the auspices of Unisa, all the constituent colleges were to become independent universities by the early 1950s forcing Unisa to establish a new role for itself. This is why, in 1946, Unisa began teaching university courses using distance-teaching methods.

Despite the pioneering nature of this bold step into DE, the shift was not primarily driven by the vision of learner independence and autonomy. Rather, it would be more accurate to say that Unisa's shift to DE was circumstantial. Unisa was previously an examining university without residential teaching facilities. This, combined with the loss of its core function meant that it virtually had no alternative but to begin teaching using correspondence methods. The use of correspondence methods at university-level were already in operation for many years, for example, in the establishment of an extension division at the University of Chicago in 1892 to teach university courses by mail (Moore & Kearsley 1996:22). Even so, Unisa was the first autonomous DE university to teach all its offerings by distance methods alone.

Even though Unisa's shift to DE was not necessarily underpinned by the vision of learner independence and autonomy, it nonetheless resulted in greater access and increased learner autonomy by virtue of its method. Another benefit of the move to DE was that the organisation was forced to devise administrative systems to cater for large numbers of distance learners, hence gaining valuable experience in this important dimension of large-scale DE. At the same time, the most important challenge facing Unisa in the early years was to establish credibility and an academic reputation for degrees taught using the distance mode of delivery.

Initially perceptions existed between the academy and society that DE courses were inferior when compared to the conventional "professing of knowledge" at residential universities. Therefore, it was paramount that Unisa develop a reputation of quality with specific reference to the academic reputation of the qualifications taught using DE methods in the eyes of South African society, industry and the academic community. They were measured against the perceived superiority of traditional face-to-face forms of university education. Unisa achieved this reputation of quality through the appointment of reputable scholars to ensure the academic reputation of the respective disciplines taught at the University, rather than optimising the design of the organisations' processes according to the specialised pedagogical requirements of materials design for DE. The organisational design limitations of Unisa would later become the object of radical transformation at Unisa.

Unisa is a unique prototype because its systems were developed before the onset of educational applications based on the mass communication media. Peters accentuates the uniqueness of the Unisa prototype:

> *Nowhere else was it possible to let correspondence studies mature over the years into an accepted method of university teaching. Nowhere else was it possible for distance-teaching pedagogical routine to be developed so early from a university-based pedagogical experiment.* (1998:158)

However, during the late 1960s and early 1970s, distance education began experimenting with mass communication media and new methods of teaching. Deserving particular mention was the Articulated Instructional Media (AIM) project directed by Charles Wedemeyer from 1964 to 1968 at the University of Wisconsin. The goal of the AIM project was to find meaningful ways of connecting (i.e. articulating) a variety of communication media (i.e. ICTs) for the specific purposes of teaching off-campus students. A variety of media were included in the AIM project: text-based study guides; correspondence forms of communication; programmes using radio, television and audiocassettes; tele-conferences and the use of local library resources. The AIM project was a prototype experiment to test how Wedemeyer's ideals of learner independence and autonomy could be achieved through the separation of teaching and learning. Moore and Kearsley summarise the significance of the AIM project as follows:

> *AIM represented a historic milestone in the history of distance education: the beginning of the idea of the total system of distance education and the first test. AIM tested the viability of the idea that the functions of the teacher could be divided, that instruction could be assembled by a team of specialists and then delivered through various media. It tested the idea that a learner could benefit from the presentation strengths of the broadcast media, and at the same time, the interaction that was possible by correspondence and telephone.*
> (1996:25)

Moore and Kearsley have detailed the influential links among Wedemeyer's vision, the AIM project and the foundation of the British Open University (see Moore and Kearsley 1996:25-27). There are also important historical links involving Wedemeyer, Unisa and the British Open University. Without understating the accomplishments of the British Open University, these historical links provide important information to help understand some of the reasons why the British Open University has achieved considerable success, particularly regarding the driving force of Wedemeyer's vision of independent learning. The following chronology summarises these events:

- In 1965 Wedemeyer presented a paper on the AIM project in Wiesbaden, Germany. After the presentation, Frank Jessup from the University of Oxford informed him of Britain's ideas for starting the "University of the Air" that would primarily use broadcast television for teaching. (The University of the Air was later to become the British Open University.)

- Jessup invited Wedemeyer to Oxford where he met with Harold Wiltshire and Fred Bayliss from the University of Nottingham. At the University of Nottingham, Wedemeyer met with Bayliss's colleague Walter James who was coauthor of the early Nottingham DE courses. Walter James wrote the following to Wedemeyer after his return to America:

  > *You bear some responsibility for the emergence of the Open University in this country. It was your talk on Articulated Instructional Media (AIM) that stimulated us to produce at Nottingham the first university course in this country in which television broadcasts and correspondence instruction were integrated; and it was this experience which produced interest in the University of the Air idea.* (cited in Wedemeyer 1982:24)

- During September 1967, the British government set up a planning committee for the "University of the Air" which included Harold Wiltshire from the University of Nottingham as a member of the committee.

- During the last quarter of 1967, independently from the developments of the Open University in the United Kingdom, Samuel Pauw, vice-chancellor of Unisa, commissioned Wedemeyer to conduct an evaluation of the Unisa system. In his report published early in 1968, Wedemeyer described Unisa as an extraordinary creation but expressed reservations about the inadequate division of labour concerning specialist areas in the design and development of Unisa's DE materials (see Wedemeyer 1968).

Previously, Unisa had adopted an artisan approach with reference to the design and development of DE materials, where the professor carried-out all functions of the development process without design inputs from instructional designers, graphic artists, media specialists or communication experts. Despite Wedemeyer's insightful recommendations in this regard, Unisa was unable to attend to these problems until the late 1990s, suggesting how difficult it is to institute substantial change in large organisations.

- In 1968, Lord Walter Perry was appointed as the first vice-chancellor of the British Open University. Anastasios Christodoulou was appointed secretary and Walter James was selected as one of the first six directors of studies. During 1968, Christodoulou visited Wisconsin to study the AIM project. A senior delegation from the British Open University was also sent to Unisa. Wedemeyer also met with Lord Perry and other senior officials in London during 1968.

- In 1969, the year of the British Open University's inaugural ceremony, Wedemeyer spent several months in Milton Keynes in England, assisting the British in developing their plans for the new University.

Clearly, there are important links among Wedemeyer's vision, the AIM project, his evaluation of Unisa and his involvement with the foundation of the British Open University. Moore (1997:98) points out that Wedemeyer was significantly influenced by what he saw at Unisa. This together with his experiences of the AIM project, ensured that the organisational design mistakes of Unisa were not repeated in the design of the British Open University DE model.

The chronology of the events summarised above accentuate two essential elements with reference to the strategic management of changing futures in mass education provision:

- first, the power of a well-founded vision in establishing successful futures; and
- second, the dilemma large organisations must manage when faced with fundamental transformation within a new societal era, regarding the advantages and disadvantages of whether or not to establish a new entity.

It is interesting to note that all the ODL mega-universities, with the exception of Unisa, were established during or after this era of experimentation and implementation of the mass broadcast media in higher education – during the 1970s and 1980s[2]. Unisa's DE initiative was founded in 1946, which means that it was established during the period preceding the use of mass communication media in higher education. Therefore, Unisa was already an established organisation before the commencement of the new era in higher education associated with the mass broadcast media. Consequently Unisa is a unique case study because it is the only mega-university that has attempted a fundamental transformation of its organisation, processes and systems in response to the challenges of a different societal period. This experience will provide valuable insights for the ODL universities who are preparing themselves for the new era associated with the global knowledge society and digital ICTs. The prototypes discussed above are summarised in the table below:

[2] Although the Centre National d' Enseignement à Distance (CNED) was established in 1939 and is listed as one of the mega-universities, it is not included in this comparison. CNED provides tuition at the higher education level, but it is not a "university" in the traditional sense of the word. For example, many of CNED's students take courses in preparation for examinations set by other institutions. The Ministry of Education runs CNED and its courses range from primary school to postgraduate level.

Table 2.1 Comparing three DE prototypes

	Unisa	AIM Project	OU(UK)
DE Founding date	1946	1964	1969
Vision	Transition to DE was circumstantial having lost its previous core function, but was directed by the vision of establishing an academic reputation for DE when compared to conventional residential universities	Driven by Wedemeyer's vision of learner independence and autonomy	Large scale implementation of the vision of learner independence and autonomy through the use of mass broadcast media
Corresponding era	Established prior to the era of mass-broadcast media in DE	Pilot prototype designed to study the use of multiple media in DE during the early stages of the era of mass-broadcast media in DE.	Established during the era using the mass-broadcast media in DE, building on the insights of the AIM project
Institutional control	Autonomy and control over its practice	Pilot initiative without institutional autonomy and control over all aspects of the project	Established as an autonomous institution with autonomy and control over its practice
Status of organisation when embarking on DE	Existing institution	Pilot within an existing institution	Newly formed institution
Division of labour regarding DE teaching functions	Artisan approach where professor carries out and controls most of the DE teaching functions	Experiment to investigate the possibilities of dividing the teaching function into specialist areas	Pioneered the team-approach in DE course development using a variety of specialists
Media	Correspondence print-based model with low levels of media integration	Project to design a total DE system incorporating a variety of media	Implementation of a large scale DE university system incorporating a variety of different media, including broadcast television for teaching purposes

Reflecting on the AIM project, Wedemeyer identified three fatal flaws in the prototype: "it had no control over its faculty, and hence its curriculum; it lacked control over its funds; and it had no control over academic rewards (credits, degrees) for its students" (Wedemeyer 1981:23). Hence, Wedemeyer concluded that a large-scale operation using the teaching approaches of the AIM project would have to begin with complete autonomy and control over its practice (Wedemeyer 1981:23). In this regard the British Open

University was founded as an autonomous institution. In addition, the AIM project demonstrated two important features. First, that the separation of teaching and learning supported the vision of learner independence and autonomy and second, that the functions of DE teaching could be divided into a team of specialists and delivered using combinations of media. The British Open University also succeeded in building these features into its organisational model.

Wedemeyer's vision of learner independence and autonomy directed the establishment of two influential DE prototypes, namely the AIM project and the British Open University. The vision was pedagogical and not technological. At the inaugural ceremony of the British Open University, Lord Walter Perry stated the driving aims of the University as being "open as to people, open as to places, open as to methods, and finally, open as to ideas" (cited in Daniel 1999a:193). The visions of learner autonomy as encapsulated in the concept of "open learning" were a directing force for the successful establishment of the British Open University, and consequently the Open University was one of the first universities that allowed access to university-level study without requirements for pre-requisite qualifications.

The British Open University was also able to overcome the flaws of the AIM project identified above, and was established as a new institution with complete autonomy and control. The second innovation associated with the British Open University was the team approach of developing DE materials, thus realising the possibilities identified in the AIM project that teaching functions could be divided among a team of specialists. John Daniel, reflecting on the reasons for the success of the British Open University, points out that "when you ask Lord Perry today what was the Open University's key innovation and the key to its success he replies unhesitatingly, 'the course team'. That was the vehicle through which he achieved his goal of improving the quality of teaching in British universities and the rest followed from that" (Daniel 1999c: Online).

The discussion now moves to the second essential element of managing strategic futures identified earlier, namely, the potential dilemma associated with the advantages and disadvantages of establishing a new entity in the context of significant transformation precipitated by technological innovation.

Unisa was a university-level DE prototype that had complete autonomy and control over its processes, as recommended by the findings of the AIM project, even though Unisa's DE initiative was founded almost two decades before the conception of the AIM project. The Unisa system was developed before the technologies associated with the integration of the mass-broadcast media in DE. However, the successful application of the mass-communication media were an important focus of the AIM project eighteen years later. Thus both the AIM project and the British Open University were conceived within the new era of using mass-communication media in DE.

At the time of Wedemeyer's evaluation of Unisa, the university used an artisan approach where the professor was responsible for carrying out and controlling most of the DE functions associated with course development and teaching. Wedemeyer's evaluation of the Unisa system in 1967, drawing on the experience of his vision and the AIM project, correctly identified Unisa's organisational design problems with specific reference to the division of labour among specialised expertise in the DE design and development process thus questioning the effectiveness of Unisa's artisan approach.

Sadly, despite the advantage of autonomy and control over it own processes, Unisa was unable to succeed in the implementation of Wedemeyer's insightful recommendations concerning the necessary divisions of labour according to specific areas of expertise required in the development and teaching of quality DE courses. In other words, Unisa did not succeed in reorganising its system to accommodate a team approach for the design and development of DE materials, as was implemented from the inception of the new British Open University. Unisa's pedagogical model and corresponding organisational structures, even in the early 1990s, had essentially remained unchanged when compared with the system at the time of Wedemeyer's evaluation in 1967 (although Unisa's administrative systems had evolved considerably to manage large numbers of students effectively).

It was not until the period immediately preceding the first democratic elections in 1994 in South Africa after the fall of Apartheid that Unisa was pressured to change because of external criticism concerning the pedagogy of its learning materials and inadequate levels of student support (see for example SAIDE 1994 and Swift 1993). The University has engaged in numerous initiatives to transform its processes according to global best practice. A group was sent to study the ODL systems of the British Open University and the Open University of the Netherlands (see Unisa 1995a and 1995b) and commissioned internal investigations to redesign the Unisa system to accommodate a team approach for the development of materials (see for example, Mackintosh 1996 and Mackintosh 1998). Unisa has succeeded in approving a new tuition policy incorporating a team approach for the design of materials. However, existing organisational structures and an institutional culture that does not mirror the ideals of the team approach embedded in the tuition policy attests to the fact that significant organisation-wide transformation is difficult to achieve in large complex organisations.

As mentioned earlier, Unisa was founded before the era associated with the use of mass-broadcast media in DE and consequently it is the only mega-university that has attempted a fundamental transformation of its processes as necessitated by radical changes in technology. Despite its success as the first single-mode DE university, Unisa has experienced considerable difficulty in transforming its systems, processes and practice according to modern ODL trends. In contrast, the British Open University was designed as a new institution and was the first mega-university to be founded during the era of the mass-broadcast media in DE. Being a new institution, it was able to design its structures and processes to suit that purpose, and the team approach of development was effectively integrated from its inception. As we move into the new era of the global knowledge society and digital ICTs, all the mega-universities that were founded in the previous era of mass-broadcast technologies will potentially be faced with challenges of managing fundamental transformation. The Unisa experience of tackling pedagogical transformation of this magnitude will provide useful insights into the management of fundamental transformation and strategic futures in mega-universities when faced with challenges and opportunities associated with a new era.

The discussion of the dynamic relationships between three influential DE prototypes above introduces two critical questions that this thesis must attempt to answer:

- What strategic vision will guide the evolution of institutionalised DE provision into the future?
- How should fundamental transformation in large complex universities be managed, including the difficult question of whether it is better to transform from within existing organisations, or whether it is better to establish new ones, designed specifically for new purposes?

Wedemeyer's vision of learner independence and autonomy was a major driving force in the previous period, and the successes of British Open University bear out the advantages of establishing a new organisation that is driven by a profound vision. However, it not clear whether we will be able to recreate the history of the past and consequently the mega-universities will necessarily have to consider a range of alternatives for generating sustainable futures. Still, Wedemeyer's passion for promoting the right of the individual to learn is a guiding light that DE should continue to follow and is best summarised in his own words:

> *I think the first important requisite for anyone who works in the field of education is a deep and abiding love and understanding of the need to learn. From there you can go on to all kinds of specialities and concentrations, but without that, I think your work might be rather shallow.* (cited by Moore 1987:59)

2.2.2 An institutional-pedagogical matrix for analysing hybrid forms of ODL practice

This section will introduce a conceptual framework to distinguish among the myriad of DE delivery alternatives that are now emerging. This trend of the growing number of institutional forms involved in DE delivery corresponds with the pervasive advances in digital ICTs and "distance education no longer has a distinct and common pedagogy" (Daniel 1999a:56). The perplexing variety of hybrid forms of DE delivery now emerging is likely to increase as we move into the future. Accordingly, the management and leadership of strategic futures in ODL will require a robust conceptual framework to innovate relevant and effective ODL systems. In addition, the process of developing this framework will provide further clarrification and evidence of the fundamental uniqueness of large-scale DE systems.

However, before this framework can be presented as a tool for comprehending the complexities of current and future ODL systems, it is necessary to consider:

- the relationship between technological innovation and the evolution of DE; and
- why conventional DE classification frameworks are becoming redundant because of the increasing complexity in contemporary ODL practice.

When considering the relationship between developments in technology and DE, it is important to recognise that DE — per definition — is a technology in its own right. The separation of teaching and learning in time-space relationships means that it is technologically mediated using ICTs. The practice of DE is simply not possible without technological mediation.

It can be argued that DE has developed in response to the evolution of society and technology. Therefore, the development of ODL practice corresponds closely with these trends. Traditionally DE could be classified according to two dominant forms: first independent study that has evolved from the foundations of correspondence study; and second, the distributed classroom model where the conventional classroom situation is relayed to remote locations. Correspondence-based DE was made possible because of the invention of print and moveable type combined with the introduction of universal postal services. More recently, technologies like compressed video have facilitated rapid expansion of the distributed classroom model, particularly in the United States.

The fact that DE has always been a technology is significant because there is a rich and well-founded experience concerning technologically mediated forms of institutionalised learning and that this experience is not confined to recent developments associated with digital ICTs as some newcomers to the "technology-in-education" bandwagon would lead us to believe. Based on this experience of DE provision, it is more important to identify and understand the fundamental sociological and pedagogical drivers of technological innovation in ODL than it is to concentrate on the specifics of different hard technologies. Accordingly, the framework that will be presented in this section is based on the pedagogical underpinnings of DE, and will not base its classification on specific groupings or generations of technology.

Complicating the development of a conceptual framework for DE concerns the distinct differences between providing learning at scale and the smaller systems found at campus-based institutions using DE methods. The correspondence-based models have traditionally operated at scale, therefore the main characteristics of this model will require a brief introduction before proceeding with the analysis in this section.

Correspondence tuition provided the foundation for the development of university-level DE practice. The unique interaction between independent activities and interactive activities that are typical of DE systems characterise the distinct pedagogy of DE, its corresponding costs and the potential for economies-of-scale.

In correspondence tuition, the mass production of standardised print-based learning materials enabled learners to work independently from the teaching institution. Opportunities for interaction were provided through correspondence, for example, written feedback on assignments submitted and returned through the post or through other technologies, for example, telephonic discussions with the lecturer or tutor. Historically, it has been relatively easy to analyse DE systems in terms of the relationships between *independent* activities and *interactive* activities. Therefore in correspondence-based systems the distinction between independent and interactive activities can be illustrated as follows: First *instruction,* — usually an independent activity in large-scale systems — referring to content presentation using mass-produced print materials; Second *dialogue,* — an interactive activity — referring to interaction between tutor and student using communication media (see for example Hülsmann 1999:72). Typically the costs of instruction (independent activities) would be fixed irrespective of how many learners were enrolled for the particular programme whereas interaction activities would be variable and would increase proportionately with the number of learners enrolled. Historically, the interaction between independent and interaction activities enabled DE to scale-up the provision to levels that are simply not possible in contact forms of provision.

In the past, the distinction between face-to-face teaching and DE has been relatively uncomplicated and DE classification frameworks based on the differentiation between independent and interactive activities have been more than adequate to describe different hybrids of ODL practice. However, given the close relationship between DE and evolution of technology combined with the exponential progression of ICTs, it is becoming increasingly difficult to analyse DE in terms of the independent versus interactive activity framework discussed above. This is one of the reasons why Daniel (1999a) has inferred that DE no longer has a distinct pedagogy and today, the concept refers to a myriad of delivery alternatives.

Nowadays, the concept of DE includes, for example, the dual-mode systems pioneered by the Australians; the large-scale open learning systems associated with the mega-universities; the remote classroom models that have gained popularity in the United States; and more recently the variety of opportunities for DE delivery utilising the capabilities of digital ICTs and the Internet. Furthermore, before 1990 only a small percentage of the conventional campus-based universities offered programmes by distance methods. Today, few universities would admit to not offering online courses. In addition, the pervasive advances in digital ICTs have enabled institutions to combine a wide variety of delivery alternatives within a single system, which means that it is becoming increasingly difficult to identify discrete delivery systems.

It is no longer adequate to simply distinguish between face-to-face and DE forms of delivery, particularly when considering the myriad of hybrid and institutional forms of DE provision. Identifying the specific hybrid form of DE delivery is important because the management and organisation of the institution is influenced in a number of ways:

- The higher the levels of technical mediation that are used in the delivery system, the greater the demands that are placed on the management and administration of the organisation. ODL systems that use high levels of technical mediation in the teaching-learning process place considerably more demands on university systems and administration when compared to conventional residential universities.

- The specific technology choice combined with the characteristics of the particular DE delivery system used, will influence the nature and quality of the pedagogy of the learning experience as well as the scalability of the delivery model to capitalise on economies of scale and economies of scope. Quality and cost are primary variables that impinge on the dynamics associated with the competitive advantage of an organisation, and must be considered when planning strategic futures for the university.
- The levels of complexity concerning the management and administration of higher education will also increase, given the proliferation of digital ICTs and their corresponding potential for DE applications in a changing global economy. Given the variety of delivery alternatives in ODL combined with the increasing technical complexity of digital ICTs and increasing skills requirements for a wider range of specialisations, DE organisations will continually be faced with difficult strategy decisions in the future and will require a conceptual basis for strategic decision-making.

Clearly a more robust and well-founded analytical framework is required for differentiating among the myriad of DE delivery alternatives at the systemic level before the strategic management issues of the thesis can be tackled. This section introduces such a framework and will serve two purposes within the context of this study:

- to provide a basis for analysis of one of the central themes of this chapter: the unique differences between contemporary DE practice and face-to-face forms of HE provision; and
- to establish a conceptual framework for discussing future strategies in DE practice that will be investigated in subsequent chapters in the thesis.

In a technically mediated environment such as ODL, it is tempting to differentiate nuances of DE practice according to the specific technology that is employed, for example print-based correspondence education or interactive broadcast television. Some authors have described the development of DE according to a number of distinct phases or generations where each stage corresponds closely with the implementation of specific technologies (see for example Garrison 1985; Moore & Kearsley 1996 and Nipper 1989). Three generations of DE are usually described:

- *First generation* DE refers to correspondence study where the primary technology is a combination of the printed study guide with interaction facilitated by assignments and correspondence using the postal system;
- *Second generation* corresponds with the creation of the first open universities in the early 1970s which were the first large teaching systems specifically designed to use the mass broadcast media including radio and television in distance education applications;
- *Third generation* DE began in the 1990s and relates to DE delivery systems using computer conferencing networks and the use of multimedia workstations.

However, in a world characterised by an exponential rate of change regarding new technologies, it is dangerous to define practice in terms of specific hard technologies. As Daniel succinctly states: "The most important thing to understand about using distance education for university-level teaching and learning ... is that you must concentrate on getting the soft technologies right. The hard technologies change"(1999c: online). Therefore in education, it is more advisable to define practice in terms of the fundamental pedagogical processes with a clear understanding of how soft and hard technologies can support and enhance these processes, together with a clear understanding of the relationship among technology, administration and management of the university. Consequently, the analytical framework presented in this section is based on a pedagogical framework rather than on any typology derived from the variety of technological alternatives in DE.

Keegan, in his six-component definition, pointed out that a distinguishing feature of DE, when compared to face-to-face teaching, is the influence of an educational organisation (1980:33). The distinguishing aspect of this element of the DE definition is a pedagogical one, and not simply a formal requirement for an educational organisation to be involved in educational provision. After all, residential university programmes are presented under the auspices and guidance of an educational organisation. Therefore, if interpreted in this way, it would be difficult to argue that this element is a differentiating feature of DE. The fundamental difference to which Keegan refers, is the fact that in DE systems, the institution teaches whereas in traditional campus-based education a teacher teaches and "[t]his is a radical difference" (Keegan 1980:19). Given that in DE systems the institution teaches, it is not sufficient to base the framework on pedagogical foundations alone. What is required is a two-dimensional model that explains the interaction between the institutional system and the pedagogy of distance teaching.

For this reason, the analytical framework presented in this section is a two-dimensional matrix representing the interplay between the following two components:

- first, the DE delivery system referring to the particular institutional form that carries out the teaching functions; and
- second, how the pedagogical functions of distance teaching are carried out within each system.

The two-components are discussed separately below whereupon some issues concerning the interplay between these components will be illustrated.

DE delivery system

As illustrated in Figure 2.2, when focusing on a particular learning situation, distance education is either synchronous or asynchronous. A single DE provider may also use a combination of both synchronous and asynchronous delivery alternatives in its system.

In synchronous delivery systems the learning takes place at the same time but at a different place from the teaching, for example, connecting a local classroom via videoconference with learners at remote sites. This form of delivery is often called the "distributed classroom" or "remote classroom" model because the classroom is distributed to remote sites. Synchronous delivery systems have the advantage of utilising the benefits of real-time dialogue and have greater freedom to structure the teaching-learning interactions according to specific needs of the learners (see Moore & Kearsely 1996).

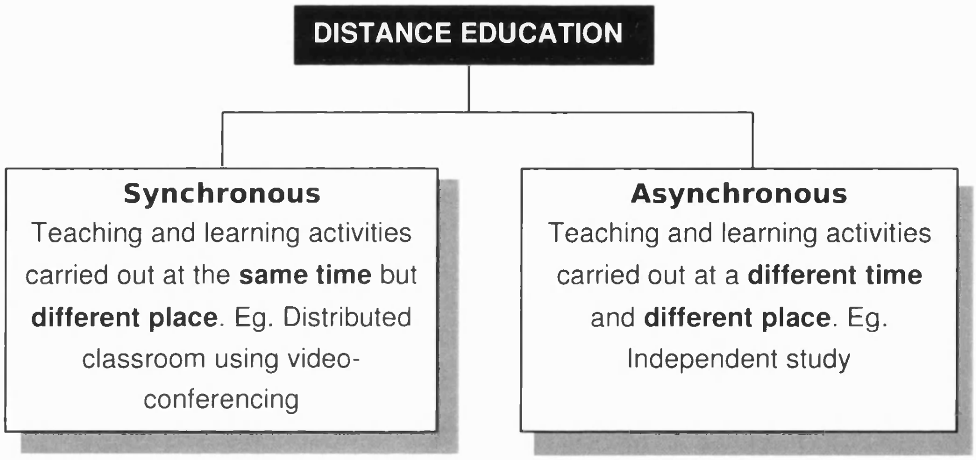
Teleconferencing is another example of synchronous delivery in DE. Keegan (1995:109) distinguishes between the following four categories:

- *Two-way audio:* Telephonic discussions (including web-telephony) between teachers and learners can be used for teaching purposes and are also used for student counselling. Teleconferences can be used for linking a number of individual students with the lecturer or linking remote sights where small student-groups are assembled around a telephone with loudspeaker capabilities.
- *Two-way audiographic:* This is an application where audio teleconferences are supported with graphic representations transmitted over the telephone line. With

careful planning, pre-prepared visuals can be included with study material or posted separately for scheduled teleconferences.

- *One-way video plus two-way audio.* This is a broadcast or narrowcast application where teaching is distributed to remote locations where dialogue between the remote student classroom and lecturer is telephonic. This configuration does not require as much bandwidth as two-way video plus two way audio, and depending on questions of cost and scale, terrestrial broadcast or satellite broadcast technologies can be used for transmitting lessons.
- *Two-way video plus two-way audio.* This is a narrowcast application, which uses video-conferencing technologies to link remote sites with the teaching centre. Most video-conferencing technologies require considerable bandwidth using carrier technologies like fibre-optic cable, ISDN or satellite.

Figure 2. 2 Synchronous and asynchronous delivery in DE



Currently, Web-based video-conferencing that uses digital Internet protocols, combined with the phenomenal advances in digital compression technology, video-streaming and growing levels of broadband connectivity, will radically change the cost-behaviours associated with the traditional teleconferencing technologies described above. It is reasonable to assume that the distributed classroom model will increase in popularity, particularly with residential institutions that plan to augment face-to-face provision with this form of DE, as evidenced by the growing use of this model in the United States of America.

The distributed classroom model has the advantage that faculty members can teach at a distance using virtually the same pedagogy as face-to-face classroom lecturing without the institution having to incur substantial training costs for the pedagogical requirements of asynchronous delivery systems. The distributed classroom model, despite its popularity, inhibits the pedagogical innovation now possible with digital ICTs and does not represent an advanced form of pedagogical evolution. It simply uses ICTs to sustain the traditions of professing knowledge by replicating lecture-room pedagogy at remote sites. It is also difficult to scale-up this model to the levels of cost-effectiveness associated with single-mode DE institutions.

Many supporters of technology-enhanced synchronous learning systems argue that this form of provision is the new future for DE and represents a paradigmatic shift in educational delivery (see for example Garrison 1989 and Garrison 1997). However, the view that technological extension of classroom teaching is a paradigm shift in DE constitutes an error in logic, as the pedagogy of the distributed classroom model is essentially the same, in all fundamental respects, when compared to conventional face-to-face instruction. Furthermore, this view of "distance education" does not cater for the fundamental social evolution associated with providing mass access to university-level education to individuals who were previously excluded from access to higher education (Peters 1998:144). The unique requirements of mass DE provision — for example, division of labour, and corresponding systemic adaptations necessary in asynchronous single-mode institutions — are also disregarded in this theoretical view of DE. Peters justifiably criticises the pseudo-theoretical frameworks of this kind of DE thinking and states that "[i]t seems that they have also not realized just how complex and demanding the pedagogical structure of teaching at an autonomous distance-teaching university actually is" (1998:144). Peters goes as far to say that the mere technological extension of classroom teaching "is *not* distance education" (1998:144).

From the perspective of the philosophy of open learning, synchronous delivery systems (where learners must be at a particular place at a specific time) limit learner freedom and independence concerning learner choices of when and where to study. Therefore they are more closed than many other DE hybrids. Furthermore, the pace of learning in synchronous systems is largely determined by the instructor and timetable of the distributed classes thus limiting opportunities for accelerated learning or a slower pace for learners struggling with the assimilation of learning content. However, the new digital ICTs are providing greater freedom of choice concerning place of study, but synchronous delivery systems still require learners to be "present" at predetermined times. Global providers using synchronous delivery systems are also limited by the constraints of teaching across time zones.

In asynchronous delivery systems, the learning takes place at a different time and usually at a different place from the teaching organisation. An example would be correspondence-based distance education that uses pre-prepared learning resources (for example, printed study-guides) for teaching combined with simulated interaction (for example, Holmberg's guided didactic conversation 1995b:175) and real communication mediated by technology (for example, e-mail). The concept of "independent study" is often used to refer to asynchronous delivery systems. The independent study model can be augmented with various levels and forms of student support and does not exclude face-to-face tutoring systems, as indicated earlier in the chapter when the concept of DE was defined. Asynchronous delivery systems offer learners greater freedom concerning choices of when and where to study compared with synchronous delivery systems. Very often, students also have the advantage of relative freedom concerning the pace of their learning according to personal requirements and the specific pedagogical model used.

The two dominant modes of DE delivery discussed above, that is, synchronous versus asynchronous modes, have been institutionalised into two distinct organisational forms:

- dual or parallel mode institutions, which offer some or all of their programmes using both face-to-face and DE forms of provision; and
- single-mode DE institutions that offer all their programmes using ODL methods.

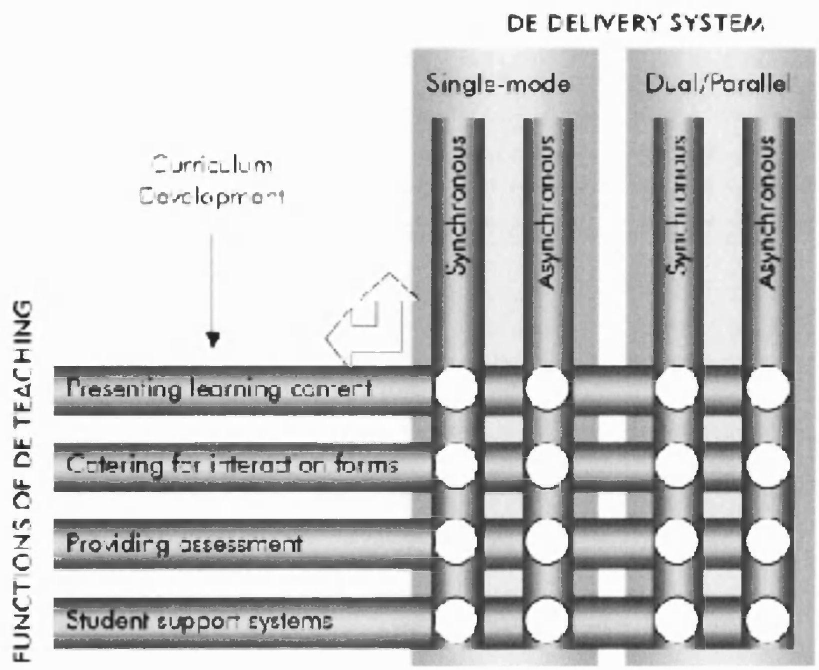
Dual-mode institutions offer courses in the same programmes in both face-to-face and DE modes. Parallel institutions offer some components of the same programme in contact settings, while other components of the same programme are only available in the distance mode.

It is important to distinguish between distinct organisation forms — for example, single-mode versus dual and parallel-mode — because the organisational form affects the way the organisation is structured, its cost structures as well as the administration, design, development and delivery of DE offerings. Furthermore, it must be emphasised that DE requires organisational structures and processes that are specially designed for DE. These structures and processes, as suggested earlier in the chapter, are distinctly different from those found at conventional face-to-face institutions.

The main benefit of dual-mode institutions is that they increase access to off-campus students. In dual-mode systems, lecturers are responsible for teaching in the classroom as well as the teaching of the DE students. This system has the advantage that the resources designed for the distance education component can also be used in the classroom. Consequently, the pedagogical discipline associated with the design of quality distance education resources in asynchronous systems can have a positive impact on the quality of classroom teaching. Conversely, the advantages stemming from the dialogue and interaction in the classroom concerning, for example, the identification of areas where contact students are struggling, can be fed back into the distance education component of the course. However, as suggested earlier, dual mode institutions based on synchronous systems essentially use the same pedagogy when compared to face-to-face teaching in the lecture hall.

Nonetheless, dual-mode systems still require a robust administration and support infrastructure, and the distance education component must be included as an integral component of the institution's mission with supporting policies to ensure that the distance component is not neglected. Very often contact institutions that begin augmenting contact provision with distance forms of delivery often overlook the administrative support systems that are required in dual-mode systems, resulting in poor quality provision when compared to the large open learning systems. Furthermore, particularly in the case of asynchronous delivery, the DE component must be adequately resourced to ensure the pedagogical quality of learning resources. Although dual-mode systems can provide a cost-effective way of increasing access to off-campus students because the same faculty member is responsible for both modes, "it is difficult to scale up enrolments beyond what an individual academic can cope with" (Daniel 1999b: 296). University management must also recognise that different organisational structures will be required for asynchronous and synchronous modes of delivery and that the cost behaviours are different for the two DE modes.

Figure 2.3 DE Analytical systems framework



The two-dimensional matrix proposed in this section is represented graphically in Figure 2.3. The matrix depicts the interplay between institutional form and the pedagogy of distance teaching. Readers will see that the DE delivery system is subdivided into single-mode and dual/parallel mode institutions. Each system can use synchronous or asynchronous modes of DE delivery. The intersection points between the vertical and horizontal bars, shown as the white circles in the figure, represent the interaction between the delivery system and functions of DE teaching. The next section will introduce the functions of DE teaching.

Functions of DE teaching

The activity of distance teaching can be subdivided into four main teaching functions:

- presenting the content of learning in a way that facilitates the attainment of the curriculum outcomes;
- to plan and facilitate different forms of interaction over time and space;
- to plan and provide alternatives for learner assessment;
- to plan for the support for the learners in the DE system.

Depending on the delivery system, some overlap between the four functions of DE teaching may occur, but nonetheless, the framework provides a valuable frame of reference for analysing ODL systems.

With reference to Figure 2.3, each of these teaching functions can use one or more of the DE delivery systems described earlier and are obviously technologically mediated because of the time and/or space separation in DE. For example, a single-mode institution could use printed study materials for the presentation of learning content (asynchronous). However, some courses could present components of the learning content using video-conferencing technologies (synchronous), in conjunction with printed study materials, thus using one or more of the delivery systems.

The differentiating characteristics between conventional face-to-face delivery and DE systems are not limited to the obvious differences regarding the use of technical means to achieve the four functions of teaching to overcome the practical barriers of time and space. In large-scale ODL systems division of labour is necessary to achieve the four functions of distance teaching. However, in campus-based teaching, the professor is responsible for carrying out all the functions of teaching at the same time and place within the lecture-room situation and does not necessarily require technical means to carry out the functions of teaching. There is also a significant difference concerning how the processes of curriculum development and instructional design are executed when comparing face-to-face with DE forms of provision. These differences necessitate that special structures and processes are instituted in large DE institutions, which differ from those required of conventional face-to-face organisations.

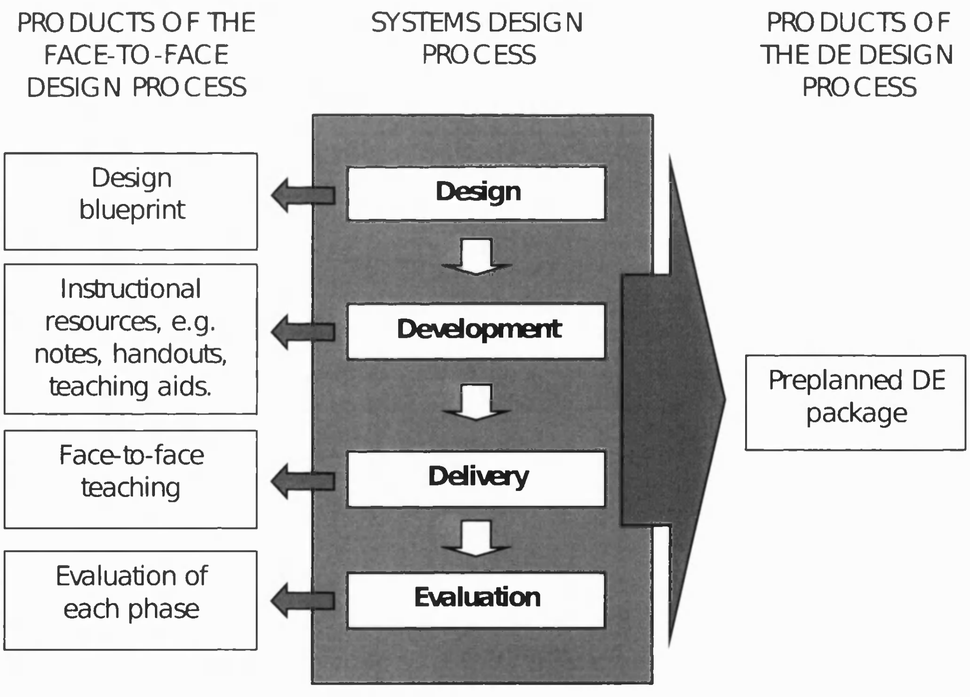
To illustrate this difference between face-to-face and DE systems, we need to compare the typical processes and products of the curriculum design and instructional design processes at both types of institution. Most instructional design models divide the process into the following subphases (see for example Andrews & Goodson 1991; Reigeluth, Bunderson & Merril 1994; Moore & Kearsley 1996):

- *design*, the professional activity associated with developing an "architect's blueprint for what the instruction should be like" (Reigeluth 1983:7);
- *development,* developing the learning resources in terms of the design blueprint above;
- *implementation,* referring to the actual teaching delivery; and
- *evaluation,* including both process and product evaluation.

The specific products of the curriculum development process and instructional design activities in face-to-face situations differ significantly from those associated with DE systems. Hence, the key performance areas of DE institutions differ from those of face-to-face institutions. The most notable difference — particularly with regard to asynchronous systems — is that the whole course is usually designed and developed before the teaching begins and therefore the design process culminates into a total instructional "package". In face-to-face situations, in contrast, there are different products for each of the subphases of the instructional design process. These relationships are illustrated in Figure 2.4.

Two fundamental differences regarding the comparison between face-to-face and DE forms of delivery require particular mention with reference to Figure 2.4. Firstly, DE systems require significantly higher levels of planning before actual teaching can begin, because the entire learning package is designed before students enrol for the course concerned, and consequently DE courses cannot rely on incremental adaptations and improvements during the course of delivery — as is possible in face-to-face forms of delivery. Secondly, given the high levels of specialisation and division of labour that is typically found in large ODL systems, organisational structures and processes are correspondingly different in DE when compared to face-to-face organisations. In classical organisational theory, structure follows strategy. Thus, given the distinct pedagogical differences between DE and face-to-face provision, the organisational form of these institutions will differ respectively.

Figure 2.4 Comparison of the process and products of the design process in face-to-face and DE modes of delivery



In the remaining paragraphs of this subsection, each of the distance teaching functions is briefly explained, with corresponding examples of how synchronous and asynchronous delivery systems mediate specific teaching functions.

Presenting the content of learning in DE

This refers to the function most commonly associated with teaching: to present the content which must be learned, or to create opportunities for acquiring the relevant skills and competencies. In most mass-provision systems and some dual-mode systems, this function relies heavily on independent study activities, facilitating the potential to scale-up this function of distance teaching. However, the remote-classroom approach (synchronous communication) is also used widely for this distance teaching function, particularly in the United States of America.

The concept "content of learning", as it is used here, is not a narrow interpretation of the concept. In other words, I am not limiting the concept of "content of learning" to that which is physically provided as actual content in the learning resources. The concept is inclusive of both the physical content which may be provided in the learning resources, and also includes the range of planned learning opportunities and experiences where the "content" to be learned is contained in the learning experience itself. In other words, the "content" to be learned is "outside" of the learning materials that are provided. In this case, the learning materials are designed to initiate and facilitate meaningful learning experiences.

Therefore the "content of learning" as it is used in this framework, is inclusive of both the reception learning and the autonomous discovery learning ends of the learning continuum as intended by Ausubel (1963) and is represented graphically in Figure 2.5 below.

Figure 2.5 Ausubel's learning continuum

Reception and discovery learning are concepts originally used by Ausubel (1963), a cognitive psychologist, to distinguish between two distinctive **types** of learning. Reception learning is the kind of learning where the content to be learned is presented in its final form to the learner. In discovery learning, however, the content is designed in such a way as to initiate autonomous or guided discovery of what should be learned.

The following table provides examples of how the pedagogical function of presenting the content of learning can be achieved when using asynchronous and synchronous forms of DE delivery:

Table 2.2 Selected examples of presenting the content of learning in DE using synchronous and asynchronous systems

Synchronous DE delivery	**Asynchronous DE delivery**
• Live radio broadcast with or without opportunities for live interaction with students;	• Text-based study guides (print or digital) distributed through postal services (printed study guide or CD-ROM) or available on demand through the Internet;
• Live television broadcasts of lectures using terrestrial analogue or digital broadcast technologies with or without opportunities for live interaction with students;	• Audio recordings of lectures and distributed on cassette, CD-ROM or as audio-on-demand on the Internet with or without text-based resources;

Synchronous DE delivery	Asynchronous DE delivery
• Live narrowcast of lectures to remote classroom sites using video-conferencing technologies or to individual students using personal computer video-conferencing technologies with or without possibilities for live interaction with students;	• Distribution of recorded lectures on video-cassette, CD-ROM or as video-on-demand using video streaming technologies and the Internet with or without text-based resources;
• Tele-conference with or without audiographic support.	• Interactive multi-media learning resources distributed by CD-ROM or available on demand from the Internet

Providing for interaction in DE

Interaction in DE poses unique challenges because of the time-space separation between the teaching institution and the students. It necessitates high levels of technological mediation, except in those specific situations where opportunities for occasional meetings between students and tutors are designed as part of the DE delivery system. The teaching function of interaction distinguishes DE as an educational endeavour and differentiates itself from other activities associated with incidental learning, for example reading a book for pleasure or watching a television documentary. From the student perspective, there are three important types of interaction in DE (Anderson 2003; & Moore 1993:20).

- *Learner-content interaction*: This is seen as the defining characteristic of education — without it there can be no education. Through the learner's interaction with the content, changes in perspectives, understanding and cognitive structures take place. Under this heading, Moore also includes the "intra-subjective" interaction that takes place in the learner's own mind when interacting with the content.
- *Learner-instructor interaction*: It is important to remember that in DE learner-instructor interaction is not necessarily synchronous but also includes numerous examples of asynchronous communication. Learner-instructor interaction is technically mediated and includes, for example, correspondence, e-mail, facsimile, web-based discussion forums, voice-mail, telephone, audio and video-conferencing. Furthermore, apart from the actual synchronous and asynchronous forms of one-to-one communication, this kind of interaction can take on many forms of simulated interaction, for example the, conversational writing style of study guides and feedback on in-text activities in study guides (see for example, Holmberg 1995a: 46-55).
- *Learner-learner interaction*: Here learners interact with other learners, one-to-one or in groups, with or without the real-time presence of an instructor. This is proving to be a valuable mode of learning as is documented under co-operative learning strategies in the literature. An electronic discussion forum or on-line chat session among students are examples of technologies that could be used for learner-learner interaction. As with the other forms of interaction above, learner-learner interaction can use both synchronous and asynchronous forms of communication.

Table 2.3 below illustrates examples of interaction and DE delivery systems. The list of examples provided in Table 2.3 is not comprehensive, but shows a range of interaction opportunities in the provision of DE.

Table 2.3 Comparing synchronous and asynchronous interaction in DE

Synchronous DE delivery	**Asynchronous DE delivery**
Learner-content interaction	
• In the remote classroom situation, the instructor can provide opportunities for learners to engage with the content using the pedagogy of compelling problem formulation and dialogue relevant to the pre-knowledge of the student group. The pedagogy used here is essentially the same as that associated with conventional classroom pedagogy.	• Engaging learners in the learning content through the design of compelling in-text learning activities, purposefully designed according to the findings of the student needs analysis conducted during the instructional design process. This will require the application of specialised DE skills and the principles of "guided didactic conversation" (see Holmberg 1995b: 47-50) and simulated asynchronous communication; These principles can be applied to other forms of asynchronous communication, however, conventional classroom pedagogy is not sufficiently comprehensive to achieve the aims of this form of interaction DE.
Learner-instructor interaction	
• Real-time dialogue using question-answer techniques during remote classroom sessions, including television and radio broadcasts and narrowcasts, for example video conferencing sessions assuming two-way audio; • One-to-one or one-to-few teleconferences between tutor and student(s); • Real-time chat sessions between tutor and student using the Internet; • Face-to-face sessions where tutors and students meet in real-time.	• Written or pre-recorded audio feedback on assignments submitted by students; • Correspondence, facsimile, voice-mail or e-mail communication between tutor and student; • Electronic discussions using Listserve or Web-based discussion forums not excluding the potential of SMS messages (cellular telephony) and video-mail; • Using the techniques of simulated communication and "guided didactic conversation" in text-based materials that are prepared in advance.
Learner-learner interaction	
• Designing opportunities for learners to interact with each other during remote classroom sessions or face-to-face sessions; • Providing opportunities for chat sessions among learners; • Enabling learners to contact each other telephonically.	• Enabling individual learners to correspond with each other using correspondence, facsimile, voice-mail or e-mail technologies; • Promoting the establishment of collaborative learner networks where learners can interact with each other in group contexts using a variety of ICTs, for example, electronic discussion forums purposefully designed as group learning activities.

The different forms of interaction — both the levels and pedagogical design thereof — enhance the educational quality of DE delivery.

Moore points out that:

> *In short, it is vitally important that distance educators in all media do more to plan for all three kinds of interaction, and use the expertise of educators and communication specialists in both traditional media - printed, broadcast, or recorded - and newer teleconference media and electronic media such as computer mediated conferencing, e-mail, voice mail etc.* (1993: 23)

Providing for assessment in DE

Assessment refers to the teaching function of providing opportunities to evaluate learning progress for both formative and summative purposes. Assessment as a pedagogical function should not be confused with the evaluation of the quality of course materials as a distinctive phase of the instructional design process.

Formative assessment refers to those assessment activities that take place during the teaching of the course and have a distinctive teaching function, for example, learning activities in the materials or assignments designed to evaluate learner progress in accordance with the planned outcomes of learning. Diagnostic assessment, although sometimes classified independently, is treated as a form of formative assessment in this framework.

Summative assessment usually takes place at the end of specified unit(s) or component(s) of the course for the purposes of certification or promotion to the next level, for example, a portfolio that is submitted as evidence of learning or a year-end challenge examination.

In asynchronous forms of DE, the absence of regular face-to-face contact requires that assessment opportunities be planned in advance and that they are carefully integrated into the teaching of the program. Furthermore, the distance element requires that the teaching institutions concerned have corresponding administrative systems to manage the assessment of learning effectively, for example setting up specialised units to manage the logistics of receiving and returning assignments, record keeping, systems for automated assessment and systems for electronically submitted and processed assessment.

The following table illustrates examples of assessment in both synchronous and asynchronous delivery systems:

Table 2.4 Selected examples of assessment in DE using synchronous and asynchronous delivery systems

Synchronous DE delivery	Asynchronous DE delivery
• Using videoconferencing or audioconferencing technology for administering an oral evaluation session for formative or summative purposes.	• Purposefully designed learning activities that are embedded in the print materials with appropriate feedback for diagnostic or formative evaluation purposes.
• Proctored test or examination sessions at predetermined place and time.	• Assignments that are submitted electronically or by post, which are then graded by lecturers or tutors from the teaching institution or graded automatically in the case of objective item assessment with appropriate feedback on achievement.

Synchronous DE delivery	Asynchronous DE delivery
	• In some cases, the assessment of practical skills can be achieved asynchronously using audio or video recordings of the activity with or without supporting documentation). The cassette is returned to the teaching organisation for assessment, for example a video recording of a practice lesson presented by a student teacher as an assessment of teaching practice. • Advances in digital security and authentication are creating new opportunities for remote asynchronous assessment for summative evaluation purposes.

Given the traditional requirements of security and unique identification, particularly in the case of summative assessment, many distance education institutions use the more conventional practices associated with campus-based models using invigilated examinations at predetermined times and venues. However, large-scale asynchronous delivery systems require robust systems to manage the logistics of administering decentralised examinations. For example, during the 2000 academic year, the Examinations Department at Unisa was responsible for employing 1 500 invigilators and proctoring 540 000 written examinations at 450 examination centres, including 72 prison centres and 139 examination sites outside the geographical boarders of South Africa. The logistics of managing: the timetable, security associated with the distribution of examination papers, invigilating and return of examination scripts is substantial, especially when you consider that Unisa strives to provide an examination venue for every student within a 50km radius from the student's place of residence, irrespective of where they reside in the world. This is a differentiating characteristic of large-scale learning systems, when compared to the particular assessment function at campus-based institutions.

Providing for student support in DE

The alienation of the teaching-learning processes in DE, because of the time-space separation, amplifies the need for student support, particularly in the large-scale teaching systems of the open universities. In this section the concept of "student support" is defined as it relates to distance education systems. Certain functions of student support distinguish the large-scale ODL universities from other forms of DE and campus-based teaching, and this difference will also be explained. Finally, a few of the difficulties facing some large-scale providers with the redesign of their systems to incorporate adequate levels of student support are introduced to illustrate that student support is a core function of distance teaching.

Student support is an illusive and, in some cases a politicised concept particularly in the context of the redesign and pedagogical transformation of large-scale DE systems. It is illusive because there are numerous pedagogical interventions that "support" learners in their learning but do not fall under the ambit of what is meant by the concept of "student support", according to global best practice in ODL. Student support is further politicised by attempts to rationalise legacy systems that do not cater adequately for the provision of student support primarily because key functions of student support are variable costs and increase proportionately with the number of enrolments. Consequently, in ODL systems that have not been designed correctly to effectively provide for this distinct function of distance teaching, heated debates about the redesign of DE teaching systems to improve student support are understandable. This is particularly true in the contemporary higher education context of diminishing financial resources. Very often, cheaper alternatives that appear to "support" learners are forwarded in lieu of the requirements to provide levels of quality support, thus contributing to the misconceptions of what the concept means in ODL contexts.

In large DE systems student support refers to "the range of services both for individuals and for students in groups which complement the course materials or learning resources that are uniform for all learners, and which are often perceived as the major offering of institutions using ODL" (Tait 2000: 289). Tait (2000: 289) identifies three primary functions of student support in ODL systems:

- *Cognitive support* refers to the customised and individualised support, provided to students in order to mediate the distance learning experience "contained" in the standardised and uniform course materials. For example, tutoring which can be face-to-face, in the case of residential schools, and discussion classes but also includes instances of individualised instructor-student interaction — whether telephonic, electronic or by correspondence — that support the students' learning over and above the mass-produced materials. Individualised feedback provided by instructors or tutors on students' assignments is also an example of student support in DE.
- *Affective support* concerns the requirements of creating an environment that engenders commitment and enhances the self-esteem of the student. In essence this dimension is best achieved by ensuring an organisation-wide culture of student-care that is promoted with all dealings with the "customer", irrespective of the responsible department. Affective support is also provided in specific services like career guidance and student counselling services.
- *Systemic support* regarding the establishment of administrative processes to ensure effective delivery of all the facets of DE provision and transparent information management systems that are student-friendly including, for example; pre-registration services (enquiries and advisory services); admission; record keeping; dispatch of learning resources; dealing with student queries and library services.

The three functions of student support are interrelated and interdependent. Unfortunately, in some DE teaching systems, student support is primarily seen as the administrative systems responsible for providing systemic support, thus ignoring the significant pedagogical imperatives of affective and cognitive support. In such systems where student support is limited to administrative processes, it is difficult to create an environment that promotes commitment and self-esteem for students, and consequently, dropout rates could be even higher. Similarly, in the absence of effective systemic support, it is not possible to achieve acceptable levels of cognitive and affective support.

Tait (2000: 289) correctly points out that the cognitive dimension of student support is less often recognised in large-scale teaching systems. For the purposes of clarity, it is necessary to emphasise that student support refers to the individualised customisation, over and above the teaching contained in the mass-produced learning resources. Student support is therefore differentiated from the teaching elements contained in the mass-produced learning resources because they are identical for each learner, whereas student support interventions are individualised according to the specific needs of the learner. Therefore, elements contained in a study guide, for example, which provide for differentiated teaching support are not classified as student support in this framework, even though they may "support" the learner. The variety of learning design alternatives that are embedded in the mass-produced learning resources (for example in-text activities) are regarded as the outcome of good teaching design and not examples of student support within this classification framework.

The cognitive function of student support is also a characteristic, which differentiates large-scale ODL systems from other forms of DE provision, primarily because of the following reasons:

- First, the cognitive dimension of student support in ODL teaching systems is provided by dedicated systems with the understanding that teaching at scale is a prerequisite condition that enables the provision of this dimension of student support; and
- Second, the student support systems of the large ODL institutions are capable of providing levels of individualisation that are simply not possible in conventional campus-based, dual-mode or remote classroom models of DE provision.

Typically, most synchronous DE systems would provide for systemic and affective support as part of the teaching system; however, the functions of cognitive support would be integrated into the synchronous learning sessions, thus obviating the need for dedicated systems that cater for this function of student support. Hence the dedicated systems — especially with regard to the cognitive dimension of student support — that are required in large-scale ODL teaching systems, are differentiating characteristics of a mega-university.

Given that student support costs are variable, scale is a necessary prerequisite for effective implementation of dedicated student support systems. The development of quality learning materials requires huge investment in infrastructure, including expensive academic and professional resource time. The mega-universities seek economies of scale to spread this investment over large numbers of students in such a way that the unit cost of the mass-produced materials is low enough to enable the provision of a system of cognitive support, notwithstanding the variable nature of the costs of this dimension of student support. Teaching at scale makes it possible for the total unit cost — including the fixed cost component of the learning materials plus the variable cost component of student support — to be less than the unit cost of conventional teaching. By comparison, the campus-based model is not scalable, and with increasing student numbers, the levels of individual student support diminish. Yet in large-scale ODL systems, high levels of individual support can be sustained.

Therefore, the cost efficiency of DE is based on achieving economies-of-scale through the standardised mass-production of teaching materials combined with the variable costs of providing student support and interaction (see for example: Rumble 1997b and Hülsmann 1999). The interplay between the standardisation of learning materials and the customisation through student support means that the large ODL systems are capable of providing university degrees at significantly lower costs per degree and, from the student fee perspective, are more affordable than the residential alternative.

There are areas of potential overlap between the four functions of distance teaching identified in the DE analytical framework of this chapter. For example, many forms of learner-instructor interaction (excluding simulated learner-instructor interaction contained in the mass-produced materials in asynchronous systems) could arguably be classified as student support, hence the reference to areas of potential overlap between the different functions of DE teaching mentioned above. The reason why student support is identified as an independent function of DE teaching is because learner-instructor interaction does not recognise the specialised systemic requirements of providing student support in DE. In fact, instructor-student interaction is not possible in large-scale asynchronous systems without a dedicated student support infrastructure. Very often division of labour means that lecturers may not be directly involved in the provision of student support, because this function is usually carried out by dedicated student support faculty. Also, learner-instructor interaction does not necessarily recognise the system requirements of integrating student support into the DE delivery system. Furthermore, learner-instructor interaction does not include the systemic support dimension, thus requiring that student support is classified as an independent function of DE teaching.

The second differentiating feature pertaining to the cognitive dimension of student support in large-scale ODL systems refers to the levels of individualisation that can be achieved when compared to other forms of DE delivery and conventional face-to-face delivery. Holmberg (1995a:51) describes distance education as "a separate mode of education in its own right" and ascribes this uniqueness to the "one-to-one relationship between one student and one tutor" (1995a:51). For example, at the UKOU, each student gets strong personal support from tutors with special training in working with adults within a dedicated system of decentralised student support. The UKOU makes extensive use of adjunct faculty and every 20 – 25 students are assigned a dedicated tutor who is personally responsible for the progress of each student (see Daniel 2000b, Daniel 2001a). The UKOU employ approximately 8000 associate faculty as tutors who are responsible for maintaining personal contact with their assigned students, grading their assignments and individualised mediation of the learning experience prompted by the mass-produced learning resources.

The analytical framework presented in this chapter considers the provision of student support as one of the essential pedagogical functions of distance teaching and is therefore not an optional feature of DE. DE systems that do not provide student support in conjunction with the standardised materials tend to have lower retention and success rates than systems that integrate individualised student support into the system (Tait 2000).

The provision of individualised support to learners that compliments the mass-produced resources is one of the key elements responsible for the success of the leading mega-universities. Student support is a pedagogical teaching function in large-scale DE teaching systems that requires dedicated systems to cater for the cognitive, affective and systemic dimensions of student support. It is a differentiating feature of the large-scale systems, but the affective and systemic dimensions are still required in dual mode and remote classroom models of DE provision. The power of current digital ICTs is creating exciting opportunities for widening the range and improving the quality of student support in DE systems. Today, student support is becoming less dependent on the geographical distribution of tutors as was previously the case. However, the evolving technologies do not negate the core pedagogical function of student support, but may have implications for the design of systems and processes within the universities implementing DE in the future.

Interpreting the interplay between DE delivery systems and functions of teaching

This section is concluded by reiterating that the traditional DE classification frameworks are no longer sufficiently adequate to analyse the many forms of DE that currently exist (and that are likely to evolve in the future). Today there is a far greater variety of delivery alternatives to choose from, and this means that DE delivery will become more flexible in the future.

In the past, DE universities would largely use a single delivery system (that is one vertical bar of Figure 2.3) for most or all of the listed functions of teaching. However, it is no longer possible to classify a DE institution according to a specific delivery system because the evolution of DE practice, combined with the pervasive advances in ICTs and corresponding changes in the costs of provision, has resulted in single institutions using more than one dominant delivery system for various sub-functions of the four main functions of distance teaching.

The analytical framework presented in this section caters for this phenomenon and it is important to recognise that in practice, one or more delivery systems can mediate each teaching function. What this means is that a single teaching function can be delivered by one or more of the delivery system alternatives within the same institution, hence the difficulties of classifying a DE institution according to one specific delivery system. For example, a decade ago, the Unisa delivery system had virtually no examples of synchronous delivery for presenting learning content. Today, Unisa makes extensive use of synchronous video-conferencing technology for presenting learning content, in addition to asynchronous forms, by linking lecturers at the main campus in Pretoria — in real time — with students at the regional centres. This was introduced to provide opportunities for interaction specifically for courses where the enrolments are too low to warrant face-to-face discussion classes.

Another trend, which is likely to become more prominent in DE, will be the ability for students to have greater choice regarding modes of delivery they can select according to personal needs and circumstances. In the past, viewed from an institutional design perspective, the choice of a DE delivery system was historically an 'either/or' choice, and the classification of delivery systems in DE was less complex. However, with an evolving DE delivery model where a wide range of alternatives are possible within a single institution (and where the number of alternatives is likely to increase) the framework presented in this section is capable of accommodating the emerging variety of alternatives and is, therefore, a more appropriate framework for analysing contemporary DE provision.

This concludes the first phase of the analysis on the defining characteristics of DE from the perspectives of the reported literature and attempts to define its practice. A number of characteristics that differentiate large-scale DE provision from face-to-face and other forms of DE delivery were highlighted. To avoid duplication, these characteristics will be summarised in the final section of this chapter.

The following section begins with the analysis of industrialisation and DE, and broadly speaking, examines the unique requirements of large-scale ODL provision from the perspective of DE being a consequence of the industrialisation of society.

2.3 Industrialisation and DE

"Labels, like rumours, can take on a life of their own. The labels of intellectual discourse are no exception" (Kumar 1992:45). Concepts like Fordism, post-Fordism and their application to higher education practice in general, and distance education in particular, are an attempt to get an intellectual grasp on the interplay between the emergence of a post-war industrial economy and the university.

The broad epochs of societal transformation from *hunter-gatherer* to *agrarian*, *agrarian* to *industrial* and more recently *industrial* to *knowledge* has provided a framework for critical discourse concerning education in society and the economy. An exhaustive analysis and social critique of this evolutionary theme does not fall within the ambit of focus of this thesis. Therefore, in this section the resulting limitations in scope obviously constrain the extent to which the complexities of this topic can adequately be addressed.

However, there are a number of compelling arguments rooted in the theoretical constructs of industrialisation, which attempt to explain the evolution and uniqueness of large-scale DE provision. The massification of higher education, particularly during the post-war period combined with the practice of the large-scale ODL teaching systems of the mega-universities who have applied principles of mass-production in their operation, suggests the existence of a close relationship between industrialisation and the evolution of DE as a mode of delivery. There has also been considerable scholarly discussion in the ODL literature using the theoretical frameworks of Fordism and post-Fordism (see for example Campion 1996; Farnes 1993; Raggatt 1993). Hence, industrialisation and its corresponding Fordist, neo-Fordist and post-Fordist nuances provide a powerful analytical framework for examining the unique requirements of DE.

Furthermore, the question of whether the emergence of large-scale DE is a direct consequence of the industrialisation of society, thus representing a new era of educational delivery is a controversial debate. The debate associated with industrialisation in DE in the ODL literature has been prolific, passionate and frequently polarised (see for example: Campion 1990; Campion 1996; Farnes 1993; Jarvis 1996; Peters 1989; Peters 1996; Raggatt 1993; Rumble 1995a, 1995b & 1995c). The main tenets of this debate will be highlighted in this section.

The core of this debate centres around Peters's assertions (see Peters 1973 & 1989) that the industrialisation of education is in fact a distinguishing feature of DE that differentiates it from conventional forms of delivery. While this is a contested view, it nonetheless presents a plausible and justifiable line of reasoning that is suitable for one of the scenario points of departure for this research project. Given its controversial history in the ODL literature, the notion that industrialisation is the defining feature of DE will be treated as an "uncertainty" for scenario planning purposes and not as a "predetermined" in this thesis.

Applying the rhetoric associated with the discourse of industry to analyse DE practice is also a contentious issue. Concepts like "Fordism" have the tendency to obscure more than they reveal (Allen 1992: 231). The debate is polarised, and riddled with intellectual complexities. Peters and others have argued that: "one cannot but conclude that distance study is *sui generis* as it is the most industrialised form of teaching and learning" (1989:7). Others like Jarvis (1996) do not accept industrialisation to be a defining feature of DE. Jarvis concludes: "That certain forms of distance education tend to be an industrialised manner of disseminating information is not in question, but to ask whether industrialisation is its defining feature is another question" (1996:48).

The first associations between DE and industrialisation can be attributed to the scholarly work of, Otto Peters during the 1960s. Further discourse in DE based on production and market related theories, including the analysis of DE according to Fordist, neo-fordist and post-Fordist frameworks, was only to come much later, and dominated the ODL literature of the early 1990s. Accordingly, the discussion of this section is divided into the following parts:

- DE as the industrialisation of education drawing extensively on the analysis of Otto Peters;
- Fordism, neo-Fordism, Post-Fordism and DE.

2.3.1 The contributions of Otto Peters on the industrialisation of teaching and learning

This section draws extensively on the rigorous analysis of DE by Otto Peters, who was the first scholar that articulated the uniqueness of DE on the grounds that it is the "most industrialised form of teaching and learning" (Peters 1989:7)[3]. His tenet that DE is the result of the industrialisation of teaching and learning preceded the contemporary

[3] Peters's research work conducted during the 1960s was originally published in German. English translations of this early work as well as English articles by Peters were published much later. This explains the 1989 citation drawing on earlier research conducted in the 1960s.

applications of production and market related theories in ODL of the 1990s by almost three decades. Peters's early findings were originally published in German and these were later to become enormously influential in the ODL literature once translated into English by Desmond Keegan (Peters 1994). The significance of his work can only fully be appreciated when you consider that until 1965, internationally there was virtually no dedicated scientific research in the field of DE and in many respects scholarly work in DE was as Peters puts it: "unexplored ground" (1994:1).

Peters's findings were based on an extensive analysis of distance education practice around the globe at the time. His research covered the full spectrum of DE provision from a number of different theoretical perspectives. Many of the published misconceptions on Peters's work can possibly be attributed to the lack of knowledge concerning the rigour with which the analysis was conducted. His early research in the 1960s formed the foundations of his inferences. Consequently, a cursory chronology of his early research will first be provided where after the rationales justifying DE as an industrialised form of provision will be discussed.

Peters's early research in DE can be subdivided into two distinct phases: data collection and theoretical analysis. He began documenting the DE practice of the early correspondence schools followed by an international comparative study of universities involved with DE. The results of these studies were published in two books and represent the first comprehensive international analysis of DE (see Peters 1965 and Peters 1968). Using this data, he then conducted an extensive didactic analysis primarily to justify that DE was a verifiable form of instruction from a pedagogical perspective.

Having completed this didactic analysis, Peters then proceeded to analyse DE using the principles of industrialisation because he found that didactic theory was not sufficiently comprehensive to explain the essence and defining characteristics of DE. Based on this analysis, he concluded that DE was the most industrialised form of education. He then proceeded with further theoretical explanations, justifying DE as the industrialisation of education from a variety of additional theoretical perspectives including historical, sociological, socio-cultural and anthropological validation.

This section provides an abridged summary of Peters's contributions to answering questions about the relationships among industrialisation, education and DE.

Data collection phase

The first study in 1965 was a description of the private correspondence schools, which had pioneered the use of DE in teaching and learning. The study of the correspondence schools as point of departure is significant because the practice of university-level DE did not evolve from the traditions of university practice. Rather, the universities adopted the practices of correspondence education that were developed by the commercial correspondence schools. The correspondence schools provided instruction, mainly to adults, who for whatever reason could not be adequately served by the traditional university sector.

Correspondence study first emerged and evolved as a commercial initiative during the 18th and 19th centuries and was not a university-based innovation. It was not until the first half of the 20th century that the first publicly funded single-mode DE university was established (Boucher 1973). References to what was probably correspondence education can be found as early as the 1720s (Holmberg 1995b: 3). Holmberg (1995a: 47) refers to an advert in the Boston Gazette of 20 March 1728 where Caleb Phillips, as teacher of the new method of shorthand, advertises what is probably the first correspondence programme. The advert mentions that: "Persons in the Country desirous to Learn the Art, may by having several Lessons sent weekly to them, be as perfectly instructed as those that live in Boston" (Battenberg, cited by Holmberg 1995a: 47). References to this form of provision that are indisputably correspondence education can be traced to the 1830s with numerous correspondence schools founded in the later half of the 19th century (see Holmberg 1995b: 3).

The foundation of single-mode DE universities around the world was predominantly a trend of the second half of the 20th century. For example, in 1965 Peters points out that: "[t]here are distance teaching universities only in South Africa and the USSR" (Peters, cited by Keegan 1993: 62). In the 1960s, the USSR had approximately 1.4 million students studying by distance methods, using a dual-mode system where DE methods were supplemented by regular and obligatory face-to-face sessions (see Peters 1994: 37 & 38, translated from Peters 1968)[4]. The large USSR system of DE preceded the foundation of Unisa's DE initiative; however, the USSR system was not a single-mode delivery system as was the case at Unisa (and the majority of private correspondence schools). There are also examples of university-level distance education established at the end of the 19th century, for example the establishment of an extension division to deliver university courses by mail at the University of Chicago in 1892 (Moore & Kearsley 1996: 22). By 1930 there were correspondence courses presented by 39 American universities (Moore & Kearsley 1996: 23). By the 1960s there were at least 62 universities in the United States, which ran distance education courses (Peters 1994: 5). However, as indicated above, these examples of university-level DE were dual-mode systems and not single-mode institutions.

With the exception of Unisa — which began teaching through distance education in 1946 (Boucher 1973: 221) — the majority of the large single-mode ODL systems were creations of the 1970s and 1980s. Furthermore, at single-mode universities, the full curriculum is provided through distance methods alone, whereas in the earlier dual-mode and external studies examples of DE, only selected courses were offered by distance.

The origins of correspondence study can be traced probably to the latter part of the 18th century, but certainly showing phenomenal growth in the 19th century. The growth of correspondence study is significant because this corresponds with the rapid industrialisation of Britain that began in the late 18th century. The critical point is that university-level correspondence education did not exist as an institutionalised and organised form of provision prior to the onset of the industrial revolution. Of course, the university as institution and the conventional traditions of professing knowledge have been around since pre-industrial times.

The origins of the university can be traced back to the humble beginnings of *studia generalia,* which were set up in the twelfth century as "places of learning which, by virtue of the fame of their teachers, could attract students from all over Christendom" (Minogue 1973: 11). The renowned models of Paris and Bologna, as two distinguished centres of learning, found it advantageous to join together into a legal association and acquired the term *universitas* (a term originally used for a legal association). Later, toward the end of the Middle Ages, when many other "universities" were already established, the concept *universitas* was to become restricted to the concept we now associate with the university (Minogue 1973: 12).

The fact that the conventional university predates the industrial revolution does not necessarily suggest that the processes of industrialisation have left the "idea" of the university untouched. Notwithstanding the stability associated with the unifying idea of the concept of "university", the survival of this institution over time can be attributed to the fact that the university "does not exist as a timeless concept, rather it is shaped and evolves in response to its environment" (Brown 1996: 28). Clearly, the conventional university has evolved as a result of the evolution of society but at the same time has also

[4] This citation format, although cumbersome, is adopted to indicate the original date of publication in German. However, the relevant Peters's references are taken from the selected English translations (see Peters 1994).

influenced how society has developed. Educational systems are institutional expressions of societal attitudes and societal power relations (Brown & Lauder 1992: 11) and examples of how industrialisation has impacted on the conventional university will be provided in Section 2.3.2 and Section 2.3.3.

On the other hand, the establishment of correspondence study would not have been possible without the invention of moveable type, the printing press and a universal postal service. Therefore it is relatively easy to make a case that the foundation of correspondence study is simply the consequence of the emergence of new technologies. The same case can be made with much of the hype about e-learning we have been experiencing recently, which came about with the advent of a universal communication network like the Internet. The problem with drawing superficial relationships like this is that they do not reveal what is essential about DE as a form of provision, and consequently, it is necessary to look at its structural differences by examining "the reasons for, and the circumstances of, its creation" (Peters 1998: 110).

> *For example, the question might be asked why distance teaching had developed in the mid-nineteenth century outside the institutions which a state had established for educating and training its citizens. Why was it able to gain in importance in the following decades, although it was neither intended nor desired, let alone planned by those responsible for the nation's education?* (Peters 1998: 110)

Peters (1998: 110), points to one fundamental structural difference between the commercial correspondence schools and the state education system: that in the case of the early correspondence schools, funds were not applied by the state so that people could be trained and educated. Rather, DE was originally created for profit, thus resulting in the commercialisation of learning by private institutions who were prepared to use the new methods of industrial production in the previously sacrosanct domain of tertiary education. The emergence of the corporate university and the for-profit universities in the tertiary sector today show remarkable similarities to some of the earlier trends associated with the development of the correspondence schools. These profit-making universities are beginning to flourish by recognising the market opportunities of those prospective students who are no longer satisfied with the conventional university system.

Returning to Peters's (1965) original descriptive study of the correspondence schools, it must be emphasised that they were an important object of scientific enquiry because the correspondence schools had established and gained practical experience in DE as a form of delivery, despite the bad reputation of a few unscrupulous providers. In Peters's 1965 study, the DE practice of the correspondence schools were described in detail from the perspective of the teaching and learning process, including a detailed analysis of the characteristics of the students, teachers and processes. Already in this early study, Peters alluded to the industrialisation of education:

> *The work of the teacher in distance education differs from face-to-face teaching in the classroom through the increased division of labour. This principle is fundamental in the industrialized production processes. Its application to the process of instruction has therefore caused considerable resistance and, mainly emotional, opposition.* (Peters 1994: 32, translation of Peters 1965)

In this study, Peters stresses a characteristic feature of many DE students: for a variety of reasons they are very often unable to take up the opportunity to obtain qualifications through the conventional education system. Reflecting on his original research — in the introduction of the translation of his selected publications — Peters (1994: 3) remarks on the paradox that the processes of industrialisation were in fact, in many cases, the reasons why countless individuals were disadvantaged regarding access to education. Yet, the very principles of industrialisation — when applied to educational provision — have enabled numerous individuals to obtain an education through DE.

Peters's second descriptive study during the data collection phase focused on university-level DE. This was a comprehensive and detailed study (of 620 pages) of the state of distance education throughout the world in the 1960s (see Peters 1968). For example, the study revealed that there were sixty-two universities in the United States who presented courses using DE methods; that in South Africa, Unisa taught exclusively by DE methods and was a university of repute; in the USSR there were seventeen all-union universities which provided courses in the applied sciences largely at a distance; and finally approximately 25 per cent of the students in East Germany were distance students (Peters 1994: 5). The significance of this study is that, by demonstrating the extent of university-level DE in the world, Peters helped to dispel some of the doubts concerning the academic reputation of distance education that originated from the commercial abuse of some early correspondence schools and the typical resistance to change associated with the traditions of the academy.

Again, this 1968 study pointed to the similarities between industrial production processes and the provision of DE by referring to the division of labour and specialisation of teaching activities and the requirements of managing large complex organisations. Peters identified another distinctive feature of DE, with similarities to industrialisation by highlighting the "*indirect* interaction between university teachers and students" (Peters 1994:37, translation of Peters 1968). By using postal services, printed media, telephone and other electronic media, the communication between teacher and student was technologically mediated.

The particular significance of these studies, with reference to Peters's discoveries about the industrialisation of teaching and learning, is not so much the specifics of these descriptive studies, but rather that he had established an extensive empirical base for theoretical explanation. He based his conclusions concerning the industrialisation of education by applying the techniques of theoretical explanation using a variety of different perspectives building on the descriptive foundations generated from the two empirical studies summarised above.

Theoretical explanation phase

The primary question focusing Peters's theoretical explanation was to establish the distinguishing features of DE. He first began with a structural didactic analysis of DE by relating and comparing it to other forms of imparting knowledge that had a track record of success. In addition this first theoretical explanation of DE, Peters also drew relationships between DE and relevant sociological, philosophical and educational findings in Germany (see Peters 1973).

The underlying motivation for the study was to prove that DE was not an extraordinary form of education to be questioned or criticised. By proving through scientific analysis that DE was founded on the didactical elements of a long tradition of various acceptable forms of indirect teaching, combined with the added value of modern ways of imparting knowledge, Peters believed he would be able to eliminate much of the scepticism towards DE as a form of education.

Peters proceeded with a detailed didactic analysis of a number of generally accepted forms of indirect teaching, identifying their specific didactic elements and the structural characteristics thereof. Then he related these to the practice of DE. This process resulted in the identification of twenty-seven didactic forms that were proved to be taken into DE from indirect teaching. The rationale for this detailed didactic analysis was twofold:

- First, to illustrate that didactic elements absorbed into distance education had proved to be effective outside the field of DE;
- Second, to demonstrate that these didactic elements were in fact identifiable in DE practices (Peters 1994: 60, Translated from Peters 1973).

In addition to the didactic analysis above, Peters also used a second approach to validate the didactic authenticity of DE (see Peters 1994: 9). In this approach, he used Heimann's (1962) structural categories of instruction, which were claimed to be applicable to all forms of instruction at all levels. The status of the categories in Heimann's structure was that, if any one of the structural elements were missing, then the instructional form under investigation would not qualify as proper instruction. Applying Heimann's structural categories to DE, Peters found that DE was, in all material and educational respects, a complete method of teaching and learning and that DE was a form of instruction in its own right. However, some qualifications were necessary in that, for example, not all forms of content could be dealt with in DE and not all methods and media could be employed in the DE setting.

Despite the detailed theoretical analysis summarised above, Peters established that didactic theory was not sufficiently comprehensive to explain the distinguishing characteristics of DE. Based on his reflections on this early didactic analysis, Peters remarks that:

> *Such a concept of distance education was unsatisfactory as it did not answer the questions, did not lay open the true nature of distance education and could not explain the enormous teaching potential ... I became aware that it might be futile and misleading to try and analyse distance education with categories of traditional teaching theory. Therefore, I looked for categories which are inherent in distance education, categories which maybe are lacking in face-to-face teaching entirely and which may answer some of the unanswered questions and the enormous impact of distance education all over the world.* (1994: 9)

This led Peters to the discovery that DE had a number of structural features in common with industrialised production: that "distance study must be carefully preplanned, prepared and organised, that there is a division of labour, a growing use of technical equipment to work with, and the necessity of formalised evaluations" (Peters 1993a:15). Peters's excitement with this discovery led to the publication of a 45-page monograph called: *"Das fernstudium an universitäten und hochschulen: didaktische struktur und vergleichende interpretation: ein beitrag sur theorie der fernlehre"* [Translation: "Distance education at universities and higher education institutions: didactical structure and comparative analysis — a contribution to the theory of distance teaching"] (Peters 1967). The essence of Peter's discovery is that DE is the most industrialised form of teaching and learning. Using a heuristic comparison between the generic principles of industrialisation and the teaching and learning processes in DE, he demonstrated that it was structurally different from conventional forms of education and proposed the following definition:

> *Distance education is a rationalized method — involving the division of labour — of providing knowledge which, as a result of applying the principles of industrial organization as well as the extensive use of technology, thus facilitating the reproduction of objective teaching activity in any numbers, allows a large number of students to participate in university study simultaneously, regardless of place of residence and occupation.* (Peters 1994: 125, translation of Peters 1967)

Keegan (1980: 17) has pointed out that if Peters's "definition, or any elements of it, is accepted, a radical separation of distance education from other forms of education is effected". The reason for this is that many DE theorists define DE in terms of degrees of distance, suggesting that particular programmes can be placed on a continuum between pure correspondence education and conventional face-to-face delivery. For example, Moore (1990:12) argues "there is distance in all educational relationships, with distance measured by the extent of dialogue between learner and instructor, and the structure of the teaching programme". Peters's position concerning DE as an industrialised form of teaching is different because he argues that "[t]here is no continuum" (Keegan 1992:78) but rather, that there are *two* distinct forms of instruction: face-to-face teaching and distance education. Given the controversy, generated by Peters's comparisons and conclusions, it is necessary to summarise the major findings of this study.

Peters (1994: 107, translated from Peters 1967) begins by pointing out that it is not coincidental that correspondence study — as an early form of DE — was a relatively new development when compared to the history of conventional university delivery because it required conditions that have existed only since the onset of the industrial revolution. "Industrialisation is the symbol of a new epoch in the development of man fundamentally different from all previous epochs" (Peters 1994: 108, translated from Peters 1967). Although conventional university education has, by comparison, remained relatively unchanged by industrialisation, DE is remarkably consistent with the principles of industrialisation.

Selected elements of Peters's analysis of DE, according to the principles of industrialisation, will briefly be summarised in the paragraphs which follow in order to illustrate the depth and extent of Peters's research. The principles to be covered include: rationalisation; division of labour and increased specialisation; mechanisation; assembly line production; mass-production; preparation, planning and organisation; standardisation; and objectification. The discussion which follows is based on the research published by Peters in the monograph referred to earlier (1994:110 – 124, translated from Peters 1967).

According to Peters (1967) *rationalisation,* when applied to the production process, refers to the methodical analysis of the entire production line to allow for the effective planning and implementation of the corresponding range of work processes in an "objective" way. The following examples are provided to illustrate the principle of rationalisation in DE:

- In DE the teaching process is based on the division of labour according to specialised functions, detached from a single lecturer as in the case of conventional education. The teaching process is planned independently of the learning situation thus avoiding the subjective obstacles to rationalisation, which may arise in face-to-face learning situations. The division of labour and objectification of the teaching-learning process means that DE can be planned effectively by applying the principle of rationalisation;
- The mechanisation in distance education (reproduction equipment and communications technologies) means that because of detached objectivity, the knowledge and teaching skills of a university lecturer can theoretically be provided to an unlimited number of students at constant quality, thus the rationalisation effect of mass-production is evident in DE;
- The application of the principles of organisation have facilitated more effective utilisation of the efforts of teachers and students;
- The mechanisation of the teaching-learning process, for example: mass-produced learning resources; other technological support media like film and television; and electronic data processing have replaced teaching staff in certain areas of their work like giving of information and some functions of assessing performance;

Division of labour and increased specialisation differentiates industrial production from artisan and craftsman practices, associated with pre-industrial practices. The division of labour in DE is an important prerequisite for its success. The teaching-learning processes and corresponding functions in DE have been subdivided into a number of different independent functions and specialisations:

- DE course materials are usually developed by a team of specialists each with a specific responsibility, and can include academic authors, instructional designers, media experts, graphic designers, and editors thus enhancing the quality of teaching materials. In courses where the student enrolment is more than the lecturers can manage, the assessment of performance is sometimes not carried out by the academics who developed the course;
- DE materials can be prepared by leading experts in the particular field concerned and can be used for large numbers of students;

Mechanisation refers to the use of machines in the production process, that replace the work done by people in varying degrees. The practice of large-scale distance education is not possible without machines. In DE, mechanisation is not limited to the mass-production and distribution of the standardised course materials (for example, printing presses, transport systems) but also includes mechanisation of the teaching-learning interaction that must be technically mediated because of the time-space separation.

Assembly line production is one of the factors that has enabled mass-production and is characterised by the fact that work pieces travel to the worker, rather than the worker travelling to them. Examples of assembly line production in DE education include:

- When developing course materials in distance education, the manuscript is passed from one area of responsibility to another, and specific changes are made at each stage, for example, authoring, instructional design, editing, typesetting, (re)production, warehousing and distribution;
- The processing of assignments submitted by the students is another example of the work piece moving between different functional areas in the DE system. For example, the student posts an assignment, which is received and recorded by a dedicated assignments department. This is then forwarded to the marker, whereafter it is sent back to administration for record keeping purposes before being returned to the student concerned.
- In the case of car manufacturing, instead of sending the worker to the vehicle, the parts and the vehicle being built are transported to the worker. In a similar vein, in large-scale DE systems the teachers and thousands of students may never actually meet – but the objects of the teaching-learning process are transported to the respective "workers".

Mass-production, interpreted in conjunction with the requirement of mass-consumption, is a structural characteristic of advanced industrial society where the standard of living is partly due to the mass-production of consumer goods in large quantities. Then these goods are generally more accessible. Also, in mass-production systems considerable effort is spent on researching consumer requirements because each shortcoming in the product is multiplied by the number of items produced. With particular reference to large-scale DE provision, the following characteristics are identified:

- The demand for higher education outstrips supply and this has been an important reason for the massification of higher education in general, and for distance education in particular. The success of the large-scale DE providers would not have been possible without mass-demand for higher education;

- Traditional face-to-face models were originally designed for small groups of students. Using these methods, these institutions found it difficult to scale-up effectively for large numbers of students. Therefore it is understandable why governments see the mass-production capabilities of DE as a means for providing tertiary education to very large groups of students;
- DE education providers put more effort and resources into the design of their teaching-learning products than what is put into conventional face-to-face provision;
- Statistics show that the number of graduates in areas near a university is higher than areas without a university. DE is capable of overcoming these geographical constraints by providing a wider distribution of education, analogous to the mass-production of consumer goods regarding wider accessibility and increases in the standard of living that a general increase in the levels of education might provide.

Peters (1967) also talks about how *preparation, planning and organisation* in the production environment impacts on the economies, speed and quality of manufactured products. Mass-production environments require comprehensive and considerably more detailed plans to enable the effective coordination of numerous interacting factors. During the preparatory stages, the planners are responsible for determining how the work, machines and materials should be coordinated during each phase of the production process. Considerably larger sums of investment are required in the preparatory phase when compared to artisan-based production. The high level of planning facilitates the inter-changeability of workers. As a consequence of the division of labour, the institution must also be organised rationally. The following features of large-scale DE provision correspond with the preparation and planning required in the industrial production environment:

- In DE the levels of preparation and planning of individual courses determine teaching success, particularly when the institution offers a wide range of courses. The entire course must be planned in advance, including development schedules and the integration of various specialists into the development process. This also includes the planning for the design, development and production of various supplementary media that must be ready when students enrol for the course;
- In conventional face-to-face systems, university teachers are usually responsible for the entire teaching process, whereas in DE individual lecturers, tutors, designers, graphic artists, editors and printing staff are more easily exchangeable, given the high levels of systemic planning in DE;
- The set-up costs of DE and levels of investment for individual developments are significantly higher than the investment associated with individual courses in conventional campus-based models.
- In cases where independent study is supplemented with face-to-face seminars for thousands of students distributed over a wide geographical area, planning becomes even more important.
- In distance education distinct dedicated departments are required for functional components that are usually carried out by the university lecturer in campus-based models, for example certain "academic" functions associated with administering assessment which in large-scale DE universities requires a dedicated assignments department;
- High levels of planning, organisation and administration are required to ensure that students receive all the necessary learning resources; and
- High levels of planning and organisation are required when catering for a decentralised examination system that requires proctoring and is distributed over a wide geographical area;

Standardisation is a characteristic feature of mass-production environments of the industrial era where the division of labour, rationalisation and mechanisation typically limits the manufacture to a few types of products, capitalising on economies-of-scale (Peters 1967). Paradoxically the manufacture of a few universal parts can be combined to result in a large diversity of products in a cost-effective way.

In DE the degree of standardisation required is considerably higher than that required of conventional teaching. Consequently, in DE there is a high degree of standardisation regarding the mass-produced learning resources. In the conventional lecture situation, the lecturer may indulge in a interesting deviation depending on the specific dynamic of the student group and can adapt corresponding assessment strategies accordingly. However, in the DE setting, the academic must take into account that the materials must cater for a more diverse audience than that associated with conventional education and situation-dependent improvisation in DE is not possible. DE developers must find a standard that is capable of catering for a diverse student audience and this requires the involvement of several specialists in the design and development process. Consequently in DE the resulting learning resources are based on the objective requirements of the course profile and will not be a reflection of the particular dynamics and interests of a particular lecturer-student group.

Objectification refers to the condition where the more a production process is determined by rationalisation and mechanisation, the less subjective the process becomes. The process of objectification becomes more apparent when the item that is objectified becomes the subject of reflection. One of the characteristic features of the industrial production processes is the fact that when analysing the respective contribution of workers and machines, high levels of objectification have been achieved.

When considering the traditions of professing knowledge at the conventional university, the professor has considerable freedom to allow subjectivity to influence the course of the teaching-learning situation. However, in DE the teaching-learning process is objectified through the production of standardised learning materials. Objectification of the teaching-learning process in distance education allows reproduction at any time and consistent quality.

Having analysed the practice of distance education from the perspectives associated with the principles of the industrialisation of society above, it is understandable why Peters concludes:

> *There is no other form of teaching and learning which breaks away from tradition so sharply, which is so conducive to structural changes, which has the potential for developing entirely new instructional configurations and which promises to tackle the problems of mass education in the coming information society with adequate means. All of this indicates clearly that the concept of distance education is, indeed, a revolutionary one.* (Peters 1992:33)

Peters's theoretical explanation of DE did not stop with this comparative analysis. He then proceeded to validate the industrialisation of DE from a variety of different theoretical perspectives (Peters 1973), including a historical, socio-cultural, sociological and anthropological validation. A detailed discussion of each of these interpretations is not provided here, but demonstrates the breadth and depth of Peters's analysis. Key elements of this validation that are relevant to the arguments of this chapter are, however, listed below:

In Peters's *historical* analysis of education, he examines the power relations and status of the teacher in the history of society, with particular emphasis on how the custodianship of knowledge in the teaching-learning situation has changed over the ages (see Peters 1994, translated from Peters 1973). Deserving particular mention is the fact that, despite the use of a variety of technical media in the classroom, the basic communicative structure of conventional education has not changed from its original traditions of oral-based instruction. On the other hand, the objectification, rationalisation and division of labour associated with the industrialisation of education in DE has "cut three bonds which tie face-to-face instruction to special places, special times and special persons" (Peters 1994: 144) and "the break of tradition mentioned appears to be a singular event in the history of instruction" (Peters 1994: 142). Peters's historical interpretation does not disregard the impacts of industrialisation on conventional face-to-face instruction, but he points out that it has developed at a slower pace when compared to DE and that it has not yet made the decisive breaks in the tradition of oral-based communication. Using this historical model, Peters also concludes that DE is the most advanced form of instruction (Peters 1994: 13).

Peters's *socio-cultural* interpretation demonstrates that DE can be assigned to the era of industrialisation, not only because of the necessary technological conditions that made DE possible, but also because of the particular socio-cultural and intellectual conditions that are characteristic of "industrial man" (Peters 1994: 144, translated from Peters 1973). With compelling theoretical justification, he argues that these specific socio-cultural and intellectual qualities of people evident during the industrial era, did not exist in previous epochs. Peters argues that these socio-cultural and intellectual qualities associated with "industrialised man" are imperative for the successful functioning of the DE method. For example, the tradition-directed individuals of pre-industrial society would not have been able to break the conventions of custom and social behaviour by studying away from their respective villages at a remote DE university. Peters raises an interesting concern regarding the challenges of implementing industrialised education in developing society contexts because of the potential mismatches associated with socio-cultural conditions required for success in DE (Peters 1994: 14).

Didactic and general educational theories were not able to adequately describe the social change caused by a form of instruction where teaching is transported to the learner, nor were they able to elucidate the inherent differences in the social structures of industrialised teaching (Peters 1994: 153, translated from Peters 1973). Peters's *sociological* analysis was largely based on Jürgen Habermas's framework for explaining structural changes in institutional subsystems that resulted from industrialisation. Applying the categories of Habermas's framework, Peters concludes that face-to-face teaching is a subsystem of communicative action and that DE is determined by rational means-end thinking. The importance of this interpretation is that it has clarified and justified important structural differences between the two forms of instruction from the theoretical perspective of a sociology.

Finally, Peters used an *anthropological* approach to clarify the industrialisation of education. The issue here was to interrogate the use of technology in order to teach at a distance. Anthropologically speaking, technology has had a determining influence on human interaction in the world and environment throughout the development of humankind. Peters (1994: 167, translated from Peters 1973) remarks that man actively organises his environment and is consequently not predisposed to passive adaptation, but rather to active change. In defence of critics of culture who say that humanity is threatened by rational planning, organisation and technology Peters suggests: "Seen in a larger context the construction of complex technical systems of teaching and learning and their successful implementation must be interpreted as real proof of man's capacity to react to fundamental changes of society" (Peters 1994: 167, translated from Peters 1973).

In summary, Peters, through his extensive research and rigorous theoretical analysis has provided justification for a plausible point of departure for the scenarios namely that DE is the most industrialised form of education. Peters has demonstrated that DE is structurally different from face-to-face teaching, because "conventional instruction is predominantly *oral* whereas distance education is predominantly *technically mediated*" (Peters 1996:51). Not only is this a sociological difference, but it is also a pedagogical difference which focuses on the core of educational activity, that is, the teaching learning process. Peters's work on the industrialisation of education is not limited to the obvious mechanisation required in DE when referring to the study materials reproduction process because the principles of industrialisation have filtered through to the core of the educational transaction that is the teaching-learning process. Peters's contributions represent a comprehensive analysis from a variety of theoretical perspectives and provide further evidence for the unique requirements of large-scale DE provision.

2.3.2 Fordism, neo-Fordism, post-Fordism and DE

This section will introduce the main tenets underpinning the comparative analysis between the development of DE and industrial theory associated with the concepts like "Fordism", "neo-Fordism" and "post-Fordism". The debate of whether it is appropriate to apply industrial theory in DE contexts has not been conclusively resolved, yet it is a foundational theme that will require deepening clarity for the purposes of planning strategic futures in DE.

A number of concepts have been used to describe the general trends of societal changes. These trends have been interrogated under the labels of Fordism versus post-Fordism, Industrial versus post-Industrial, Modern versus post-Modern. The specificity of the discourse under each of these labels, resulting from the particular nuances of the underpinning theoretical perspectives used, has resulted in considerable controversy. While some authors, understandably, describe the theoretical differences between these labels (Kumar 1992, Scott 1997a), the choice concerning the heading of this subsection has been more pragmatic in nature. This subsection is reported under the labels that have appeared in the ODL literature of the 1990s, yet recognising that the "different theories of post-industrialism — the information society, post-fordism, post-modernism — overlap one another" (Kumar 1992: 59). Notwithstanding the academic problems of nomenclature, Campion (1996) is of the opinion that opening ODL discourse to production theory has resulted in a range of options being opened for DE theorists that were previously unnoticed. There has been some criticism that the vigour of the post-Fordist debate in DE has closed ODL discourse to a range of other theoretical perspectives (see Rumble 1995a). However, Campion correctly reminds critics of his view that "the debate about post-Fordism has ended an era in which an unanalysed notion of industrial process informed much policy-making in distance education and that in so doing the debate has increased the range of possibilities rather than reduced it" (1996:43).

As depicted earlier, the historical development of distance education can be traced back to its roots of the commercial correspondence schools shifting to mainstream government lead initiatives serving a variety of political and social values. These shifts match the preferred concepts that have been used in the literature to report its practice, that is, starting with correspondence education then distance education, then open distance learning including contemporary concepts like flexible learning, virtual education and e-learning. The ODL literature of the 1990s experienced the inclusion of a range of varied critical approaches. When reviewing this trend, Tait (1994: 27) observes that: "the ideology of ODL is being reviewed in ways which put and end to its advocates being able to succeed in representing it solely in its own terms". He goes on to suggest that "[t]he age of innocence for ODL has ended" (Tait 1994: 27). A prominent example of one of these critical approaches in the ODL literature is represented by the industrial and post-Fordist analysis of distance learning during the 1990s (Tait 1994: 32).

Following Peters's original inferences justifying DE as the industrialisation of education in 1967, this theme was revisited with vigour as a critical approach in distance education theory and discourse (see for example: Campion 1989, Campion 1990; Campion and Renner 1992; Edwards 1991; Farnes 1993; Raggatt 1993; Rumble 1995a, 1995b & 1995c).

Badham and Mathews (1989) identify three defining variables that characterise production systems:

- first, the level of product innovation;
- second, the degree of process variability in the system; and
- finally, the extent of labour responsibility in the production process.

Specific combinations of different values for each of these defining characteristics result in three dominant production systems: *Fordist systems* are centralised models that are geared for high volume production of standardised products for the mass market; *neo-Fordist systems* are still mass production systems but offer greater flexibility regarding products thus targeting niche markets; and *post-Fordist systems*, like neo-Fordist systems, operate according to a flexible production philosophy, but differ from the latter because decision making authority is not centralised. Campion summarises the distinction between neo-Fordist and post-Fordist systems as follows:

> *Neo-Fordism involves the extension and deepening of the exploitative relationship between the organisation and the worker, whereas post-Fordism is grounded in a commitment to worker involvement and participation that is oriented towards a very different socio/political outcome.* (Campion 1996: 45)

Drawing on the insights of Badham and Mathews (1989) into the nature and characteristics of new production systems, Campion and Renner (1992: 12) summarise the three production systems according to the defining variables as follows in Table 2.5:

Table 2.5 Characteristics of Fordist, Neo-Fordist and Post-Fordist production systems

Fordism	• Low product innovation • Low process variability • Low labour responsibility
Neo-Fordism	• High product innovation • High process variability • Low labour responsibility
Post-Fordism	• High product innovation • High process variability • High labour responsibility

Reproduced from Campion and Renner (1992: 12)

Campion and Renner (1992) apply this framework to various ODL systems. The Fordist system when applied to DE "is best represented by a fully centralised single mode national distance education provider, much like the Open University in the United Kingdom" (Campion & Renner 1992: 9). Monopoly provision of DE in this way allows greater economies of scale thus justifying the development of expensive standardised courses within a system characterised by extreme division of labour and a production process fragmented into component parts (Campion & Renner 1992: 10). These authors argue that the dominant Fordist paradigm is being challenged by neo-Fordist and post-Fordist philosophies, on the grounds that large-scale mass-production can no longer ensure competitive advantage in national and international market places.

When applied to DE, a neo-Fordist approach "might well be represented by a centrally controlled, perhaps multinational, yet locally-administered model of distance education" (Campion & Renner 1992: 11). The example suggests that courses developed at other institutions could be offered at regional DE centres that also provide student support. It is suggested that this model would be able to provide a greater variety of course offerings and opportunities for mixed-mode delivery by presenting a variety of combinations of distance and face-to-face delivery, hence resulting in greater flexibility for students. However, this model still contains remnants of the Fordist system because courses would be imposed on academics having a deskilling effect on academic staff.

Finally, a post-Fordist expression of DE, according to Campion and Renner (1992), would be decentralised. In this system academics could respond in the most flexible manner to changing student demands but would still retain integration between study modes. Campion and Renner's post-fordist expression of DE is focused on organisational design issues where division of labour and rigid managerial control is discarded.

Although the parallels between the development of DE systems and industry's shift towards post-Fordist production systems are suggestive, Campion and Renner's (1992) organisational design focus has not succeeded in clarifying the pedagogical details of a post-Fordist DE delivery system. What do post-Fordist DE learning resources look like? How does the pedagogy of Fordist-based DE differ from post-Fordist ODL? Does "post-Fordist DE" qualify to be called DE? Is post-Fordist DE a new form of instruction or is this face-to-face teaching reincarnated? Organisationally speaking, is decentralisation *sine qua non* with desegregation and dismantling of organisations into a network of autonomous entities? Is it possible for large organisations like the mega-universities to develop post-Fordist delivery systems yet retain their size and corresponding advantages of scale? These questions represent important issues that must be addressed in the various scenarios of Chapter 4.

Applying Fordist and post-Fordist frameworks to DE production systems is not a straightforward exercise. The university environment is not an automobile production facility and, therefore, a theoretical construct that originated in the automotive industry can be questioned as a paradigm model for analysing DE systems (Rumble 1995a). Furthermore, the factors of Fordism which gave rise to the system of mass production at Ford's Highland Park Factory in Detroit between 1913 and 1914, cannot be analysed in isolation nor can they be divorced from the bigger picture of society and the economy (Allen 1992: 232). Clearly a holistic approach is required.

Badham and Mathews (1989) do admit that the simplicity of their model does potentially obscure the inherent complexities at play but argue that it "is analytically defensible to look at production systems — provided it is understood that in the real world these strategies are never pursued in isolation, but always within multiple (and conflicting) economic and political contexts" (1989:196). In defence of Campion and Renner's (1992) attempts of analysing DE systems in terms of production theory, it must be pointed out that these authors are also quick to recognise the complexities of this debate:

> *Indeed, scholars and commentators of many political and ideological persuasions have contributed their distinctive marks to the debate, and in so doing have created a web of variant interpretations. ...Thus, the post-Fordist debate is not only one between proponents and critics of a post-Fordist future, but is a debate of conflicting points of view among such proponents.* (Campion and Renner 1992: 17)

With this understanding, the postulated trajectory from Fordist to Post-Fordist systems in DE will be examined as a key uncertainty in the scenario planning process with particular emphasis on whether a post-Fordist objective is likely to evolve concerning the future of DE delivery systems. In preparation for dealing with the post-Fordist objective as an uncertainty for the different scenarios, the following questions will be considered here:

- Can the application of a production system focus be justified in the context of university level DE systems?
- To what extent can the large-scale ODL university systems be labelled as Fordist?
- Is post-Fordism a likely strategic objective for evolving DE futures?

In answering the first question above, a brief synopsis of the key variables of Ford's production system will first be provided.

Henry Ford's production system is usually associated with the introduction of the moving assembly line within a standardised mass production environment. However, Ford's system would not have achieved the success it did without the unique interplay among the following four factors:

- moving assembly lines;
- specialised machinery;
- high wages; and
- low cost products (Allen 1992: 232).

Thus the success of Fordism associated with Henry Ford's production system cannot be fully appreciated unless it is interpreted using a total systems view. Similarly the utility of the "Fordism" framework when applied to DE systems will also require a total systems view as opposed to identifying parallels at the micro level by comparing the large ODL universities and Ford's automated production system.

The thrust of Ford's mass-production system was focused on the elimination of labour through the implementation of technology, notably mechanisation and automation. There have been inferences that Ford's success can be attributed to the application of Frederick W. Taylor's "principles of scientific management" but Hounshell (1984) does not agree. Hounshell points out significant differences between Taylorism and Ford's mass production system. Whereas Taylor sought to optimise productivity through time and motion studies and consequent organisation of labour around machinery, Ford focused on eliminating labour through mechanisation and implementation of technology. However, the success of Ford's production system necessitated the unique interplay among the variables of a total system. For example, Ford's early approaches resulted in growing levels of absenteeism, a high labour turnover rate and high levels of dissatisfaction in the Ford factory. Therefore it was necessary to introduce a system of high wages. Workers could participate in profit-sharing schemes that effectively doubled their earnings, which by comparative industry standards of the time, resulted in a highly paid, unskilled labour force (Allen 1992: 234). Also, Ford realised that there would be enormous demand for a reliable low-priced product. Consequently, without substantial market demand, Ford's system of mass-production would not have worked. Combining the technologies of mass-production and mass-consumption, Ford was able to achieve success with his system of mass production.

The important point here is that the success of Ford's production system resulted from the combination and interplay between the factors listed above. Similarly, when analysing the success of the large-scale DE universities, the interplay between the four factors introduced in chapter one suggest the presence of Fordist elements in the system:

- the production of high quality DE materials that are developed by a team of specialists;
- the provision of individualised support by adjunct faculty trained to work with adults to mediate the learning experience contained in the mass produced items;
- a robust and efficient system to manage logistics and administration of students studying at a distance; and
- faculty that remain actively involved in research to promote the intrigue and excitement of the academic concepts being taught (Daniel & Mackintosh: 2003).

The combination of these factors — through rationalisation, division of labour and objectification of the teaching-learning process — into a total teaching system where learning is provided at scale — has resulted in the mega-universities providing a quality education at a greatly reduced cost. Seen in this light, there are close relationships between large ODL systems and the heuristic of Fordism. However, when you attempt to apply the specific factors of Ford's system of mass-production to DE, transfer problems begin to emerge. For the purposes of illustration (at an absurd level of specificity): although in ODL the study materials being developed move between distinct functional departments, obviously they are not transported using an automated assembly line. One of the problems with using the discourse of industry to make direct comparisons of this nature is that education is a service environment and not a manufacturing one. Using the characteristics of Fordist production systems and generating checklists to establish whether a practice like large-scale ODL is Fordist or not will fail to render meaningful results: "rather, it concerns the presence of *actual* connections between these features. For without such interconnections the concept of Fordism is sapped of its explanatory power" (Allen 1992: 247).

Thus in answering the first question, it is suggested that it is analytically justifiable to apply Fordist frameworks to large-scale DE, provided that it is analysed from of total systems perspective.

Moving onto the second question concerning the extent to which the large-scale ODL systems can be classified as Fordist, a number of researchers have analysed the Fordist and Post-Fordist trends in distance education. Nick Farnes (1993) for example, has applied four modes of production and identified corresponding stages of educational development. What is interesting about Farnes's analysis is that he has applied the "modes of production" framework to both conventional face-to-face education as well as to DE. This suggests that the impacts of Fordism have influenced both campus-based systems as well as the single-mode DE providers. Farnes (1993) used the following four modes of production in his framework:

- *Pre-industrial mode* refers to the unskilled agricultural workers of agrarian society who used simple tools to produce basic foodstuffs; the small group of craftsmen who made a living from their skills and the use of more complex tools to produce more elaborate products; and a small group of elites who had acquired knowledge through education and advanced education through attendance of Oxbridge type tutorials. (The availability and access to printed books was first limited to a relatively small number of literate elites);
- *Industrial pre-Fordist mode* is characterised by the factory system where large numbers of people worked in unskilled jobs corresponding with little responsibility, repetitive processes and standardised products. This era saw the beginnings of mass primary education, where one teacher taught a limited range of subjects to a large group of learners (in comparison to the individual tutoring associated with elite families). Secondary education expanded slowly and tertiary education still remained a privilege of the elite, using a craft model of tutoring. This mode corresponds with first generation DE where students were supplied with correspondence lessons (often poorly prepared) and at intervals students sent work to the correspondence tutors who provided comments;

- *Fordist mode* represents the era of mass-production and mass-consumption corresponding with an increase in wages. The complexity of products required standardisation, and economies-of-scale were necessary to offset the substantial investment in machinery and initial design. But at the same time, economies-of-scale were also necessary to keep prices within the range of mass purchasing power. Secondary education expanded dramatically and the growing skills requirements of an industrialised economy necessitated expansion of higher education. Conventional education, having to deal with larger student numbers, began to specialise and bureaucratise through the introduction of subject-based teaching where one lecturer tends to specialise in a particular subject. Counsellors, welfare officers, librarians and administrators were also introduced to the basic campus-based model. In the large single-mode DE providers, second generation DE dominates and is characterised by large production runs of standardised materials, incorporating various media and (re)produced by a relatively inflexible production system. However, the use of the course team approach, incorporating a variety of specialists, does paradoxically have the flexibility to create innovative learning materials.
- *Post-Fordist mode,* in parallel with developments in technology and consumer demand for greater choice in products, has resulted in systems producing a greater variety of products, shorter production runs and greater flexibility from employees and machines. A post-Fordist system of education might emerge where students can study using a mix of face-to-face, open learning materials that are franchised, as well as distance education courses taught by the same or different institutions. This mode could also refer to third generation DE where the combination of interactive communication and mass-produced information may result in a qualitatively different ODL system. Third generation DE is more decentralised, democratic, participatory and has higher levels of responsibility for students and teachers.

Farnes (1993) illustrates that mass provision of conventional face-to-face teaching has relied heavily on industrial principles, and for this reason points out that DE is not unique in being an industrialised form of provision. In addition, second generation DE "is predominantly Fordist but has important post-Fordist features, particularly course teams, project work and flexibility in time and place" (Farnes 1993: 18). Taking these considerations into account, Farnes (1993: 11) shows the developments of education according to the modes of production introduced above in the following table:

Table 2.6 Comparing modes of production and stages of educational development in conventional education and DE

Mode of production	Stages of educational development Conventional education	Distance education
Pre-industrial	Craft model, Oxbridge tutorial, apprenticeships	Pre-distance education, independent learning from books
Industrial, Pre-Fordist	Mass elementary, expansion of secondary education	1st generation single media DE
Fordist	Mass secondary, expansion of further and higher education	2nd generation multi-media DE
Post-Fordist	Mixed higher and continuing education, mixed mode	3rd generation computer based open and distance education, networks of opportunity

Reproduced from Farnes (1993: 11)

Raggatt (1993) uses a comparative framework comparing Fordist-style mass production with the future model of flexible specialisation and applies this framework to the UKOU system. He argues that the existing Fordist paradigm for course production at the UKOU lacks the flexibility to meet contemporary demands and that major changes can be expected in the "nature and structure of higher education" (1993: 21). Raggatt says that the Fordist-style of production in ODL is "ill equipped to respond to the substantial growth which will take place in the professional development/continuing education area in which shorter life, lower volume, sophisticated learning materials for specialised markets will predominate" (1993: 23).

The key features of a Ford-style production model and flexible specialisation are summarised by Raggatt (1993: 22) in Table 2.7.

Table 2. 7

Ford-style model Mass production 1960s and 1970s	**Future model Flexible specialisation 1990s and beyond**
Production System	
• Mass production, long production runs providing economies of scale	• Short production runs for specialised markets
• Small range of products	• Wide variety of products
• Fixed automations	• Flexible automation
Work organisation	
• Centralised planning, bureaucratic, hierarchical organisation, vertical integration	• Intelligent organisation, decentralised decision making, flatter hierarchies, partial vertical integration
• Specialised division of labour	• Multi-skilled workers operating in teams, job rotation, few job classifications
• Restricted range of skills required by individuals	• Wider range of skills, includes interpersonal and communication skills
• Workforce mostly full-time	• Smaller core of full-time workers plus part-time, temporary, and contract workers providing flexibility
• Lay-offs and turnover provide flexibility/economies, labour viewed as variable cost	• Core workforce regarded as an investment, management seeks to reduce turnover
Cost control	
• Direct labour costs tightly controlled	• Economies through just-in-time production and greater reliance on buying in outside services as required
• Arms-length outside purchasing based on competitive pricing, many suppliers	• Outside purchasing based on price, quality, technology; fewer suppliers
Training	
• Limited provision, on-the-job training predominates, some specialist/technical training for specialist workers	• On and off-the-job training, substantial off-the-job training in new technologies for core workers
• No supplier training	• Suppliers may receive training

Reproduced from Raggatt (1993:22)

Raggatt (1993) cites a number of examples of the UKOU production system to justify that its system is essentially Fordist:

- During the early years of the UKOU, the university was able to capitalise on economies of scale using long production runs to meet the high volume demands of a few courses. In addition several years supply of course materials were printed in a single print run, thus spreading the set-up costs of printing over larger numbers of students (Raggatt 1993: 23);

- Revision of courses was originally planned for a four-year cycle; however, in practice this period was often extended. In early years the decision to revise was predominantly academic, involving the course team. However, the decision to revise soon became a management decision, based on costing criteria and the shelf-life of courses was extended to six years and later to eight years (Raggatt 1993: 24);
- The UKOU is a centralised, hierarchical organisation where individual units are responsible for different functions, for example, academic work, editing, instructional design, administration, etc. Horizontal integration is achieved through an extensive committee system (Raggatt 1993: 26);
- The UKOU is organised according to specialist division of labour where strong boundaries between different categories of staff are maintained. Conditions of service, remuneration and line-reporting responsibilities differ for each of the categories of staff, and movement between the categories is limited (Raggatt 1993: 26);

Raggatt argues that the rapidity of change in many academic and professional areas, combined with the emergence of new academic areas will necessitate shorter production runs (1993:24). New technology will enable greater flexibility by providing "the opportunity to develop an integrated information and production system in which production is related to market information, registration figures for courses and the like" (Raggatt 1993: 25).

Of particular relevance to this thesis is the question of whether or not industrialisation is a defining feature of distance education. Rumble (1995a: 19) rejects the view that industrialisation is a defining feature of DE and, therefore, does not agree that DE "differs markedly from traditional education" (1995a: 10). He essentially bases this conclusion on two rationales.

First, Rumble (1995a) contends that Keegan's refinement of the definition of DE to exclude industrialisation as a defining feature is justification for his position. Rumble (1995a) points out that Keegan (1980) — in his original definition of DE— included Peters's notion that DE is an industrialised form of education as one of the defining features in his definition but in later publications did not insist that it was a defining feature (although Keegan did qualify this inclusion in his original definition by stating "if accepted" (1980:33)). Rumble (1995a) uses this supposed refinement of Keegan's thinking as an example to reject the notion of industrialisation as a defining feature of DE. In his defence Keegan did anticipate that Peters's classification that DE is a different form of education might be "unpalatable" to many (Keegan 1980: 34). For example, Bååth (1981: 213) argued that by including industrialisation as a defining feature of DE, Keegan effectively excluded the small correspondence schools that were teaching at a distance. However, by 1986 Keegan only referred to the presence of more industrialised features than face-to-face provision, and "no longer insisted that it was a defining feature" (Rumble 1995a:14), although Rumble concedes that Keegan still recognised that it was an important characteristic of large-scale DE systems. Rumble uses this history of the development of a definition for DE as one rationale to reject industrialisation as a defining feature of DE. Rumble concludes that: "This debate established that, while distance education could be an industrialised form of education, industrialisation is not a necessary characteristic of distance education" (1995a: 14).

Second, Rumble points out that the "claim that traditional education is a non-industrialised form of education is also clearly wrong" (1995a: 15). He then provides numerous examples of how the principles of industrialisation have impacted on conventional face-to-face teaching. Rumble demonstrates that the need to educate growing numbers of students in conventional systems has resulted in changes and influences derived from the industrialisation of labour. For example, there is the shift in emphasis from a tutorial learning experience to one where the teaching process is divided up among a range of teachers, each responsible for a specific subject specialisation. Rumble also suggests that the increased use of technology in the face-to-face situation is an example of the acceleration of industrialisation of education as a whole (1995a:17). Rumble concludes that;

> *Distance education is thus not the only form of education to have been affected by industrialisation, nor given the increasing convergence between distance and traditional forms, is it even particularly distinct. The fact is that all of education is under pressure to improve its productivity, and supported open and distance learning, which entails industrialisation, provides a means of doing this.* (1995a: 17)

Rumble's first rationale does not prove or disprove that industrialisation is a defining feature of education. Keegan's (1980) original attempt at "defining" DE was a compilation of four early definitions of DE that he selected for analysis on the basis that these definitions were representative of the field at the time. Keegan clearly stated that "[i]t is not the purpose of this study to devise yet another definition of distance education but to highlight those elements which are essential to any definition" (1980: 14). Keegan has a good command of German and by 1980, Peters's work was still unknown in the English speaking world. Consequently, Keegan was responsible for introducing Peters's discoveries to the broader DE community in 1980. He was also responsible for translating Peters's early texts into English in 1994. Reflecting on Peters's research, Keegan says the following:

> *He [Peters] is quite convinced that distance education has its own laws of didactical structure, great teaching potential, serious didactical flaws and that it presents opportunities and dangers to both teachers and students which are as yet not fully studied. Anyone professionally involved in education, he maintains, must presume the existence of two forms of education which are strictly separable: traditional education based on personal communication and distance education based on industrialised and technological communication.* (1980: 17)

Clearly, Keegan was well aware of Peters's view on the industrialisation of teaching. However Keegan took an objective view by not making a judgemental selection of the criteria for his composite "definition" of DE. Recognising that Peters's view suggested a radical separation from conventional face-to-face education, he qualified its inclusion as a defining feature in his "definition" by pointing out that it was subject to the reader's judgement whether or not it was to be accepted. Keegan did not insist on the inclusion of DE as an industrialised form of teaching and learning as suggested by Rumble (1995a: 14). Consequently, Rumble's first rationale for rejecting industrialisation as a defining feature of DE is difficult to justify theoretically.

Rumble's second rationale attempts to dispute that industrialisation is not a defining feature of DE on the grounds that both forms of provision (DE and face-to-face) have been influenced by the processes of industrialisation. However, this does not invalidate the claim that industrialisation is the defining feature of DE, it simply proves that "industrialized methods of thinking and acting penetrate *all* areas of life and work, infiltrate them and alter them" (Peters 1998:112). The fundamental difference between the impact of industrialisation on face-to-face teaching and the impact on DE is that in the case of distance teaching, the teaching-learning relationship is altered fundamentally and is therefore structurally different. For example, the increased use of technology in campus-based models may suggest increased levels of industrialisation, but the pedagogical mode of instruction is still predominantly *oral*, the same as for thousands of years. However, in DE, the industrial impact of technology has resulted in the teaching-learning relationship being objectified, and DE is a coded and technologically mediated form of communication (Peters 1998 112). This is a structural difference.

Remaining with the theme of whether or not industrialisation is a defining feature of DE, Jarvis (1996:48) agrees with Rumble that it is not, however for different reasons. Based on the work of Giddens (1990) regarding time-space compression as a condition of late modernity, Jarvis (1996: 48) suggests that: "distance education is basically defined through the recognitions that the relationships between space and time have been re-aligned and that different technologies have facilitated these processes." He suggests that time-space compression is the defining feature of DE and not industrialisation. Using the time-space separation characteristic of DE as a defining feature of its practice is inherently logical, and linking this to Giddens's time-space relations with reference to the consequences of modernity, provides a suggestive sociological foundation.

However, Jarvis (1996) has failed to develop this line of reasoning adequately in his attempt to refute industrialisation as a defining feature. The time-space notion of DE, although useful, does not distinguish the defining characteristic of large-scale ODL teaching systems. Yes, time-space separation is evident in all DE systems and is a prerequisite condition enabling its practice, but it does not distinguish large-scale ODL pedagogy from the pedagogy of the remote classroom model, whereas Peters's notion that industrialisation is a defining feature of DE does.

This distinction is important because the two forms of provision are structurally different. With specific reference to the remote classroom model, the pedagogy and modes of learning are virtually identical to classroom-based pedagogy. However in the case of large-scale DE, the pedagogy and modes of learning are different. Conventional "instruction is predominantly *oral*" (Peters 1996: 51), and even though in the case of the remote classroom model, communication is facilitated by technology, the pedagogical modes of learning remain the same, as is the case for oral instruction. Furthermore, there is a distinct rationalisation and corresponding division of labour required of the teaching function in DE, which is not the case in contiguous forms of provision (see Peters 1989). Again, this is a structural difference.

With reference to the question of the use of technology in distance education, it is not so much the fact that technology is used — as compared for example to the use of multi-media applications in face-to-face instruction — but in DE it is rather the "problem in how far technical media change, impair, and even destroy traditional social structures and how far 'natural' forms of communication which have been the basis of instruction from time immemorial can be replaced by technical artefacts, the impact of this difference becomes discernible" (Peters 1996: 52). In DE, the dynamic of the teaching-learning communication process is objectified through the use of technical media. Certainly, the new digital ICTs do provide exciting opportunities for communicative action over time-space dimensions. However, in such cases, the communication would then be derived from traditional pedagogical modes, and would not constitute a structural difference. Incidentally, this is one of the reasons why the analysis of DE is becoming more complex — because there is no longer a distinct DE pedagogy but rather a myriad of alternatives, which complicates precise definition of DE.

Furthermore, the objectification of communication in DE is one of the main reasons why some sociologists, psychologists and educationalists may criticise DE. Personal interaction and communication is considered to be a core element of education and they would argue that the rationalisation associated with DE removes these core elements of socialisation (Peters 1996: 52).

For instance, Evans and Nation are strongly opposed to the tendency in DE to disregard the significance of dialogue through the commodification of knowledge in what they have called "instructional industrialism" (1989:38). This concept encapsulates a critical perspective in opposition to the view that DE is structured according to the practices of industrialisation (Inglis 1996). Evans and Nation believe that it is imperative that we understand and respect the capacity of learners to shape their own learning, and to use this in shaping their own lives, and that this should be achieved by "dialogue" in DE (1989). However, the risks of "instructional industrialism" in many forms of DE may result in the "dialogue" being compromised. The ODL discourse is framed and shaped by the practices and technologies that surround it. "[T]hese discourses need to be subjected to analysis and critique in ways which may lead to the deconstruction of the instructional industrialism of distance education and open learning, and a construction into new forms of education reflecting the 'post-industrial world' "(Evans & Nation 1992:3).

Critics argue that accepting the industrialisation of education perspective means that supporters of this view must necessarily acknowledge that DE is not education because the deconstruction of traditional modes of human interaction in education — through, for example, rationalisation and objectification — disqualifies the industrialisation perspective from being recognised as a defensible educational theory. In other words, a theory which infers that the core element of education (personal interaction and communication) does not exist in its authentic form cannot logically be a valid educational theory.

Despite the compelling logic of this argument, it is not a justifiable basis to refute the validity of the industrialisation of DE. The contestable assumption of this line of reasoning is that human interaction cannot be technically mediated, or that effective dialogue cannot be achieved asynchronously. The rationalisation, objectification and associated division of labour in DE, has not removed interaction as constitutive element of the educational transaction. When discussing the DE analytical systems framework depicted in Figure 2.3 earlier, catering for the different forms of interaction during the teaching-learning process was specified as a core function of distance teaching. Certainly, in the absence of providing for all the forms of interaction at the systemic level, DE would not be education.

What industrialisation has meant for large-scale ODL teaching systems is that through rationalisation and division of labour, that which can be standardised is scaled-up and provided in large quantities. Yet interaction and dialogue is maintained as a core function of DE teaching systems and has capitalised on the unique advantages of technically mediated communication as well as the advantages of asynchronous communication. By applying the principles of industrialisation, the unique interplay among the core distance teaching functions, when carried out at scale over a distance, has enabled large-scale ODL to provide a quality university-level education in a cost-effective way.

With more than 3 million learners collectively studying at the mega-universities, this is a factor of one-and-a-half times more than the total number of tertiary education enrolments in the United Kingdom, not to mention the millions of learners studying by means of DE at other institutions. This proves that DE delivery is a significant form of delivery that cannot be ignored. Now it is more important, than ever before to gain a deeper understanding of how and why the driving forces of industrialisation have altered educational provision. In the absence of such an understanding, it will be difficult to fully comprehend how the emerging knowledge society may impact on the university as institution and the transformation of its modes of delivery.

In summary, the research depicted here suggests first, that large ODL systems are essentially Fordist and second, that the trajectory for future change of this form of education provision is likely to be post-Fordist. The first deduction is supported by compelling evidence, particularly when considering Peters's extensive theoretical explanations and the evidence summarised here. However, with reference to the second inference, global transformation of ODL to a post-Fordist system is not a foregone conclusion, despite its inherent appeal.

There are a number of reasons why the post-Fordist objective in DE will still require extensive intellectual interrogation and empirical research:

- With particular reference to the mega-universities, we do not have a global example of one that can objectively be classified as a post-Fordist organisation. Certainly, there is evidence of pockets of post-Fordist tendencies in the practice of some of the mega-universities, but this is not sufficient in nature to conclude that the trend in large-scale ODL teaching systems is definitively post-Fordist. Consequently, much of the research work on post-Fordism in ODL is speculative in nature.
- The five largest mega-universities are all based in developing countries and were only established since 1978 (Worldbank 2000). These are fundamentally Fordist institutions, notwithstanding the fact that they were established in an era, which is generally regarded to be post-Fordist in the West. Reporting from the wider sociological perspective of Education, globalisation and economic development, Brown and Lauder (1997: 175) remind us that the supposed demise of Fordism in the West does not necessarily hold true for developing society contexts: "Therefore, while recognizing that some of the key elements of Fordism in western nations are being transformed in the global economy, it is important not to prejudge the direction of these changes" for all contexts (Brown & Lauder 1997: 176). This is not a judgemental statement concerning the social good of post-Fordist tendencies. Whether or not it is in the interests of developing societies to first focus on industrialised approaches and therefore forgo opportunities to "leapfrog" into a knowledge-based economy is a question that will require extensive analysis. Dimensions of this debate will be tackled later.

Having said this, these reservations do not necessarily disprove that the future objectives of university-level DE should not be post-Fordist. In fact, this question is a fundamental focus area of the research reported in this thesis. What is important is that these reservations allude to the complexity of the debate and should therefore not be discounted as trivial anomalies. Reflecting on the imperatives for shifting towards a post-Fordist organisation, Rumble remarks that:

> *Realistically, I am doubtful if we have a choice. If we do not go this way, we may well not survive in an increasingly competitive world. Survival however, has its price. The degree of cultural change required is immense, and the effect on structures, jobs and employment practices will be significant and not without pain.* (1995c: 40)

The influence of theories from outside the traditional writings of DE has had a considerable influence on the thinking in ODL. In particular, the industrial theory discourse is an important debate that is likely to be refined in the future, but should certainly not be ignored. In conclusion, given that there are different nuances of industrialisation, Campion offers an insight that is worthy of further contemplation concerning future strategy work in ODL:

> *Those who see distance education as a form of industrialised educational practice should pause and reflect on what form of industrialisation they have in mind. It may be that technology has changed the nature of work and industry to such an extent that their view of industrialisation is outdated and, therefore, their conceptualisation of distance education is as redundant as the blacksmith.* (1991: 203)

2.4 Summary of the unique requirements of DE and corresponding implications for scenario planning in ODL

The purpose of this concluding section is twofold: first to summarise the findings justifying that large-scale single-mode DE is a form of educational provision that has its own specialised requirements; and second, to introduce the main implications of these findings for the scenario planning process.

The research reported in this chapter has been directed by answering the question:

> What are the defining characteristics of DE when compared to face-to-face forms of delivery, and is it important to know the difference?

Two approaches were used to identify the defining characteristics of DE: first, a literature survey of the research reported in the ODL field with specific reference to defining and describing the practice of DE and second, a broader sociological analysis using the heuristic of industrialisation as an intellectual framework to further justify the uniqueness of large-scale DE.

The literature survey conducted in the first phase of the analysis was principally underpinned by the point of view that DE is a method of delivery within a tapestry of alternatives. This phase has revealed the following distinguishing characteristics of DE in general and large-scale ODL provision in particular:

- Technical mediation of the core teaching-learning processes is a defining feature of DE, when compared to campus-based teaching. Without it, DE would not be able to bridge the time-space barrier. Technology *per se* is not the differentiating feature, but rather that the dynamic of the teaching-learning process is mediated by technology. For example, although face-to-face instruction may use a variety of technologies like multi-media simulations in the classroom the core nature of the dominant pedagogical modes of communication in classroom-based teaching remain unchanged. This distinguishing characteristic is also illustrated at the organisational and systemic level when considering the use of new ICTs in campus-based models with regard to flexible learning applications. For example, the essential nature, character and organisational structure of face-to-face institutions is not changed in substantive ways when these organisations begin using web-based teaching strategies to provide remote access to learning resources to their full-time campus students — even though this flexible learning strategy meets the traditional time-space separation requirement associated with the definition DE. Therefore, the requirements of large-scale single-mode ODL are different when compared to other forms of DE and campus-based delivery.
- Although time-space separation distinguishes DE from face-to-face teaching, it is not a differentiating feature of large-scale ODL provision when compared to other forms of DE. For example, the remote classroom model of DE (which meets the time-space separation requirement) essentially uses the same pedagogy as classroom-based teaching, whereas the large-scale DE teaching systems have developed their own distinctive pedagogy.
- DE imposes special systemic requirements on the organisation regarding planning, designing, developing and delivering distance learning. However, this characteristic is more discernable in the case of large scale ODL teaching systems.

- Provision of two-way communication is essential in all educational endeavours: however, in the case of DE, this is technically mediated. Large ODL teaching systems make extensive use of simulated communication strategies and communication dominated by asynchronous interaction, thus differentiating them from conventional face-to-face models which use synchronous dialogue as the main mode of interaction.
- Open learning as a philosophy is not a defining characteristic of DE as it can be applied to all forms of educational delivery. However, the nature of DE, does in some cases, lend itself to being more "open": for example, students can study at times more convenient for them and if the course design permits, they can study at their own pace.
- When comparing the UKOU, Unisa and the AIM project as DE prototypes it is clear that the UKOU was designed as a total teaching system from its inception within the new era of using mass-broadcast media in higher education. Unisa has been struggling with the redesign of its systems and organisational structures, which were originally instituted prior to the era of the use of mass-broadcast media in education. The fact that the UKOU was established as a new entity facilitated the design of a system fit for purpose. The difficulties experienced by Unisa in the redesign of its systems and structures, because they were found to be inappropriate for contemporary demands of DE provision, provides further evidence of the unique requirements of large-scale DE systems. The inefficiency of a conventional academic organisational design structure is evident where administrative departments are added-on to a basic academic structure (as in the case of Unisa). This attests to the fact that large teaching systems have specialised organisation requirements that cannot be based on conventional organisational design structures associated with the university.
- DE is also differentiated from conventional face-to-face forms because, in the case of DE the institution teaches, whereas in campus-based models, individuals teach.
- In asynchronous DE delivery systems the entire curriculum development and instructional design process (including the phases of design, development, implementation and evaluation of the whole course) is carried out in advance of individual learning situations. However, in face-to-face and synchronous DE delivery systems, the instructional design process is broken down into sub-phases that are carried out progressively over the duration of the course. Consequently, asynchronous delivery systems cannot rely on incremental adaptations and improvements to the core materials during the course of delivery. This places high demands on the pedagogical design process, with specific organisational requirements concerning processes and structures. Furthermore the quality of the pedagogy is consistent for all learners, while in face-to-face systems quality is variable. Clearly higher levels of planning are required in advance to cater for heterogeneous groups of students because the teaching cannot be adapted in a piecemeal fashion. Organisational structures and processes are correspondingly different for these institutions.
- Large-scale ODL teaching systems require robust logistics and administration systems that are different in nature and magnitude from those found at campus-based institutions. For example, an assignments department is needed to administer the receipt, distribution for marking and recording of student achievement. Corresponding systems are required for warehousing and despatching large volumes of course materials.
- The cognitive dimension of student support differentiates large-scale ODL systems from other forms of DE and face-to-face provision because dedicated student support systems are required. These student support systems — a variable cost — can only be sustained when operating at scale because of the comparatively low cost (and savings) of the presentation of learning content (one of the core functions of DE teaching). Also, the levels of individualisation

that can be achieved in these systems distinguish large-scale ODL systems from face-to-face provision.

The second phase of the analysis was based on analysing large-scale ODL systems from the perspective of industrialisation. Further explanations, clarifications and debate were introduced by applying the Fordist, neo-Fordist and post-Fordist frameworks associated with production theory to DE practice.

Peters, based on his extensive sociological analysis (see for example 1967, 1973) concludes that DE is structurally different from other forms of provision, and it is therefore a unique form of educational provision. In summary, the most prominent features that characterise distance education as a product of the era of industrialisation are listed below (see Peters 1993b):

- High levels of planning are required in DE regarding the design and development of learning materials. This phase is just as important as the actual delivery (teaching) of the course. This corresponds with the high levels of preparatory work associated with industrial production processes;
- The effectiveness of the teaching-learning process in DE is dependent on the levels of planning and organisation implemented;
- In DE the traditional functions of the teacher are divided into a number of sub-functions that are performed by a number of specialists. This corresponds with the division of labour associated with industrial production processes;
- Large-scale DE teaching systems can only be economical if they operate at scale and rely on standardised learning materials. This corresponds with the characteristics of mass-production and mass-consumption associated with industrial mass-production systems;
- DE is characterised by high levels of mechanisation, which replace certain functions of the teacher and objectifies the teaching activities. This corresponds with the extensive use of machines that replace people in classical industrial production;
- Not unlike the industrial production process, DE requires significant capital investment and centralised administration;

This chapter has demonstrated and concludes that the practice of large-scale ODL corresponds with a unique set of requirements in terms of its pedagogy, processes and structures. Furthermore, large-scale single-mode DE is essentially Fordist. That campus-based organisations can be differentiated from the large-scale ODL institutions suggests that there are two separate points of departure. Both must be considered when developing scenarios for the future of DE regarding how digital ICTs can be applied in the tertiary education sector in support of a global knowledge economy. In addition, with Peters's view that the industrialisation of education resulted in a form of provision that was structurally different from the era which preceded it, a third speculative point of departure emerges. The third point of departure suggests that emerging modes of ODL provision may differ structurally from the current modes of DE provision.

It would appear that the interplay among the forces of globalisation, knowledge-based economies, unprecedented advances in digital ICTs, and the moral challenges of expanding access to higher education may suggest a new era for the university encapsulated by generic concepts like post-modern, post-industrial, post-Fordist and the information age. Whether or not these forces will result in a new epoch for tertiary education remains to be seen. Given that these trends may constitute a new trajectory for the future evolution of ODL provision, the meaning of these trends must be interpreted in terms of possible strategies for the future. The dilemma, of course, is that this research dimension is largely speculative. Nevertheless it is a directional trend that can be rationalised from reported perspectives of the economy, society and industry.

Fortunately, scenario planning is a powerful conceptual tool that can be used in these speculative situations to help steer organisations through turbulent times and this will be discussed in Chapter 3.

Chapter 3

Scenario planning and key uncertainties challenging DE futures

3.1 Introduction

The tertiary education sector is operating in uncertain times (see Cunningham et al: 1998). Apart from the discontinuities associated with the combined forces of the massification of higher education, the global knowledge society and the pervasive advances of digital ICTs[1], there are a number of additional factors of which the outcome is uncertain that could have a significant influence on the future of DE in the higher education market place. It is unclear how these uncertainties will ultimately play out in the future, hence the need for adopting a scenario approach.

In volatile markets such as the rapidly changing DE market, it is extremely risky to base strategic planning on definitive predictions of the future. Furthermore, conventional forecasting techniques are also precarious because they tend to be linear in nature basing future strategies on the assumptions more akin to the past than the future. This is where the technique of scenario planning comes to the fore. Rather than predicting a single future, alternative opportunities can be constructed in the form of conceptual models of the future and individual strategic projects can then be tested against the various scenarios.

The first section of this chapter provides a brief overview of scenario planning as a tried and tested technique for strategy innovation in the corporate world where the purposes and characteristics of the technique are explained. The second section provides a high-level analysis of the volatility of the rapidly changing DE market thus justifying the appropriateness of scenario planning as preferred technique for strategy innovation for e-learning futures in higher education. The concluding section of the chapter will concentrate on identifying and analysing the factors which scenario planners label the "uncertainties" — specifically those which relate to DE futures.

As indicated in the objective of this study (see Chapter 1, Section 1.2), scenario planning normally differentiates between factors that are predictable and factors that are uncertain. As planning shifts its focus deeper into the future — as in the case of strategy development — the predictability and potential impact of the "uncertainties" begins to exceed that of the predetermined drivers of change and existing industry trends (see Chapter 1, Figure 1.3). With specific reference to evolving DE futures, the following two

[1] See discussion on these drivers of change in the problem formulation of Chapter 1.

uncertainties will be analysed as the key dynamic variables for the scenarios on distance education futures:

- First, the latent potential embedded in the emerging technology of digital learning objects to transform the way education is delivered;
- Second, the extent to which the apparent paradox of mass-customisation and post-Fordist delivery systems may impact on future DE delivery systems.

Clearly, future DE systems will operate as systems of dynamic complexity and consequently it is not possible to define the identified uncertainties as discrete variables. Fortunately, scenario planning is capable of studying the future in a way that recognises complexity and dynamism. In this regard, "[c]omplexity refers to the multiplicity of variables that must be considered and the variety of relationships that can exist among them" (Ward and Schriefer 1998: 140). Wilson distinguishes between data-based complexity and dynamic complexity and points out that dynamic complexity requires a conceptual and creative approach (cited by Schriefer 1995: 33). Whereas the application of forecasting algorithms and probability analysis is appropriate for data-based complexity, the scenario planning methodology is more fitting for tackling the challenges of dynamic complexity.

In this study the uncertainties are analysed from the perspective of a dynamic systems context. This necessitates that the identified uncertainties are analysed from multi-dimensional perspectives. This is a principal difference between forecasting and scenario planning. Whereas forecasting techniques examine the impact of a particular variable whilst keeping the other variables constant, scenarios on the other hand, "change several variables at a time without keeping the others constant" (Schoemaker 1995: 27). Consequently, this chapter paints a wide canvas to accommodate descriptions of the dynamic interaction among the array of uncertainties.

3.2 An overview of the scenario planning methodology and specific scenario matrix for this study

In this section the methodology of scenario planning is defined and further justified as to its appropriateness for strategic planning in volatile markets. Building on the experience gained from industry in scenario planning, a scenario matrix for analysing alternatives relating to DE futures in higher education is introduced and explained.

A scenario is a mental model that articulates plausible futures by taking into account fundamental business assumptions combined with a deep understanding of the dynamics of present-day reality. A scenario promotes the interpretation of the present in terms of a picture of the future. It is a storyline that plots a path from the present to the future. Scenarios enable leaders to think in depth about external forces that may affect the future, and then allows them to translate this future picture into the implications for the existing business model. On the one hand, scenarios can be used to generate mental models for improving or modifying existing markets and technology. While on the other hand, when viewed from an innovation perspective with specific reference to DE futures, scenarios can also be used as a tool for generating new modes of educational delivery that have the potential for building new markets in the higher education sector.

Scenario planning or mental modelling as a tool for strategic innovation is not a new planning technique. It is a tried and tested methodology that has been used successfully in the corporate world. For example, the Royal Dutch Shell Group pioneered one of the first examples of successful scenario planning (Schoemaker & Van der Heijden 1992). They used scenario planning in the form of mental models of the future to steer the company through the turbulent oil crisis of the 1970s resulting in Shell becoming one of the strongest oil companies by the late 1980s (see Schoemaker & Van der Heijden 1992; Senge 1994: 8). Other examples include the Anglo-American Corporation of South Africa, which convened an international group of experts to explore South Africa's corporate future in the 1980s before the first post-apartheid elections in 1994 (see Schoemaker 1995). Also the Mont Fleur Scenario Project, where a group of academics, business people and political activists used the methodology to explore the future of a post-apartheid South Africa in 1991 (Kahane 2001). Scenarios have been used in diverse contexts, including a wide range of industries, competitive advantage market analysis, investment planning, future product development and public policy formulation (see for example Bonnett & Olson 1998; Fahey 1998a & 1998b; Millet 1998; & Thomas 1998).

The original Shell approach of scenario planning has matured into a powerful technique representing a variety of approaches which force companies to think more critically about the future than conventional forecasting techniques allow. Reflecting on the Shell experience of scenario planning, Van der Heijden remarks that "[f]orecasting produces answers, but scenario planning had made people ask the crucial questions" (1996: 18) about the future. The inherent power of the technique is that it transcends the "domination of the credible, popular but very wrong imagined future" (Van der Heijden 1996: 18). Shell also discovered the pervasive influence of using scenarios to accelerate organisational learning, hence Senge's support for using mental models to promote the ideals of the learning organisation (Senge 1994).

The Shell leaders have refined the competencies associated with drawing up scenarios for the oil business. They deliberately set up scenarios at opposite ends of the spectrum, so as to expose managers to alternatives they may not ordinarily see and then asking how they would respond if a particular scenario realised itself. Much of the published literature on scenario planning draws on the pioneering experiences of the Shell Group (Schoemaker 1995 & 1998; Schoemaker & Van der Heijden 1992; Van der Heijden 1996).

Further support for using scenario-planning techniques is provided by other authors who have noted the advantages of conceptual modelling for generating strategic futures. Handy, for example, talks about "curvilinear logic" (1994: 60). Curvilinear logic, which is necessarily conceptual, is directed to "starting life over again" (Handy 1994:60) based on the assumption that the reasons for current achievements will not sustain future success. In order to start the second sigmoid curve before the first one fades out, leaders must critically question the assumptions underpinning the first sigmoid curve and build conceptual models for the future. Senge (1994) argues that the success of a learning organisation is dependent on the mental models of its people. Existing images of how we perceive the world to work can constrain us to familiar (old) ways of thinking and can work against establishing successful futures. Therefore, Senge (1994) also emphasises the important role that scenarios can play in building mental models of the future, thus facilitating the shift from present-day reality to the possibilities of the future.

Clearly scenario planning is an appropriate technique which holds considerable potential for strategy innovation and has a proven track record in the corporate world. The following features are listed in summary of the scenario planning technique (see for example Fahey & Randall 1998; Georgantzas & Acar 1994; Ringland 1998; Schwartz 1996; Senge, Kleiner, Roberts, Ross, Roth & Smith 1999; Van der Heijden 1996 & Wulf 2003):

- The prime purpose of scenario planning is to create an organisation which becomes more adaptive by using change and uncertainty to the advantage of the enterprise because it is one of only a few strategy techniques that is capable of dealing effectively with uncertainty;

- Scenarios do not predict the future, but are used as tools to gain a better understanding of alternative future paths. Scenarios are used to test strategic options against alternative futures that are based on a set of new — but realistic — assumptions. In this way enterprises can generate a unique source of competitive advantage to maintain a leadership role in emerging markets. In other words, scenarios are used as a tool to plan strategic futures without having to 'predict the unpredictable';
- Scenario planning is a method that enables leaders and managers to generate insight into the potential implications of emerging discontinuities by critically questioning existing models of reality and to change where necessary. Hence, scenario planning enables leaders to rethink their worldview and expose their assumptions about important aspects of their respective business;
- Typically, multiple scenarios — equally plausible — are produced and used as a test-bed to evaluate the performance of policies and strategic projects against each scenario. Each project is evaluated against two or three scenarios and the decision on whether to go ahead is based on multiple outcomes as opposed to a single dimension strategy. Each scenario is built in such a way that they are equally plausible. Therefore, a more comprehensive assessment of value and risk regarding specific strategic projects can be obtained;
- Scenarios enable managers to think in an unconstrained way because it is not a cost intensive technique. Institutions do not have to commit significant reserves to a predetermined strategy at this point of the planning phase. Viewed from this perspective, the conventional limitations associated with existing budgetary constraints do not dictate foresight, thus freeing organisations from the restrictions of operational feedback loops. Furthermore, the process of scenario planning has the added advantage that it is not capital intensive when compared to the research and development of new products and new technologies.

There has been some debate in the literature concerning whether scenarios should be used purely as a *reactive* tool to respond to the forces bearing upon the organisation from the external environment. Alternatively, should scenarios be used in a *generative* way to assist organisations to recognise how they can actively participate in shaping the changing world? (see for example Kahane, cited in Senge 1999 et al). Clearly, scenarios can be used effectively in both applications, and in this study both types of scenario will be used.

Good challenging scenarios — whether of the reactive or the generative type — must nonetheless be recognisable, believable and internally consistent. Scenario planning cannot be based on conjecture. Planning is based on the assumption that things are predictable to a greater or lesser extent. Plainly, if the future is 100 percent uncertain and unpredictable, then planning would be nothing more than wishful thinking and a waste of time. The skill of scenario planning is to "separate what is predictable from what is fundamentally uncertain" (Van der Heijden 1996: 26). The predictable elements are known as "predetermineds" (Chapter 1 and Chapter 2) and the non-predictable elements are known as "uncertainties" (Chapter 3). When using multiple scenarios, the predetermineds remain the same while the uncertainties play out in a different way within each scenario (Van der Heijden 1996). Furthermore, uncertainty must not be confused with probability. Probability is a quantified measure of the likelihood of some future event, very often based on the statistics of similar events that have occurred in the past. However, Marsh (1998: 44) points out that if the outcome of a future event cannot be estimated or anticipated, then the outcome is uncertain, consequently no probability can be ascribed to the outcome concerned.

There is a conceptual point beyond which accuracy cannot be improved, and this is what Van der Heijden calls "irreducible risk" (1996: 103). There comes a point where managers have to face irreducible risk when planning for the intermediate future, particularly in situations that are fast-paced and complex. Forecasting techniques are focused on predicting a particular outcome and typically the sources of uncertainty become hidden in the analysis. Conversely, scenarios are built as compelling storylines that examine a dynamic chain of cause-and-effect relationships and differ from forecasting techniques because they consider, not just the outcomes but also "the driving forces which could move a business one way or the other" (Van der Heijden 1996: 105). In this way, scenarios promote understanding about the future, and at the same time, test existing mental models and assumptions about the existing business, thus promoting the notion of knowledge innovation which underpins the strategic perspective of this study.

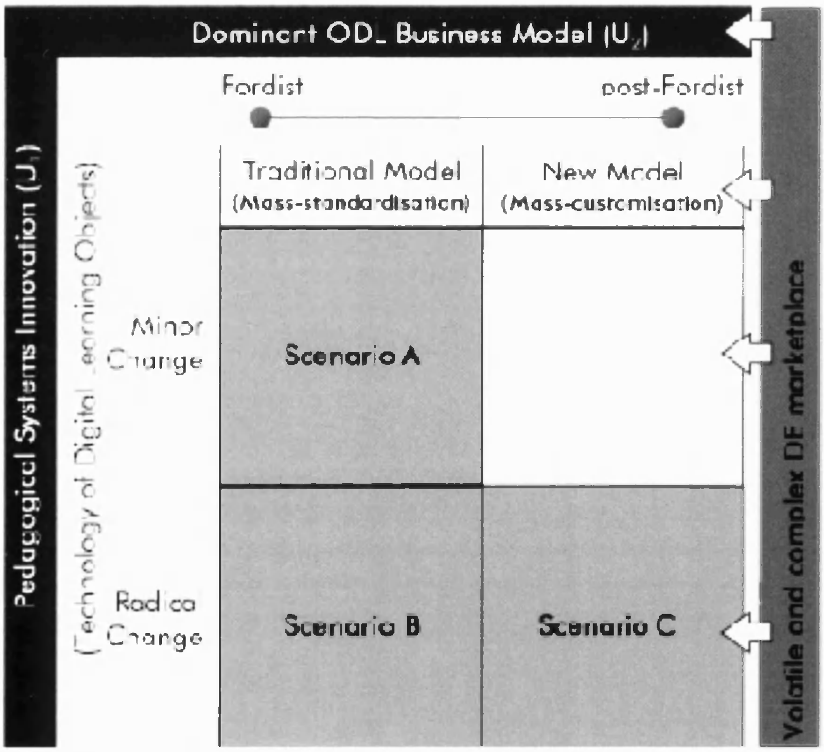
Before proceeding with the detailed analysis of the uncertainties identified for this study, it is necessary to consider some of the practical rules of thumb of scenario planning based on the advice of experienced scenario practitioners. The following practical guidelines were used to refine the scenario matrix used for this study:

- At the very most, no more than five scenarios should be developed, as too many scenarios dilutes focus and tends to confuse the important issues. Schoemaker (1998) suggests that two to four scenarios are usually adequate to bracket the range of alternative images of the future. Schriefer (1995), for instance, is of the opinion that more than two scenarios can become cumbersome. In this thesis, three scenarios will be developed thus falling within the suggested parameters of Schriefer (1995) and Schoemaker (1998).
- It is difficult to get the balance between the predetermineds and the uncertainties right. A scenario which places to much emphasis on existing trends and drivers will not be able to stimulate new strategic options and is very often a good indication that the organisation is not looking far enough into the future. Conversely, insufficient focus on the drivers of change will result in plausibility problems for the scenarios. Furthermore, it is paramount that the predetermineds focus on the deeper forces underpinning change and not superficially on the symptoms of these drivers of change (see Schoemaker 1998). Whether dealing with the divers of change, trends or uncertainties, the research reported in this thesis has opted for an in-depth multi-disciplinary approach when interrogating and analysing the core factors underpinning the scenarios of the thesis.
- Scenarios must define and deal with the decision context; otherwise, they simply become the product of an exercise (see Schriefer 1995). It is neither advisable nor possible to build scenarios for all eventualities, but rather you should focus on a clear purpose and focus. The scenarios being developed in this thesis will focus on the alternatives facing universities in the future regarding the structural and systemic elements of evolving DE markets, taking into account the high level pedagogical implications of each alternative.
- Scenarios can only succeed if they meet the criterion of corporate relevance (see for example Wilson 1992). They must reflect the institution's central concerns as well as the key issues and decisions they are most likely to tackle in the future. The scenarios in this thesis have been developed from the perspective of the university as institution and recognises the value of the traditions of the academy. Consequently, the scenarios are not developed from a dominant corporate perspective disregarding the idea of the university. However, the potential threat, if any, from corporate providers moving into the traditional university marketplace must necessarily be taken into account because the scenario's scope should be broader that the specific industry concerned (see Schoemaker & Mavaddatt 2000).
- Scenarios should succeed in simplifying the "avalanche of data into a limited number of possible states or scenarios" (Schoemaker & Mavaddatt 2000: 212). These authors recommend that good scenarios should not attempt to analyse more than two key uncertainties. After determining the possible poles or states of each uncertainty, a two-by-two matrix can be constructed. Each quadrant then

represents the nucleus for a possible scenario. The scenarios in this thesis will be built using two key uncertainties: first the latent potential for pedagogical innovation in DE delivery systems associated with the technology of digital knowledge granules (U_1); and second, the Fordist versus post-Fordist continuum as distinct ODL business models (U_2). The resulting matrix is represented graphically in Figure 3.1.

The three scenarios identified in Figure 3.1 will be named and developed in the following chapter. However, the framework is introduced here to provide a conceptual overview of the relationships among the key uncertainties and the origins of the prospective scenarios. The unlabeled quadrant does not represent a plausible state, because it is not technologically feasible to develop high levels of mass-customisation in DE in the absence of significant advances in the technology associated with digital knowledge granules.

Figure 3.1 Scenario matrix for DE futures (depicting uncertainties and plausible scenario nuclei)



Strategic business decisions essentially revolve around deciding what areas are worthwhile committing limited resources to. This decision is largely driven by the question of what would really make a difference to the existing business model (Van der Heijden 1996: 94). Arguably, expanding provision alternatives to include technology-enhanced DE will make a difference to the current situation. However, most providers — including the corporate for-profit universities — will be doing this, and it will be difficult to establish competitive advantage using such a strategy. Answering the question of what would **really** make a difference has directed the final selection of the key uncertainties to be used for the scenarios. For example, being able to provide truly customisable learning experiences for prospective students because of a structural shift to a post-Fordist delivery philosophy would make a real difference in the tertiary education market. Moreover, being able to adapt and enhance pedagogy according to more effective modes of learning utilising the potential of digital knowledge objects and intelligent tutoring systems would also really make a difference. This is not intended to reduce the complexities associated with the volatile and emerging DE market, and this dimension will nonetheless be dealt with as a factor justifying the appropriateness of scenario planning as a strategic technique.

The two key uncertainties for this study have been derived from research on companies that have demonstrated repeated success with innovation, thus meeting the criterion of what really makes a difference. For instance, Hargadon and Sutton (2000) have conducted an extensive analysis of companies that have been successful innovators. One of the characteristics of the most successful corporate innovators is that they were able to take good ideas in one area and successfully move and adapt these ideas into an area where they are not commonplace. In the DE context there are two significant innovations that have evolved in other areas that have considerable potential for innovation in the domain of ODL teaching systems: the technology of digital learning objects; and the industrial paradox of mass-customisation.

Recent developments in the computer sciences and software engineering support the innovation of digital learning objects. Digital learning objects "are elements of a new type of computer based instruction grounded in the object-oriented paradigm of computer science" (Wiley 2000: 3). Although still in the early stages of development, digital learning objects will be capable of customisable multi-media, multi-mode DE delivery in the near future, and they will be discussed in greater detail later in the chapter.

The second innovation concerns the concept and industry practices of "mass-customisation" as the basis to maintain competitive advantage. Mass-customisation is rooted in the ideals of a "tremendous increase in variety and customization without a corresponding increase in costs" (Pine 1993: xiii). Many industries have thrown away the paradigm of producing standardised goods and services for homogeneous markets and replacing this with a new controlling focus of mass-customisation. The large-scale ODL teaching systems are traditionally based on a system of mass-production of standardised learning resources. Consequently, mass-provision of DE may benefit from a closer study of innovations in industry associated with mass-customisation.

The volatility of emerging DE markets and the two key uncertainties introduced above will be analysed separately in the following two sections.

3.3 Analysing market volatility and competitive advantage in distance education

This section analyses two dominant themes: first, the volatility of the DE market space based on an analysis of competitive advantage; second, the complexities associated with innovation in volatile markets. The imperative for innovation, particularly for the traditional DE providers, becomes clear when analysing the rapidly changing dynamics of competitive advantage in the higher education sector. Furthermore the difficulties associated with innovation in large successful organisations are particularly acute because the reasons for past success will not necessarily ensure future prosperity — hence, the innovator's dilemma.

The higher education sector is experiencing unprecedented growth in DE and this is changing the tertiary education market in fundamental ways. This growth in DE provision, combined with the rapid advances in digital ICTs, is resulting in discernable volatility in the traditional higher education market space. Also, the composition of the traditional DE market concerning the division between residential insitutions becoming involved with DE and the single-mode providers is changing. The DE market is becoming increasingly unstable and how this market dynamic will ultimately influence the tertiary education sector and the individual higher education providers is uncertain, thus justifying the appropriateness of scenario planning as a strategic management technique. Closely related to the challenge of maintaining or expanding existing market share in a volatile and rapidly changing market is the perplexing dilemma of how to innovate successfully under these conditions. Clearly there is a complex interplay between maintaining existing market share in a volatile market and the imperative for innovation to gain new market share. A cursory introduction of this interplay is provided here. Then a more detailed discussion of competitive advantage and the innovator's dilemma follows.

The entire university sector (that is, traditional face-to-face, mixed mode and single-mode DE providers) is challenged by developments associated with the global knowledge society, massification and advances in digital ICTs. One of the outcomes of these changes is the phenomenal growth in DE, particularly at conventional campus-based institutions. Clearly there are changes taking place in the traditional distance education market and the continued growth of the large-scale single-mode ODL universities is potentially at risk because of the radically changing cost structures of distributed learning. This situation is exacerbated by the potential for pedagogical innovations in modes of learning that are now possible because of recent developments in digital ICTs. Changes in the cost structures and quality enhancements of educational provision will influence future decisions of the participants in the higher education market. It is reasonable to predict that the existing dynamic of competitive advantage associated with ODL in the university sector is likely to change, particularly with regards to changes in the respective DE market share of conventional universities when compared to the single-mode DE providers.

The corollary of these dynamic changes in competitive advantage of the DE market concerns how providers in this market can maintain market share in a volatile market, or alternatively can establish new emerging markets. The challenges facing the large-scale DE providers show remarkable similarities with the occurrence of large companies that fail to stay on top of their respective industries when faced with certain types of technological and market change. This phenomenon does not exclude the large campus-based institutions now embarking on DE forms of provision.

From an industry perspective, despite the success of some organisations that systematically succeed with innovation there are also many organisations that struggle with this challenging process. In fact there are numerous examples where large successful corporations have failed because innovation is extremely difficult to achieve in established firms (see for example Christensen & Overdorf 2000; Henderson & Clark 1990).

Companies fail for many reasons, including, bureaucracy, poor planning, inadequate skills and resources. However, Christensen reports on an interesting phenomenon where "well-managed companies that have their competitive antennae up, listen astutely to their customers, invest aggressively in new technologies, and yet still lose market dominance" (2000: ix). Christensen (2000) calls this the "innovator's dilemma".

Christensen (2000) calls this the innovator's dilemma because the sound management practices and processes that have ensured the success of many large corporations in the past are also the very reasons why they lose their positions of leadership in the absence of appropriate innovation when faced with new technologies. Similarly, with specific reference to the large-scale single-mode providers in conjunction with the ubiquitous expansion of digital ICTs, many of the mega-universities may be challenged by the innovator's dilemma given the rapidly changing dynamic of the DE marketplace. The reasons underpinning this dilemma will necessitate careful investigation within the context of the distance learning challenges in the emerging DE markets of the future.

The innovators dilemma will be discussed in this section as a subcomponent of the changing dynamics of competitive advantage in the DE market sector.

Surprisingly, the failure referred to above, cannot be attributed to bad management. In fact many of these companies have been used as examples of cutting edge management thinking. Rather, Christensen's (2000) research has demonstrated that this kind of failure is attributable to three factors:

- a specific kind of technological change;
- the rapid pace of technological progress which progresses at a faster rate than changes in market need; and
- the paradox that the existing markets of successful companies dictate their respective strategy at the expense of emerging markets for new entrants.

There is strong evidence to suggest that the conditions associated with the "innovator's dilemma" listed above are present in the DE sector, particularly in the case of the large-scale single-mode ODL institutions. This section will be subdivided into: (1) discussing the changing dynamics of the DE market; and (2) how the challenges of the "innovators dilemma" may influence organisations that plan to embark on DE delivery strategies in the future.

3.3.1 Changing dynamics of competitive advantage in the DE sector

There are significant shifts taking place in the higher education market with particular reference to the provision of DE. These trends are summarised by the following points:

- Prolific growth in the provision of DE offerings at conventional face-to-face institutions as a result of the removal of the traditional barriers-of-entry into this market, made possible by the pervasive and ubiquitous advances in digital ICTs;
- The emergence of a wide range of institutional forms of educational providers that did not exist prior to the onset of the e-learning revolution;
- The unprecedented internationalisation of the provision of higher education, facilitated by globalisation and advances in digital ICTs.

The factors listed above are changing the dynamic of the DE market in a fundamental way — a market that was previously dominated by the large-scale single-mode providers. Each of these factors will be investigated in more detail below.

Analysing the competitive advantage of large ODL universities will help explain the fundamentals associated with the changes taking place in the DE university sector. The phenomenal growth and success of the world's mega-universities can be explained in terms of an analysis of the competitive advantage that traditional DE had previously established when compared to conventional campus-based delivery models. Historically, the competitive advantage of the mega-universities was based on the unique interaction among the determinants of the eternal triangle introduced in Chapter 1, that is:

- *better access and more flexibility*: ODL as mode of delivery — underpinned by the philosophy of open learning — has provided access to a large number of students who would otherwise not have been able to study at conventional campus-based institutions. Furthermore, correspondence forms of DE have provided students with more choice of where and when to study, as compared to conventional university models;

- *consistent quality of provision*: The characteristic division of labour found in large-scale DE systems combined with the practice of using multi-skilled professional teams for developing learning resources has the inherent potential of providing teaching of a consistently high quality;
- *significant cost advantages*: Economies-of-scale have facilitated huge savings in the unit cost of providing higher education and on average, most mega-universities have been able to provide undergraduate degrees at less than half of the comparable unit cost of conventional campus based delivery (see Daniel 1999a: 30).

The combination of flexible access, quality pedagogy and significantly lower costs of university study, has enabled many of the mega-universities to grow at extraordinary rates. However, the technological advances in the knowledge media in recent years has generated a real threat to the competitive advantage that the mega-universities had.

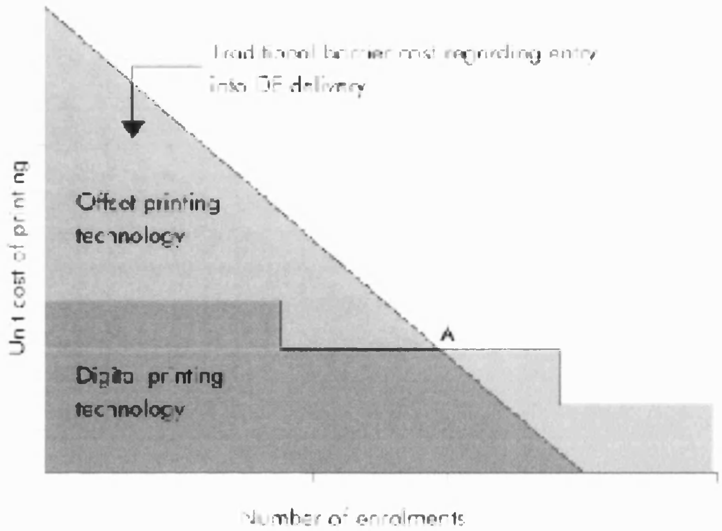
These technological advances are effectively breaking down the traditional entry barriers into the DE market which previously prohibited smaller institutions getting involved with mainstream DE. For example, the technology of desktop publishing and the low cost of digital printing combined with the capabilities of electronic publishing and distribution via the Internet have radically altered the cost behaviours of traditional DE provision. Initial capital investment in technology for entry-providers is significantly less, because these institutions do not, for instance, have to set up printing factories that are capital intensive. Furthermore, given the flexibility and capabilities of entry-level technologies, it is not necessary for start-up operations to invest in digital technologies of industrial capacity, rather technology solutions can easily be adapted according to the changes in the specific levels of demand.

Figure 3.2 illustrates the significant differences in the cost behaviours resulting from the introduction of digital printing technology in, for example, a correspondence based delivery model when compared to conventional offset printing technology. The net result is that digital technologies enable new entrants into the ODL market to achieve economies-of-scale at considerably lower enrolment levels than is possible with the traditional mega-university model of basing operations on scale. The smaller initial investment requirements combined with opportunities to target niche markets is changing the fundamentals of the tertiary education market.

With reference to digital printing technology, there are a range of solutions, depending on the level of printing demand ranging from desktop low volume laser printers to high-speed industrial capacity laser printers capable of in-line binding and packaging. In the case of digital printing, the fixed cost component attributable to a given print-run is very low. Essentially the unit cost of digital printing is fixed within certain ranges assuming that the appropriate technology solution is selected according to the corresponding print demand. This means that the unit cost of printing one study guide with digital printing technology will be the same as the unit cost of printing the tenth study guide. The changes in the unit cost curve of digital printing in Figure 3.2 represent the threshold points where it is more cost-effective to introduce alternative digital printing technologies capable of larger capacity. Furthermore, because digital printing solutions do not require extensive preparatory procedures for printing a specific task, it is easier to incorporate print-on-demand solutions and thus take advantage of savings with regards to the costs of keeping large inventories and warehousing.

In the case of conventional offset printing, the set-up costs — including image setting, preparation of plates for printing and setting up the machinery — are considerable when compared to digital printing. Consequently the unit cost of low print runs with offset printing is very high. The unit cost of offset printing steadily decreases as the volumes increase, as indicated in Figure 3.2 below.

Figure 3.2 Illustrative example of the impact of digital printing technology on the cost behaviour of large scale ODL teaching systems



When operating at scale, the unit cost of offset printing will ultimately be less than the comparable costs of digital printing, as the fixed cost component of setting up a print job is spread over a very high number of units. This juncture is indicated by point A in Figure 3.2. In effect, digital printing technology has removed the high set-up costs of conventional offset printing at low volumes. This has changed the dynamic of competitive advantage in DE provision which previously was dependent on large enrolment numbers. The dilemma facing the mega-universities is that while they will still be able to maintain cost advantage when operating at significant scale, the dynamic of the DE market is changing radically because the traditional entry barrier of scale is being eroded through the introduction of digital technologies. Moreover, it is difficult to scale down systems and processes that were designed for operating at significant scale, hence the threat to market dominance of the large-scale providers in the ODL market.

The shifting nature of competitive advantage in the DE market is not limited to the changes in cost behaviour, but also extends to the dimensions of access and quality.

Before the advent of networked communication systems, physical access to conventional campus-based universities was restricted by geographical and social constraints. For example, you could only enrol at a contact university if you resided — on- or off-campus — within a reasonable travelling distance from the institution concerned. Furthermore, prospective students were restricted to studying at times when lectures were presented. Therefore, employment and other social commitments may have clashed with the lecturing timetable of the university for large numbers of adult learners. In the past, the large-scale ODL teaching systems were able to generate competitive advantage by overcoming the time-space barriers of traditional university study, by providing more flexible access than their residential counterparts based on a teaching system designed to operate at scale. However, digital communication networks are effectively removing the barriers of time and space with online access, thus making it technically possible for every conventional university to expand its access into the DE market, irrespective of geographical location. Also, a recent trend corresponding with increasing student fees for tertiary study, is the growing number of "full-time" students engaging in part-time employment to support their studies at campus-based institutions.

Operating at scale has enabled the mega-universities to apply division of labour and specialisation with specific regard to the team-approach of course development. Combined with adequate student support systems, the mega-universities have been able to provide distance learning experiences that were consistently of high quality. Superior quality in DE is no longer an exclusive feature of the mega-university DE system, particularly in the light of emerging digital technologies. Multi-mode, multi-media learning materials now possible have huge potential for improving the pedagogical quality of distance learning. Certainly, the mega-universities have acquired a wealth of tacit and codified knowledge concerning the unique quality requirements associated with the processes of DE pedagogy. However, this is well reported in the literature and tacit knowledge resides in individuals. These people often migrate into the conventional university sector that are now expanding delivery through e-learning. Consequently, the mega-universities cannot rely on their experience alone to maintain competitive advantage regarding the specific pedagogical requirements of quality DE, and it will become increasingly difficult for the mega-universities to compete on the quality of DE pedagogy alone.

Plainly, the traditional competitive advantage that the mega-universities have held is changing fundamentally in terms of flexible access, consistent quality of provision and cost advantage. Early signs of these changes can be observed in two ways: first, by the rapid expansion of DE provision at conventional campus-based institutions; and second, by the growing number of alternative forms of institution and the number of "new providers" in the higher education sector.

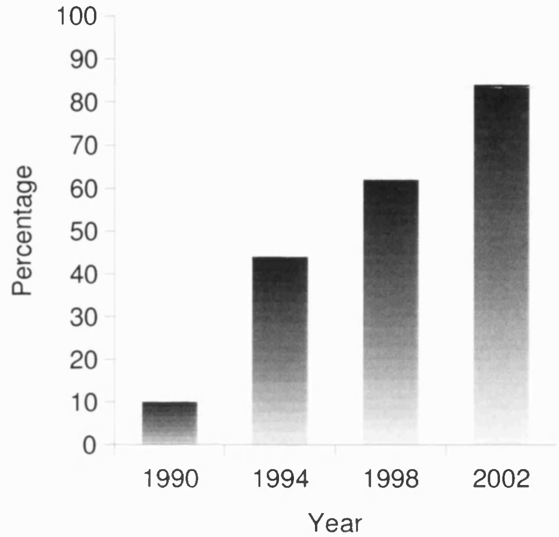
Unfortunately, global statistics on higher education provision (for example, UNESCO's World Education Report 2000a) do not distinguish between DE and traditional modes of delivery therefore it is difficult to accurately assess the extent of this global trend. However, there are some telling examples that attest to the significant growth in the DE sector of the higher education market. At the beginning of the 1990s, very few traditional universities were actively engaged in mainstream DE provision apart from a few of the traditional offerings associated with external study and continuing education. The situation at the turn of the century was significantly different.

For example, in the United States, during the 1997-98 review period, almost 44 percent of all higher education institutions offered distance-based courses, which represented an increase of one-third since the 1994-95 review period (CHEA 1999a). It was predicted that 85 percent of colleges would offer DE courses by 2002 and this represents an increase from 58 percent in 1998 (CHEA: 1999b). Also, four-year colleges and universities that offer DE courses were predicted to escalate to 84 percent in 2002, constituting a rise from 62 percent in 1998 (CHEA 1999b). This trend for universities and four-year institutions is represented graphically in Figure 3.3.

Viewed from the perspective of competitive advantage, the exponential growth in DE delivery at traditional campus-based institutions over the last decade is growing at the expense of a market segment that was previously dominated by the single-mode DE institutions. In other words, using Porter's concept, the expansion of traditional campus-based universities into DE is focusing on the same "value chain" (1985:33) as the market of the single-mode providers, thus changing the division of the DE market sectors among higher education providers.

Furthermore, in South Africa, for example, the situation shows similar trends. During the early 1990s, Unisa and Technikon South Africa — the two national single-mode DE providers in the country — enjoyed a legislated monopoly in the DE arena, prior to the first democratic elections in South Africa, with virtually no DE provision taking place at the residential campuses. However, student numbers at these DE institutions dropped by 41 000 during the period from 1995 to 1999, representing a decline of 21 percent. Over the same period, DE students at conventional residential institutions increased by 31 000 representing an increase of 111 percent of DE provision at campus-based providers (Vergnani 2000). It was estimated that in 1999, 65 000 students were studying by distance education at the traditional residential universities in South Africa (Vergnani 2000).

Figure 3.3 Growth rate of the number of traditional four-year colleges and universities offering DE courses in the United States of America



The second dimension of the changes in competitive advantage in the DE market relates to the number of "new providers" and emerging partnerships, alliances and consortia in tertiary education provision. These new arrangements developing in the learning marketspace are completely reshaping "the nature and organisation of higher education" (Duin, Baer & Starke-Meyerring 2001: 35). The new providers "represent a diverse assortment of higher education options" (Eaton 2001: 5):

- *New stand-alone, degree-granting online institutions:* Examples include: the Western Governors University initiative (http://www.wgu.edu); the United States Open University (http://www.open.edu) representing the United States arm of the UKOU; and for-profit institutions like Jones International University (http://www.jonesinternational.edu) and the University of Phoenix's Online campus (http://onl.uophx.edu);
- *Degree-granting online consortia:* UNext Cardean (http://www.cardean.edu) is an example of a for-profit degree-granting consortium that brings together the following universities: University of Chicago School of Business; Carnegie Mellon University; the London School of Economics and Political Science; Stanford University; and Columbia Business School. Staff members from these institutions will provide course content for Cardean programmes and Cardean awards degrees. Another American example is the National Technological University (NTU) (http://www.ntu.edu) and is a degree-granting engineering school based on an alliance of more than 50 universities. Universitas 21 (http://www.universitas.edu.au), an alliance with Thompson Publishing, is another example;
- *Nondegree-granting online consortia:* Networks comprising a number of degree-granting institutions from which students can select a range of online courses is another emerging institutional form. Typically these consortia do not offer degrees themselves and this function remains with the respective member institutions. In the United States, the Southern Regional Education

Board's (SREB's) Electronic Campus, created in 1998, offers a selection of 3,200 online courses and 102 degree programs networked through 262 institutions from 16 states (see for example Carnevale 2000 & Eaton 2001);

- *Corporate universities:* Eaton (2001) estimates that there are at least 1000 and perhaps as many as 1600 companies in the United States that maintain private training enterprises. Examples of these corporate universities include Dow Jones University; Hamburger University and British Aerospace's Virtual University. The large software companies also offer online training and certification, for example Cisco, Microsoft, Novell, and Oracle;
- *Non-affiliated institutions that offer online courses and programmes:* It is extremely difficult to estimate the number of online programmes offered by non-affiliated institutions.

It is interesting to note that the emergence of these "new" institutional forms and alliances in higher education only began to proliferate after the onset of a globally networked society. Noticeably, the DE higher education market and traditional dynamics of competitive advantage among institutions in this sector are changing drastically and "the speed at which these new providers are proliferating is genuinely startling" (Eaton 2001: 8). Merrill-Lynch has estimated that the online higher education market in the United States will grow to $7 billion by 2003 (see Eaton 2001). The large-scale ODL providers will no longer be able to sustain competitive advantage on the dimensions of access, quality and cost in DE by using existing delivery models.

This raises the critical question of whether there is still a need in the market for single-mode, large-scale ODL providers in the future when considering the vast number of new entrants into the DE market sector. The conditional answer to this question is that the future of the single-mode DE mega-universities is at risk unless they do a good job of strategic planning and transformational leadership, based on a clear understanding of the changing dynamics in the DE sector. Furthermore, when taking the combined effect of the uncertainties identified in this chapter into account, campus-based institutions that are moving into DE will also have to think critically about their strategic futures given the emergence of non-traditional institutional forms in the tertiary sector.

Furthermore, there is blurring of the distinction between traditional for-profit and non-profit institutions in higher education. As universities begin establishing new alliances and partnerships, they will have to think critically about how this impacts on their core values. Miller warns that:

> *Public nonprofit institutions could pay a big price if the reasons they receive public support--state appropriations and tax advantages--are called into question. Public institutions need to demonstrate that they provide important social goods and services that are not part of the missions of for-profit institutions if they do not want to lose that support.* (2000: 4)

The mega-universities succeeded in maintaining the core values of the academy, yet they were able to compete in the "open market". Consequently, it is important that all universities think creatively about establishing new market opportunities without compromising the values of publicly funded universities otherwise "the marketplace might well, in the near future, swallow the village green" (Miller 2000: 4).

The third factor affecting the dynamic of the DE market in higher education is the internationalisation of tertiary education provision. Internationalisation is closely related to the advances in ICTs, which have enabled providers to move across national boundaries with relative ease. The business of borderless education concerns the threat (or opportunity) associated with international providers with the capacity to expand their delivery globally, thus potentially gaining market share in domestic education markets. Corresponding with internationalisation is the emergence of a range of new alliances in the tertiary education sector, as introduced above. Although internationalisation is closely related to the factors already discussed, it necessitates specific attention. The internationalisation of higher education provision requires specific attention because until recently there has been a shortage of rigorous analysis of this emerging situation. Cunningham et al verbalise this gap as follows:

> *There is no shortage of scholarly, journalistic, governmental or institution-specific material on the impact on communications and information technologies, media influence, the globalised economy, or the future of higher education. There is, however, an acute shortage of thorough and realistic analysis of the intersection of these areas.* (1998:xiii)

This shortcoming in the research is progressively being addressed. A number of international studies and initiatives have been conducted, examining questions of borderless and virtual education. For example, the Australian Government, through the Higher Education Division of the Department of Employment Education, Training and Youth Affairs (DEETYA), has recently commissioned two substantial investigations into borderless education. The same research team carried out both studies (see Cunningham et al 1998 & 2000). The first study: *New media and borderless Education: A review of the convergence between global media networks and higher education provision* (Cunningham et al 1998), examined the available evidence regarding the involvement of global media and communications networks in higher education provision across national boundaries. The second study: *The business of borderless education* (Cunningham et al 2000), was aimed at providing market intelligence on the practices and successes of the corporate, virtual and for-profit universities and their capacity to expand educational provision globally. Building on these Australian studies, the Committee of Vice-Chancellors and Principals (CVCP) and the Higher Education Founding Council for England (HEFCE) jointly commissioned an investigation to report on how borderless education might impact on universities in the United Kingdom (CVCP & HEFCE 2000a, 2000b & 2000c). Also, the Governments of the Commonwealth also commissioned two studies relating to the global practice of virtual education in schools and tertiary education through the Commonwealth of Learning (see Farrell 1999 & 2001). This list is by no means exhaustive, but the studies listed have succeeded in identifying fundamental aspects of this evolving practice.

The relevance of this kind of study for the university as institution is illustrated in the sentiments expressed by Alan Gilbert, Vice-Chancellor of the University of Melbourne:

> *Most formidably, the challenge to established universities will come from the international giants of the communications, information technology and multimedia industries — global providers, replete with capital, able to access outstanding international scholars and teachers, skilled in providing* in situ *student support simultaneously in many countries, and capable of brokering professional accreditation and recognition around the world. Quality in the resulting 'global virtual universities' will be high, standardisation will create cost structures that are mightily competitive, brand recognition will be obtained, perhaps by embracing one of the great Ivy League institutions as a partner, or alternatively by migrating into higher education a dominant brand from the communications or computing industries.* (1997: 11)

Before tackling the main findings of the various investigations on virtual and borderless education listed, the tensions between the university as institution and the alternative forms of higher education institution now participating in the education market should be taken into account. Furthermore, examples of how borderless education may impact on the competitive advantage of conventional universities will also be provided.

With specific reference to the continued survival of the university as institution, the question of borderless education and the potential impact of the advances in digital ICTs, set against the background of an emerging global knowledge economy appears to be divided between the two competing ideas already suggested in Chapter 1 of the thesis. First is the idea that the university as institution has survived major cultural and societal changes over the last 500 years and will continue to do so in the future. The opposing view is that the university sector is undergoing a paradigm shift because of these emerging factors and that the university of the future will not be recognisable when compared to the university of the past (see for example Harasim, Hiltz, Teles & Turoff: 1995).

Using Handy's (1994) concept of the "sigmoid curve", these opposing ideas may well represent the early tensions that arise between the starting point of a new sigmoid curve and the continued path of the old curve. The purpose of this Chapter is not to exercise a value judgement or to provide a predictive statement concerning the potential outcomes resulting from these opposing ideas. Rather, the intention is to demonstrate that sufficient evidence exists to warrant that a range of plausible alternatives exist in validation of using the scenario planning technique.

Viewed from a scenario planning perspective, the analysis in this study is not necessarily aimed at deconstructing the arguments of the "sceptics" who hold the view that the university will continue to survive as an institution largely unchanged. Paradoxically, the purpose of interrogating the future threats pertaining to the university's continued survival in this thesis is aimed at ensuring the future success of the university as institution. This will only be done through successful knowledge innovation, particularly regarding the continuity of the values on which the university is founded. Based on contemporary insight of strategic management, organisations can ensure their futures by playing an active role in their own destiny by becoming leaders, as opposed to laggards. Should universities continue to adopt a reactive stance concerning the fundamental changes in the higher education market, opportunities are greatly reduced for ensuring the future security of the traditional values of the university. Universities must play an active role in shaping their future destiny; otherwise, they will be forced to follow the market pressures as dictated by the business and political elites and risk losing the values to which the academy espouses.

Complicating matters in the area of borderless education is that the changing dynamic in market share is not limited to cross-border competition between publicly funded universities. The phenomenon of borderless education is also characterised by a complex web of provision among a range of higher education providers, including public, private not-for-profit, private for-profit and corporate providers (see CVCP & HEFCE 2000 a). These relationships in the higher education sector are obscured further by partnerships and alliances, including media companies, publishing companies, professional bodies, and educational brokers.

Given the growing complexities associated with borderless education, the traditional "business model" of conventional universities will come under increasing competitive pressure. For example, the modern university — arguably a remnant from the age of enlightenment — still places a high priority on its research function concerning the generation of new knowledge. Certainly, the quest for knowledge ultimately enhances the quality of teaching; however, the traditions of university custodianship over the functions of knowledge generation in society are being challenged by Mode 2 knowledge production (see Chapter 1; Gibbons, Limoges, Nowotny, Schwartzman, Scott & Trow 1994; Gibbons 1998). Furthermore, the functions of research carry a high cost that could potentially erode bottom-line profits from the for-profit provider prospective.

John Sperling (1999), President and CEO of the Apollo Group, the holding company of the University of Phoenix, is adamant that the research function in higher education should be limited to a few large research universities. Sperling (1999) is critical of the traditional research function of universities, suggesting that a large percentage of faculty research is undertaken to advance the personal careers of individual faculty members, rather than to promote the ideals of society at large. He suggests that, in the future, the overwhelming majority of higher education institutions should rather focus on teaching. Furthermore, Sperling (1999) remarks that faculty members have difficulty in making the transition from individual scholarship to teaching demanding and assertive adults. Understandably, the for-profit universities, in the interests of promoting bottom-line, will not place as high a priority on carrying the expenses of basic and applied research in their business models. Clearly, the for-profit universities have an opportunity to generate strategic advantage by prioritising a teaching focus when compared to the research-intensive universities because the cost of provision at the non-research institutions will not have to carry the expenses of the research function.

A perception that virtual education may erode the core values of the university appears to exist among the cautious academic majority, particularly among those that have little knowledge or experience of teaching across the barriers of time and space. Fortunately, the values on which the university is founded are not delivery-mode dependant. The traditional values of the university — including the importance of academic freedom and autonomy; the quest for knowledge and corresponding intellectual scepticism; the institutional acceptability of a critical disposition underpinned by the rationality of scholarship; and the unashamed responsibility to enrich the social conscience of society — can be practiced irrespective of the mode of delivery. This has been demonstrated by many of the mega-universities who have maintained the core values of the university as institution, despite using a mode of delivery that is fundamentally different from the traditions of professing knowledge in face-to-face situations. Furthermore, despite the communicative power of the new digital technologies, unless ICTs are implemented as part of a holistic seamless system, the difficulties of supporting a sense of community in asynchronous modes — a core value of the university as institution — may also be compromised in the name of technological development or even worse, in the name of maintaining bottom-line profitability.

In the face of growing competition in higher education, it is conceivable that student demand will not continue to support the increasing costs of conventional campus-based provision simply out of loyalty to the university as institution. For-profit providers could arguably do a better job in terms of value-for-money in the higher education market. In the future, the risk for universities, is that competitors who are able to establish a leadership role and corresponding market dominance in new and innovative modes of delivery may not necessarily base their business models on maintaining the traditional values of the university. Therefore it is imperative that universities themselves work for innovative futures that are sustainable and competitive and still ensure that the values of the institution are upheld. It will be up to the universities themselves to plan futures that are based on securing the values of the university as institution — the alternative could result in a shift back to elitism, losing the impressive gains in the massification of higher education by the university in the face of fierce competition from the for-profit providers.

Returning to the various studies on virtual and borderless education, it is interesting to note that at the time of the first studies in this area, there was more hype than substantive evidence supporting the threat of borderless education. For example, Farrell (1999) remarks that despite the popularity of the term *virtual,* at the time of the study in 1999 there were very few institutional examples where ICTs were used in a way to carry out most of the institutional functions of educational provision. Farrell deduces that the "development of virtual institutions is still experimental, rather unfocused, and not necessarily matched to clientele learning needs" (1999: 3). With specific reference to the global media networks, Cunningham et al, found that:

> *While there is a good deal of 'hype' relating to the involvement of global media networks in higher education, there is currently little evidence of this involvement, and, at least in the declared strategies of many of the global media networks, little intention of involvement beyond current interests in the carriage of educational content produced and controlled by other providers.* (1998: xiv)

Notwithstanding the limitations of verifiable evidence, the early studies found growing evidence of individual projects that focused on the use of new media and technology in higher education. Furthermore there were "clear indications that this use will continue to grow" (Cunningham et al 1998: xv). There is growing substantiation that the "development and deployment of information and communication technologies will have a profound impact on access, institutional functioning, and the teaching and learning process" (Farrell 1998: 3).

Subsequent studies have validated the exceptionally dynamic nature of virtual and borderless education to the extent that university leadership is advised to prioritise this dynamic as an area of strategic focus. Reflecting three year's later on developments since the first Commonwealth of Learning report on this issue in 1998, Farrell attests that the "international environment has changed remarkably with respect to the application of ICTs at all levels of education" (2001: 1). He cited, for instance, the trend that most educational institutions are developing or planning to develop capabilities in Web-based delivery (Farrell 2001).

The United Kingdom study on borderless education reports that:

> *[T]here has been an explosion of borderless education and it looks set to continue. In addition, we consider that the drivers behind borderless developments are strong and will strengthen. ...The UK cannot afford to delay in addressing the implications of borderless developments at national or institutional level. The opportunities are real and the threats, both direct and indirect are already present* (CVCP & HEFCE 2000b: 57)

Understandably, there is uncertainty concerning how borderless education is likely to impact on the future of the university, and consequently this factor contributes to the volatility of the higher education market. The uncertainty is illustrated by the unimpressive performance of many of the new for-profit virtual university initiatives following the collapse of the dot-com boom at the turn of the century. For example, for-profit online learning ventures at New York University, Temple University, and the University of Maryland University College have closed and Columbia University has shut down Fathom — its for-profit virtual university venture (Carslon 2003). On the other hand, some virtual university initiatives are reporting sustainable revenue streams (Epper & Garn 2004).

Nonetheless, there are a range of issues that were highlighted in these studies on the business of borderless education and they are important for the research reported in this study (see Cunningham et al 2000; DETYA 2000 and CVCP & HEFCE 2000a, 2000b, 2000c):

- Notwithstanding the fact that popular reporting on borderless education contains elements of corporate propaganda, the university sector must avoid the allure of complacency in the name of preserving the status quo of traditional delivery models. There is sufficient evidence to suggest that 'it won't be business as usual';
- The most prominent breach of 'boundaries' is not necessarily geographical but it is rather occurring among the traditional market segments associated with

different providers of higher education (both campus and off-campus learning experiences) including universities, corporate providers, new alliances, and new institutions. Similarly boundaries are blurring between education and training;
- The for-profit providers are developing new systems that disaggregate the functions of educational delivery that are usually catered for in a single university, for instance registration, teaching and assessment. Outsourcing is a characteristic feature of the for-profit providers, once again emphasising the imperative for universities to continuously evaluate their core business in this rapidly changing environment;
- The for-profit providers are sophisticated and professional, utilising a range of educational and other specialists denoting an unmistakable shift away from a craft-based practice where the professor carriers out most of the activities associated with the teaching-learning process.

In summary, this section has identified three factors, which collectively attest to the volatility in the higher education market observed by changes in the composition of the conventional DE market: First, there has been unprecedented growth in conventional campus-based institutions now engaged with mainstream DE teaching predominantly using web-based delivery models. Second, the tertiary education sector is now characterised by a wide range of new educational providers and partnerships that are moving into the DE field that did not exist before. Finally, the opportunities and threats associated with borderless education have the potential to change competitive advantage associated with the market share of participants in the DE market. The interplay among these three factors means that while the DE higher education market is, indeed volatile, the probability for establishing new market value has increased significantly.

Clearly there is an opportunity for universities to develop innovative new DE delivery systems that will establish competitive advantage in these sectors of the higher education market. The corresponding challenges and underlying principles associated with managing innovation will be examined in the following section.

3.3.2 Large-scale higher education providers and the innovator's dilemma

Apart from the changing dynamics of the DE market discussed in the previous section, strategic organisational responses that will ultimately have an impact on the DE market must also be considered. The way in which organisations manage technological change at the strategic level will have a direct impact on the organisation's performance in the relevant market. At the same time this can have a reciprocal effect on the structure of the market itself. Furthermore, there is growing evidence that large successful organisations risk losing market dominance when faced with certain types of technological change. There are remarkable similarities between this phenomenon in the corporate world and the technological change facing DE providers. Therefore, this phenomenon must be factored into the different scenarios. This section will examine the strategic alternatives available to large organisations when faced with certain types of technology-precipitated change.

Determining an appropriate strategic response — with regards to maintaining existing market share or generating new competitive advantage — is the planning corollary associated with a volatile market. The planned institutional responses to a changing market, precipitated by technological change, would ordinarily be treated as the outcome of a reactive scenario and for that reason they would not be managed as determinants of the scenario concerned. However, in the case of a generative scenario — where organisations play an active role in generating new ways of doing things in order to establish new value in the marketspace — specific institutional responses must necessarily be managed as determinants of the scenario itself. Technically speaking, this is a key difference between a reactive and generative scenario.

For example, improving or modifying an existing DE delivery system through the application of ICTs would be an instance of a reactive scenario. However, if you developed a scenario storyline that describes a plausible way of innovating a new mode of delivery that results in a new market proposition that did not exist before, this would be an example of a generative scenario. The critical question from a generative scenario perspective is: What changes in higher education provision, in the DE market structure, in competitive advantage and in ICTs have already taken place but have yet to have a full impact? Drucker motivates the rationale for a generative disposition in the following way:

> *It is commonly believed that innovations create changes — but very few do. Successful innovations exploit changes that have already happened. They exploit the time lag — in science, often twenty-five or thirty years — between the change itself and its perception and acceptance. During that time the exploiter of change rarely faces much, if any, competition. The other people in the industry still operate on the basis of yesterday's reality. And once such a change has happened, it usually survives even extreme turbulence.* (1995: 40)

Clearly technologies will play a decisive role in evolving futures and it is necessary to clarify what is meant by "technology" in this chapter and to examine how different types of technological change may influence the futures of those providers engaged in DE delivery.

Technology is defined by the Open University as "the application of scientific and other organized knowledge to practical tasks by organisations consisting of people and machines" (cited by Daniel 1999a: 10). This notion of "technology" includes the idea that it is an applied science. Christensen, for instance, defines technology as the "processes by which an organization transforms labor, capital, materials, and information into products and services of greater value" (2000: xiii). Therefore, for the purposes of this chapter, the notion of technology includes the people, hardware, processes and systems that are necessary to coordinate the effective delivery of quality DE teaching and learning and is not limited to the popular perception that technology means machines. The distance education process (Moore and Kearsley 1996) — including design, development, delivery and support — is consequently a technology in its own right, in the same way as face-to-face provision is also a technology.

Christensen (2000) has demonstrated that corporations are at risk when faced with certain types of technological change. Hence, it is necessary to examine whether or not this phenomenon could apply to the DE environment and therefore influence the development of the scenarios in this study.

In order to explain the management of strategic alternatives in organisations that are faced with changes in technology, this section will use the large-scale DE delivery systems associated with the mega-universities as a relevant DE example to illustrate the case of the "innovator's dilemma" (Christensen 2000). This is not to suggest that the mega-universities are the only tertiary education providers that will be able to innovate new successful futures. Conventional campuses will always be in demand and the way in which technology futures evolve at these institutions is likely to be different from that of the mega-universities. However, the phenomenon of the "innovators dilemma" is particularly acute for large organisations; therefore, institutions planning to provide e-learning at scale will need to recognise these differences and plan accordingly.

Viewed from the perspective of competitive advantage, the problem facing the mega-universities is that conventional universities and other new providers entering the DE market challenge the traditional market dominance previously held by the large-scale ODL providers, with regards to access, quality and cost. At the meta-level, there are two strategic alternatives that the mega-universities could adopt should they wish to maintain market dominance in the DE market:

- To compete on the basis of product enhancement by improving the efficiency and effectiveness of the existing delivery model through innovative applications of emerging technologies, thus benchmarking DE delivery in terms of improved access and quality of the learning experience at a lower cost;
- Alternatively, to generate a new ODL delivery model that is capable of providing learning experiences in ways that cannot easily be matched by other institutions that are currently expanding into the DE market. For example, they could shift to a model of mass-customisation where significant scale is a prerequisite requirement for functioning effectively in this environment — a requirement that will be difficult to match for individual campus-based institutions entering into this market for the first time because the mega-universities are already operating at significant scale in the DE market.

Similarly traditional campus-based institutions are also faced with two strategic alternatives:

- To compete on the basis of enhancing the face-to-face delivery model through the smart implementation of technology by reducing cost, improving access and improving the quality of the learning experience;
- Alternatively, to generate a new delivery model that is capable of providing learning experiences in ways that cannot easily be matched by the large-scale ODL providers, as well as other competitors in the market.

The first strategic alternative is most effective when organisations are in the early climbing phases of Handy's (1994) sigmoid curve introduced in Chapter 1. However, when approaching the inflection point of the curve (as validated in the problem formulation of the thesis) different strategies are required to initiate a new curve. During a recent interview, when asked why organisations fail, Charles Handy responded as follows:

> *... I think to a large extent they continue to do things for longer than they should. They don't realize that the world has moved away from them. And so they try to do the same thing, only harder or cheaper or quicker or whatever and that isn't the answer. They should be doing something different.* (cited by Honore 2000b: 34)

There is growing evidence in the management literature that when specific industries begin losing their competitiveness, leaders should begin to think differently about their competitive advantage. Analysing the existing industry structure — that is the conventional wisdom of benchmarking — will provide answers as to what has happened but does not necessarily focus on the "why" of the diminishing competitiveness. Subsequently benchmarking is not an effective strategy to regain leadership. "Laggards will remain laggards" (Hamel & Prahalad 1995: 23). Conventional strategy work associated with the usual planning ritual tends to start from what is and rarely with what could be (Hamel & Prahalad 1995), thus providing further support for the innovation strategy suggested as the second alternative above.

We have established that well-managed companies who apply conventional management wisdom can lose their market dominance, particularly when faced with certain types of technological change. Christensen, in his excellent work "*The innovator's dilemma: When new technologies cause great firms to fail*" (2000), attributes this predicament to the principles of disruptive innovation. Christensen's extensive analysis and research covering a variety of different industries has led him to distinguish between two distinct types of technology:

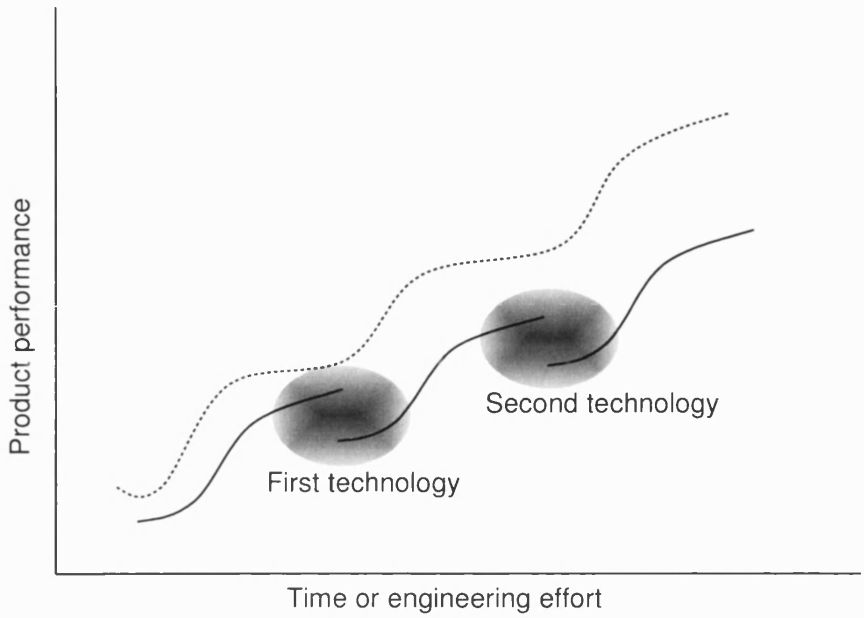
- *Sustaining technologies,* which are technologies that promote the efficiency and effectiveness of existing product performance (sustaining technologies are closely associated with the first strategic alternatives listed above); and
- *Disruptive technologies,* which are technologies that bring to the market a new value proposition that did not exist before. This kind of technology is difficult to integrate into existing organisations and they usually require a different organisational structure to flourish. This suggests transformation as opposed to change (disruptive technologies are connected with the second strategic alternatives listed above).

The significance of Christensen's research is that he focused on successful companies, companies that are known for their good management and for their historical abilities in innovation and implementation of those innovations. These companies are very good at integrating sustaining technologies and growing market share steadily. In spite of this, successful companies fail, hence the innovators dilemma. The perplexing dilemma of Christensen's work is that some companies — known for their past successes — have surprisingly hit disaster, while applying the same management principles that ensured their success in the past. This has led Christensen to conclude that management *per se* could not have been the reason for the demise of these successful enterprises. Christensen's research attributes this phenomenon to the devastating potential of disruptive technologies.

For example, until the mid 1960s, Sears Roebuck was regarded as one of the most successful and astutely managed retail companies in the world. Yet today, the viability of its operations have been questioned. While Sears continued to do things right — the way they always had been done — the company missed the advent of discount retailing and home centres. The other well-known example is that of IBM who dominated the mainframe computer market, but missed out on both the minicomputer and desktop personal computer market (see Christensen 2000).

Classical sigmoid-curve theory (Handy 1994) is frequently used as the basis for thinking about technology strategy. It describes a product's performance and improvement over time with reference to emerging technologies in specific industries. With the introduction of each new technology, initially performance declines until the technology is better understood and embedded into the market, whereafter accelerated growth and performance can be observed. Eventually the rate of growth diminishes as the technology matures because it has reached its natural or physical limits for growth in the market place. Technology strategy scholars assert that the core of successful technology strategy management is to identify the inflection point of the S-curve in advance of its decline and to initiate the development and implementation of a successor technology (see for example, Christensen 1992; Handy 1994 or Taffinder 1998). This process is represented graphically in Figure 3.4. The course of the dotted line shows how established firms can succeed in navigating technology strategies. This process describes the changes associated with sustaining technologies.

Figure 3.4 Classical technology S-curve and sustaining technologies



(Adapted from Christensen 1992: 340)

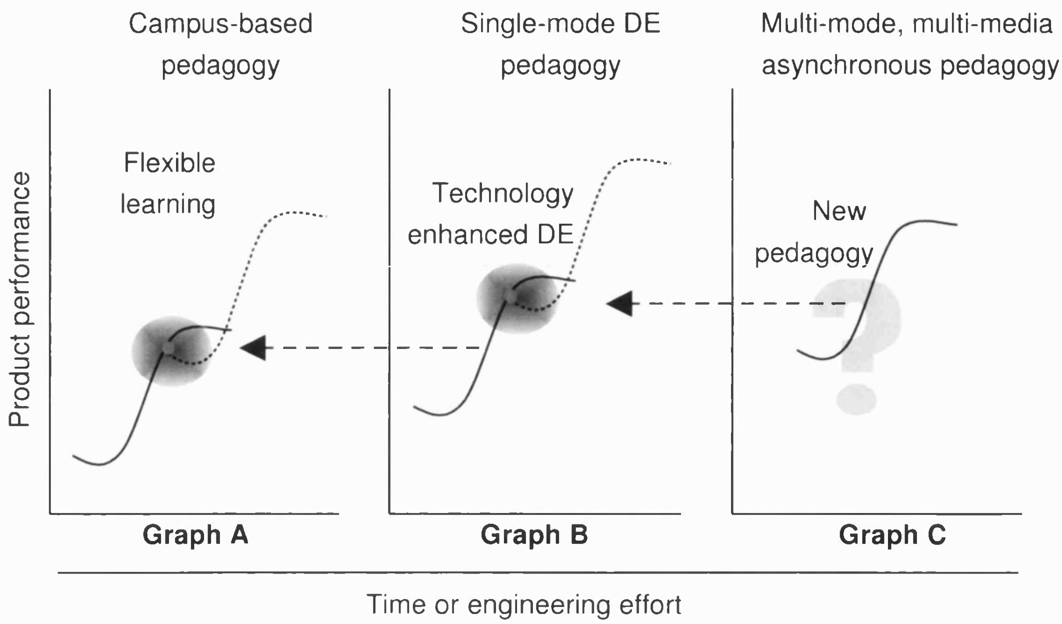
Classical S-curve theory as described above assumes that the new technologies are developed and integrated within existing value networks. The concept of a "value network" has much greater power in explaining the phenomenon of the innovator's dilemma. A value network refers to the market context within which an enterprise operates and includes the processes and relationships how "a firm identifies and responds to customers' needs, solves problems, procures input, reacts to competitors, and strives for profit" (Christensen 2000: 32). Each enterprise operates within a specific value network comprising a nested network of producers and market users.

The problem with classical S-curve theory — as depicted in Figure 3.4 — is that it does not explain the essential nature of disruptive technologies. In the case of sustaining technologies, each cycle of innovation corresponding with a new technology is implemented in a way that enhances the existing product by reducing costs or enhancing quality.

Conversely, disruptive technologies create a new value network and are not directly related to enhancing product performance within the existing value network. In other words, the S-curve of disruptive technologies cannot be plotted on the same axis as the preceding curve because, by definition, they "measure *different* attributes of performance than those relevant in established value networks" (Christensen 2000: 41). Furthermore, disruptive technologies get a start in emerging value networks before invading established value networks.

Hence, a disruptive technology cannot be plotted on the same vertical axis as the one illustrated in Figure 3.4 above because disruptive technologies get their commercial start in new emerging value networks before they take-over established value networks (Christensen 2000). The dynamics of sustaining versus disruptive technologies in distance education are better represented by the S-curves illustrated in Figure 3.5.

Figure 3.5 Comparing sustainable and disruptive technologies in DE within three value networks



With reference to Figure 3.5 and the evolution of DE technology, this thesis posits that three distinctive value networks can be identified. The series of graphs labelled A, B and C represent these different value networks:

- Conventional campus-based delivery based on the pedagogy of professing knowledge in synchronous dialogue situations (see Graph A);
- Single-mode, large-scale DE delivery that emerged after the onset of the industrial revolution, based on processes and pedagogy that differ from face-to-face forms of provision. The uniqueness of DE is validated in Chapter 2. (see Graph B); and
- The latent potential for innovating new pedagogy that is now possible because of contemporary advances in digital ICTs and the knowledge media. This is an exploratory supposition that signifies the uncertainty dimension of a scenario-planning matrix. It would appear that this new value-network of asynchronous delivery would be characterised by multi-mode, multi-media learning encompassing high levels of student-driven customisation and autonomy (see Graph C).

The first two value networks have already been validated by the mainstream alternatives of higher education provision used today, whereas the third value network is speculative as inferred by the question mark in Graph C. Nonetheless the third value network must be examined as a scenario alternative representing a potential disruptive technology for DE in the future.

The existing "product performance" of each value network can be enhanced through the application of modern ICTs. The emergence of a new S-curve on an existing axis (as represented by the dotted lines on Graph A and Graph B), is an example of a sustaining technology. The dotted lines represent the application of emerging ICTs within existing value networks and the concepts of "flexible learning" and "technology-enhanced DE" have been selected to differentiate between the two examples of sustaining technologies in Figure 3.5. However, where new technologies result in different attributes of performance, then the technology is classified as disruptive. This is represented graphically by a new S-curve on a *new* axis. For identification purposes this is simply labelled the "new" pedagogy.

Flexible learning is a concept that is frequently used in the literature to refer to the implementation of technology in teaching. There is a close relationship between the technology-based teaching at campus-based institutions and the notion of DE. Consequently it is necessary consider the meaning of "flexible learning".

The concept of "flexible learning" first originated in Australia to encapsulate evolving trends and technological developments of their DE dual-mode systems. Deakin University's Centre for Academic Development, for example, describes the concept as follows:

> *Flexible teaching and learning can mean different things to different people both within and outside the University. ... However, the vision is fundamentally about making the University's course offerings more accessible in a broader range of educational settings (on-campus, cross-campus, off-campus; workplace, home, international) to a more diverse range of student groups studying at undergraduate, postgraduate and advanced professional levels. Flexible approaches to teaching and learning require some freeing up of place and time constraints in the educational experience. Technologically mediated forms of education facilitate greater flexibility in the time and/or place of teaching and learning and in the provision of resource-based forms of teaching suitable for different contexts and student groups* (1996: 6-7).

A number of authors relate the concept of "flexible learning" to the perceived convergence of DE and face-to-face forms of provision. Moran (cited by Moore 2000: 57-58), for instance articulates this relationship as follows:

> *Distance learning methods and new information technologies are converging with the classroom strategies to create what will be a substantially different and exciting educational environment. ... In Australia, long the home of dual mode distance teaching, this convergence is termed 'flexible learning'. While rhetoric outstrips reality, some universities and technical colleges, significantly assisted by government, are revolutionising their approaches to how, where, when and what they teach. For them, 'flexible learning' is mainstream educational strategy, not a marginal experiment.*

Drawing a conceptual link between flexible learning and so-called convergence is understandable given the time-space separation of teaching and learning. However, viewed in the context of a disruptive technology, the advent of large-scale DE in response to the industrialisation of society would constitute a new value network illustrated in Figure 3.5. In many respects the misconception of convergence, is akin to the management paradox of the innovator's dilemma by assuming that emerging changes, even though they may be substantial, represent the beginning of a new S-curve on the same axis and not seeing that a new value network may be budding. Writing from Australia, Evans and Nation allude to the fact that the concept of "flexible learning" does not necessarily represent a new value network:

> *This newfound openness is often interpreted relatively narrowly, despite the attachment of names such as 'open learning', 'open campus' or 'flexible learning'. Many interpretations are narrow because they often deal with matters of 'access' and 'delivery' in rather mechanistic or 'industrial' ways which are controlled by the institution, Certainly, there are often important improvements for the students in comparison with traditional education but many of these 'new approaches' differ little, if*

> *at all from distance education as it has been practised for the last three decades. The terms 'open' and 'flexible' have been deployed more recently to serve marketing and political purposes.* (1996: 15)

In this thesis, the concept "flexible learning" is not used to refer to the onset of a new mode of delivery corresponding with disruptive technologies. Rather, it is used to refer specifically to the significant enhancements in efficiency and effectiveness now possible through the application of digital ICTs when integrated with face-to-face forms of provision as indicated in Graph A of Figure 3.5. Examples of flexible learning strategies would include using synchronous distributed delivery of lectures using video-conferencing; uploading lecture notes onto a web-server for remote access by students; and making use of electronic communication between lecturer and students.

In order to differentiate the influence of sustaining technologies on single-mode DE delivery from those associated with face-to-face delivery systems, this thesis uses the concept of "technology-enhanced DE". It is important to make this distinction, given the uniqueness of large-scale single-mode delivery systems that was extensively analysed in Chapter 2 of the thesis. Moreover, the origins of single-mode university-level DE were in the beginning an example of a disruptive technology. When the University of South Africa began with its pioneering DE initiative in 1946, it created a new value network in the university sector that was subsequently replicated with considerable refinements by other mega-universities. Consequently, enhancements in the product performance of this model of delivery precipitated by digital ICTs should not be confused with flexible learning developments, nor should they be confused with new delivery systems associated with disruptive technologies. Examples of technology-enhanced DE would include uploading study guides onto a web-server for electronic access by students; augmenting or replacing correspondence communication with electronic-mail or video-mail; electronic submission of assignments instead of relying on traditional postal services.

Finally this study hypothesises the existence of a possible disruptive technology in the tertiary education sector. Developments in the area of digital learning objects and emerging possibilities of mass-customisation combined with the volatile dynamic of the contemporary DE market may generate a new value network in tertiary education provision that did not exist before. This would enable multi-mode, multi-media delivery that is customisable by prospective students and would represent a pedagogical innovation. This is why it has been necessary to consider the challenges associated with the "innovator's dilemma".

Conventional management wisdom promotes proactive responsiveness to the demands of customers and the broader environmental context. This approach aims to promote efficiency and effectiveness in the existing market. When the innovators of disruptive technologies — usually small start-up companies — succeed in generating market share in a new value proposition, the successful companies in the old market are too far behind or too inflexible to regain market dominance. Consequently, the failure of large successful companies in the corporate sector is not necessarily the result of bad management, but is rather attributed to the disruptive characteristics of certain new technologies. The risks associated with disruptive technologies in the tertiary education sector must therefore be considered when building future scenarios.

3.4 A contextual analysis and validation of the key scenario uncertainties

"[C]ontemporary innovation is a precarious business" (Etzkowitz, Webster & Healey 1998: 7). This is not so much because of the nature of the innovation process, but rather because innovation "in the context of late modernity, is intrinsically more difficult to control, to be sure of, and to anticipate than in the past" (Etzkowitz, Webster & Healey 1998: 7). Despite the complexities associated with contemporary innovation, success in this area is significantly enhanced when innovation strategies are well founded.

The focal point of this section is directed towards a thorough analysis of two key innovations that have evolved outside the higher education context, but at the same time have the latent potential for significant innovation in the ODL university context. The unique interplay between the technology of digital "learning objects" and mass-customisation — particularly when applied and adapted for the context of distance teaching systems — potentially constitutes a radical innovation which could have a significant impact on the conventional dynamics of competitive advantage in the higher education sector. However, the future outcome of these factors is unknown.

The two innovations mentioned above are manifestations of the meta-level uncertainties that were identified in the scenario matrix: namely pedagogical systems innovation (U_1) and the dominant ODL business model (U_2). The two-by-two technique is an heuristic approach, and working deductively, each uncertainty is divided into two clear-cut states (see for example Schoemaker & Mavaddat 2000). For example, I will analyse radical *versus* minor change in the case of evolving technologies underpinning pedagogical innovation and Fordist *versus* post-Fordist orientations as the dominant ODL business model. In this way the scenarios will provide for alternative outcomes of these uncertainties. Despite their respective potential for radical change in the DE delivery systems, it is unclear as to how they will impact on the future evolution of higher education provision, hence the need to deal with these factors as uncertainties.

The classification of these factors as uncertainties does not mean that they are independently unpredictable. In fact, the existence of each of these factors can be verified separately. Hence the factors identified comply with the criterion of a good scenario in that they are plausible determinants of the future.

The uncertainty concerns how the interaction among these factors can potentially be leveraged to innovate new strategic futures. This is the purpose of a scenario: to develop a conceptual model that articulates a probable, but plausible future. Therefore this section will focus on justifying the plausibility of the identified uncertainties, but at the same time will demonstrate the potential for fundamental transformation of higher education provision. This section is devoted to validating and interrogating the nature and extent of the identified scenario uncertainties.

3.4.1 The technology of digital knowledge granules: learning objects of the future

There has been considerable interest and activity from educational institutions working on providing more flexible learning alternatives corresponding with developments in the Web of late. Nevertheless, many educational institutions "continue to replicate traditional educational models using the new medium" (Porter 2001: 47). Porter suggests that very few providers have considered the potential of "component based instructional units, 'learning objects', and complementary business systems and student service models that have the potential to revolutionise instructional practice" (2001: 47). The potential for breaking through the "one-size-fits-all" barrier (evident in the majority of teaching materials and learning resources) is gaining considerable ground because of developments in the new technology of "learning objects".

In the literature, this new technology is discussed under the concept of "learning objects". However, there is a myriad of different interpretations of the concept. For the purpose of building scenarios in this study, it is necessary to define the parameters of a learning object, as it will be used in this research.

This section will discuss the evolving technology of digital learning objects with particular emphasis on its potential for innovation in DE delivery systems. The discussion is divided into the following parts:

- Origins, description and characteristic features of digital learning objects;
- Examples of initiatives working with digital learning objects; and
- Summary and pedagogical implications of ODL digital learning objects used as point of departure for the individual scenarios.

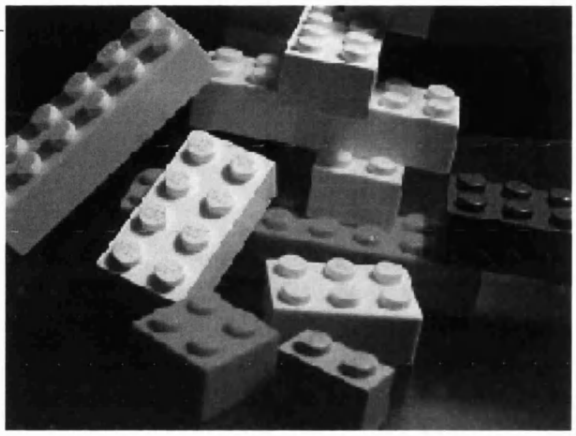
Wiley (2000) is of the opinion that learning objects will become the technology of choice in the next generation of instructional delivery and, as an agent of change may result in an entire paradigm shift in "the way educational materials are designed, developed, and delivered to those who wish to learn" (Wiley 2000: 2). Despite the huge potential for innovating new pedagogy based on the building blocks of digital learning objects, the technology is still in its infancy. It is difficult to predict — with statistically verifiable probability — the extent to which the technology of digital learning objects will be able to achieve its intended ideals. Consequently, this factor is classified as an uncertainty for the scenarios being developed in this thesis. Two potential outcomes will be assumed for this factor: first that the technology of digital learning objects will effect only minor change regarding the potential for pedagogical innovation; and second, that the technology will result in radical change for instructional systems (see the scenario matrix, Figure 3.1). The degree of change will depend on the nature and extent of technological developments in this field, combined with the organisational ability concerning effective implementation of the technology concerned.

Origins, description and characteristic features of digital learning objects

Learning objects were defined earlier as "elements of a new type of computer-based instruction grounded in the object-oriented paradigm of computer science" (Wiley 2000: 3). Elsewhere, the Learning Technology Standards Committee (LTSC) of the Institute of Electrical and Electronics Engineers (IEEE) define a learning object "as any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning" (LTSC 2001: 1).

Generic examples of learning objects would include multi-media content, other instructional content, instructional software, persons, organisations and events referenced during technology-supported learning (see LTSC 2001: 1). As is the case with most evolving technologies, the concept eludes precise definition and rather than being "a single definable object, it is a complex and multi-faceted emerging technological construct" (Gibbons, Nelson and Richards 2000: 1). Therefore the concept will be explained by tracing its origins and development, then considering a number of perspectives and examples focusing on specific characteristics of digital learning objects.

Graphic 3.1 Lego building blocks



(Photograph by Author)

The LEGO metaphor — referring to the popular toy building blocks illustrated in Graphic 3.1 opposite — is sometimes used to explain the conceptual properties associated with learning objects because: first, any LEGO block is compatible with any other LEGO block; LEGO blocks can be assembled in any manner the "builder" chooses; and an array of different LEGO-block sizes and shapes can be used.

LEGO is a useful introductory metaphor, particularly from a technical interoperability point of view, given the universal familiarity with the LEGO brand. However, the metaphor becomes problematic when applied more directly to the concept of learning objects because it does not adequately cater for the complex instructional design requirements of quality learning. For example, building a learning experience from randomly selected blocks would not necessarily result in a meaningful learning experience when taking into account the requirement for logical sequencing of the sub-components of a defined learning outcome.

Taking the advantages and limitations of the LEGO metaphor into account, Wiley recommends that the "atom" is a more useful metaphor for the learning context, as it "is a small 'thing' that can be combined and recombined with other atoms to form larger 'things' " (2000: 17). Also, the atom metaphor differs from the LEGO metaphor in important ways and is more useful in the learning context because:

- not every atom can necessarily be combined with every other atom;
- atoms are assembled according to structures determined by their own internal structure; and
- some training is required to assemble atoms effectively (see Wiley 2000: 17).

Since the early days of computer-based instruction and computer assisted learning, the goal has been to develop instruction that is adaptive to the individual; generative rather than pre-composed (relying on the artificial "intelligence" capabilities that can be built into instructional software, for instance IDXelerator™ to be discussed later); and scalable; thus capitalising on the advantages of economies-of-scale (see Gibbons, Nelson & Richards 2001: 7). Although these objectives have always directed the development of computer-based instruction, only since the advent of the Web and corresponding developments in the technology of digital learning, have these ideals become achievable in ways that may alter instructional delivery in a qualitative way.

The significance of the Web for learning is not so much the ubiquitous nature of communication that can take place anywhere and anytime. There have been other technologies that have transcended space barriers and have been able to communicate on an any-where basis like telephony. Yet these technologies did not initiate a learning revolution. Why should the Web be any different? The learning value of the Web — which is significantly different from any preceding communications technology — is the convergence between two-way communication and the ability to share and manipulate information. Therefore, the Web is not just about conversation between students and lecturers; it also provides an important feature of the socialisation function in learning. That is, the Web can simultaneously provide something to talk about and the means to hold the conversation. Brown and Duguid encapsulate this feature very well:

> *The value of the Net doesn't simply lie in the way it allows groups of people to talk with one another. It also comes from the way that, unlike telephones or video links, the Net can provide common objects for participants to observe, manipulate, and discuss. It's not, then, simply a medium for conversation, nor is it just a delivery mechanism. It combines both, providing a medium for conversation and for circulating digital objects. Furthermore, it also allows participants to turn the ongoing conversation itself into another object of conversation for further reflection.* (1995: 16)

Very few technologies have been able to combine the three things listed above, not forgetting that these three aspects can now be carried out independently of time and space. Combine these features with the focused and contemporary research interest in learning objects we could potentially be working with a disruptive technology capable of realising pedagogy in ways that were previously not possible. Consequently, the technology of digital learning objects is a powerful scenario uncertainty.

Defining learning objects

A variety of working definitions for learning objects can be found in the literature. These range from broad encompassing descriptions, for example defining learning objects "as digital media that [are] designed and/or used for instructional purposes" (South & Monson 2000: 1) and illustrate that these "objects range from maps and charts to video demonstrations and interactive simulations" (South & Monson 2000:1). These authors acknowledge that they prefer the more conservative term "media objects", given their generalist interpretation of the concept "learning objects". Nonetheless they point out that their description falls within the ambit of generally accepted descriptions of learning objects. A serious limitation of this description for the purposes of this study is that this definition does not differentiate, for instance, between what is unique about learning objects; why learning objects are different from other media used in the classroom or the reasons why learning objects in some form or another "will become a major factor in the growth and proliferation of computer-based instruction and performance support technology" (Gibbons, Nelson & Richards 2000: 2).

Other definitions are more finite in their attempts to categorise the nature of learning objects. However, when attempting to formulate descriptions of learning objects with higher levels of specificity, the complexity of what to include (or exclude) in the description increases considerably. Many of the difficulties of defining learning objects arise from questions like: How big (or small) is a learning object? What are the minimum component parts that are necessary before an object can be classified as a learning object?

In this regard, Wiley (2000: 25) has developed a useful taxonomy of learning object types, which provides a framework to deal with the difficult question of how big a learning object is. His taxonomy is based on a number of learning object characteristics, including:

- the number of elements the object contains, ranging from one to many (such as video clips and images);
- the presence (or not) of reusable components;

- the object's dominant function in terms of describing how it is generally used (for instance whether it is pre-designed instruction or computer-generated instruction or whether or not it contains learner activity);
- extra-object dependence, referring to whether a specific object requires information about other objects other than itself (for instance the locations of other objects on the network);
- an object's potential for inter-contextual reuse (e.g. using the same learning object developed for a statistics course in a research methodology course in Education);
- alternatively, using a physics object developed by Institution A for WebCT in a physics course presented by Institution B using BlackBoard as the delivery system; and
- the potential for intra-contextual reuse (e.g. using the same object defining student properties or preferences repeatedly for the same course offering).

Clearly, at a technical and pedagogical specific level, the development of learning objects is a complex activity. Moreover, the interoperability of learning objects on a global scale will depend on the continuing development of de facto standards for learning objects. This is an issue that is being addressed by collective standards authorities working towards the development of specifications, such as the IMS Global Learning Consortium (see 2002a) and the Dublin Core Metadata Initiative (see online undated. a). The development of interoperability standards and specifications is receiving considerable attention and provides evidence of concerted research efforts to develop a technical standards platform for learning objects. The technology of digital learning objects is evolving and the notion that they will become an important element in future instructional delivery is certainly plausible, given the time and effort being expended on developing these standards.

From learning objects to digital knowledge granules

It is not the intention of this section to get caught up in the detail and complexity of definitional decisions concerning the levels of granularity; specifics concerning the interoperability standards of learning objects; or the taxonomies of different types of learning objects. To avoid this problem, this section will adopt a working definition for a learning object to be used in the study. Furthermore, in order to distinguish the definition used in this thesis from the published literature on learning objects, the concept of ODL "*digital knowledge granules*" will be used when referring to the description adopted as the point of departure in the thesis. Having established a working description, it will then be possible to proceed with the analysis of the important characteristics of a digital knowledge granule for the purposes of this study as opposed to learning objects.

For the purposes of the research reported in this thesis, an ODL digital knowledge granule is described as an independent fragment of understandable knowledge purposefully designed for multi-mode delivery of instructionally sound and well-founded asynchronous learning experiences. Of necessity, the form of ODL digital knowledge granules is multi-modal and the granules are storage, carrier and delivery technology independent. Appropriate levels of intelligence are embedded in the granules to facilitate the creation of relationships with other objects (both knowledge and instructional objects); and to establish links for intelligent learning design objects for student-driven "just-in-time" compilation of learning resources.

A few dimensions contained in this description require further clarification:

- *Fragment of understandable knowledge:* This provides a conceptual indication of the size of the granule. From a pedagogical perspective a digital knowledge granule is inherently meaningful. This can be explained using the metaphor of the linguistic components of text.

Words are constructed from the letters of the alphabet; collectively words make up phrases and are built into sentences. A sentence has the property of being able to communicate one or more "complete thoughts" (Merrill 1998: 3). Collectively, a number of sentences communicate ideas and the interrelationships among these ideas build meaningful concepts. A concept is meaningful when the reader understands it. A concept can be conveyed effectively within a paragraph, or may need a few pages, depending on situation variables associated with the demands of the learning task and learner specific variables, for instance, prior knowledge and ability. Concepts are usually sequenced and grouped into sections that together form chapters, and so on.

Therefore, size is variable in digital knowledge granules, depending on the difficulty of the concept. However, the size is limited to that of a concept and is independent in that it is inherently "understandable".

Furthermore, the notion of a knowledge granule recognises that different types of content have an internal structures that can be defined independently of the specific content area, and that it is possible to develop a system of knowledge representation based on pre-defined knowledge objects (see for example Jones, Li & Merrill 1990; Merrill 1998; and Merrill & ID_2 Research Team 1996). Defining knowledge representation independently of specific content has significant advantages for promoting well-founded automation of instructional strategies.

- *Multi-mode delivery:* Each digital knowledge granule is purposefully designed for simultaneous presentation in more than one sensory mode of learning. At a meta-level the pedagogical modes of learning are derivatives of only two "presentation formats": that is verbal (including text and audio) and visual (including for example, static graphics, dynamic graphics, images, photographs, video clips, three-dimensional models and virtual reality simulations.) For example, when learning from text (printed or electronic), the mode of learning is reading, whereas in the case of an audio recording (analogue or digital) the mode would be listening. A video clip would require observation and listening as modes of learning.

  Multi-mode delivery requires that more than one sensory modality is engaged simultaneously. Multi-mode delivery requires multi-media presentation because more than one medium is required. A video clip is a good example of a multi-media presentation, but it is a limiting example because it conveys the false impression that, if its not moving pictures with sound — it's not multi-mode. Furthermore, it must be emphasised that this study is not advocating that all instruction should be video-based. There are more humble — but just as effective — examples of multi-modal presentation formats that can be used quite easily without sophisticated digital delivery platforms. Consider for instance a small printed graphic or diagram on the left of a page with a short verbal description in text placed to the right of the diagram. This is an example of what Mayer and his research team have called "multi-media summaries" (see Mayer & Anderson 1992; Mayer, Bove, Mars & Tapangco 1996; Mayer & Gallini 1990). The point about multi-media is that more than one "medium" is presented simultaneously by virtue of the close proximity of the two "mediums" of visual observation and linguistic processing.

  The advantage of designing for multi-mode delivery is that learners can have far greater control regarding the choice of medium of delivery based on their own preferences for learning. This suggests plausible opportunities for learner-driven, mass-customisation. Moreover, research suggests that the use of multi-media summaries reduces the problems associated with cognitive overload during the conceptualisation process (Mousavi, Low & Sweller 1995) and that students learn more effectively "when words and illustrations are presented together rather than separately [—] as a words-only or illustrations-only treatment" (Mayer, Bove, Bryman, Mars and Tapangco 1996: 72). This suggests that the implementation of digital knowledge granule technology could facilitate the emergence of "new" pedagogy that is qualitatively different from conventional online teaching.

- *Storage, carrier and delivery technology independent:* This is a significant feature of digital communication technologies, particularly regarding the opportunities for cost-effective customisation of DE learning resources. Sourcing and storing materials using digital protocols means that it is very easy to use a variety of storage, carrier and delivery technologies. For example:
    - A digital audio recording can be stored in a variety of ways (on a network, local hard disk, CD-ROM etc.).
    - It can also be transported over a distance in a variety of ways, including for instance: digital voice on-demand using Internet protocols (note that this is not dependent on specific carrier technology, for example ISDN, copper wire or even CD-ROM via the post can all be used); data broadcast and stored at any number of remote sites (using for example, digital satellite or radio waves); or even digital converted to analogue formats and transported on audio-cassettes.
    - Furthermore, a variety of delivery platforms can be used to play back the audio recording: a multi-media computer, radio receiver (digital or analogue), audio cassette player, voice-mail applications for shorter voice recordings (both cellular and analogue telephony).

    Learners of the future will be able to choose from a wide range of delivery media alternatives, and providers will be able to do this in a more cost-effective way because of digitisation and convergence of technology. However, the requirement is that digital knowledge granules must be purposefully designed for customisation capabilities.

Learning objects can take on a variety of different forms, embody different features and, from a technical point of view, can be designed and assembled in an array of different ways. To limit the myriad of possible alternatives and outcomes, for pragmatic reasons, the description of a digital knowledge granule as discussed above will be used as the point of departure when building the scenarios. The remainder of this section will discuss learning objects in more general terms indicating how the technology has evolved and what is technically possible in further support of the likelihood of the technology of learning objects evolving into something capable of transforming and improving educational delivery.

The philosophy of separating content and form in design and corresponding technologies

The technology of digital learning objects is a good example of how innovation in one area often originates from developments in other areas that were designed for different purposes. Important dimensions associated with the technology of learning objects were initially developments that evolved in the area of software engineering, design and development. Shata affirms that the "discipline of computing is definitely influencing and shaping almost every aspect of our life, including education" (2001:1). In this regard the confluence of *Rapid Application Design* (RAD) and *object-oriented* design is enabling the emergence of the technology of "learning objects" which are digital learning resources that can be created, shared, stored, reused and adapted in ways that were not previously possible. The combination of these two technologies in instructional settings enables the separation of content and form from a learning design perspective, but also provides a way of combining content and form in a meaningful way at the point of delivery. The notion of digital learning objects built using these technologies has considerable potential for innovation in ODL teaching systems and the potential application of these software design concepts will be discussed in the paragraphs below.

Software developers have learned that it is inefficient and costly to design new applications each time from scratch. By applying the principles of RAD, software engineers are able "to develop products more quickly and of higher quality" (Downes 2001: 9) by using and applying a set of predefined subroutines in the programming environment. RAD is also characterised by a close consultative relationship with client needs and emphasises the role of prototyping during the design and development process. Similarly, in the instructional design context, a collection of reusable subroutines and applications relevant to the learning design context could be developed and refined. With regards to the pedagogical design components of a delivery system based on learning objects, the concept of "Rapid Application Design" can be conceived as a collection of reusable subroutines and applications for the design and development of digital learning resources — which themselves are also learning objects.

The instructional design equivalent of RAD should not be confused with or limited to reusable content objects. Rather, it concerns the intelligent automation of selected dimensions of the instructional design process. This is made possible because of one of the pioneering innovations associated with the "meta-language" of storing information, namely the philosophy of separating *content* from *form*, as in the case of eXtensible Markup Language (XML) developed by the World Wide Web Consortium (2001).

The implications of separating content and form is that, in the case of electronic publishing, it is now possible, using XML technologies to produce media-independent documents. For example, assuming a text is tagged using XML, it can be displayed in a web-browser but just as easily be printed as a book from the same repository. Both examples would be able to adhere to the conventions of professional typography and screen layout notwithstanding the fact that the typographical requirements of the two mediums differ significantly (see World Wide Web Consortium 2001). This is possible because XML is derived from the ISO approved SGML (Standard Generalized Markup Language) that is extensively used in the printing industry, and is a good example of how internationalised standards can promote interoperability. HTML (Hypertext Markup Language) — as it is currently implemented in the coding of web-pages — embeds content and presentation information in the same tags, but XML separates content and form.

XML is also a structured markup system which means that "object hierarchy may be defined such that one object may contain other objects, and such that any given object may be assigned any number of properties" (Downes 2001: 17). Thus documents can be represented according to their internal hierarchical structure. For example, using the textual analogy, XML is capable of representing an object's hierarchy and relationships within the structure of a book comprising chapters, sections and subsections. This can facilitate "intelligent" sequencing when students are navigating through an array of learning objects according to their own specific needs.

Similarly, from an instructional design perspective, it is possible to apply the notion of separating content from form, and it is feasible that the evolving technology of digital learning objects can go a long way in achieving these ideals. An important component of an instructional designer's work deals with balancing *what* is taught (content) with *how* it is taught (form) by taking the dynamic of the following variables into consideration during the design process:

- selected design paradigm, for example behaviourist, eclectic, constructivist;
- nature and characteristics of the prospective students, student needs and preferences, prior knowledge and experience;
- the subject specific content demands, for example, the intended outcomes associated with the learning task and the inherent subject specific requirements (for instance, the teaching of Chemistry poses different demands from those in the teaching of Literature);
- specific design contexts, for example the differences between synchronous and asynchronous delivery models.

Let's look at some examples: the design paradigm underpinning a particular design will necessarily direct the types of teaching devices typically used for the delivery of the learning content. In the case of a behaviourist design philosophy, learning materials will be characterised by the inclusion of behavioural learning objectives, strict sequencing of learning materials in accordance with prerequisite knowledge and competency-based assessment measuring performance in accordance with predetermined behaviour. A constructivist design paradigm would use different teaching devices: for example advance organisers and techniques to incorporate own experience and the social construction of knowledge. The design paradigm will also, from a form perspective, determine the preferred sequencing, for example, regarding inductive versus deductive teaching strategies.

These differences in teaching devices and approaches are derivatives of the underpinning design paradigm. It is possible to define specific teaching devices and instructional sequences independently from the content. Similarly it is possible to define content independently from predetermined pedagogical form. Using technologies like XML — based on a philosophy that separates content from form — it is theoretically possible to seamlessly construct customised learning resources just in time, using the predefined properties of different teaching devices. When the principles of rapid application design are combined with the concept of object-oriented design (which will be introduced below), the potential for pedagogical innovation using learning objects is considerable. Of course, there is always the uncertainty as to how these technologies will evolve in the future.

Object-oriented design is a computer-programming concept that is based on defining and developing prototype elements that can easily be cloned and used by software when and if needed (Downes 2001: 10). One of the powerful characteristics of object-oriented design concerns how objects are generated because of the ability to inherit properties from a parent object. Using the design paradigm example, it is possible to define the generic properties of a behaviourist design approach (or any other instructional paradigm). For example, question and answer strategies are instructional techniques that can be used effectively in a number of different design paradigms. However, the sequencing, nature of the questions, how the feedback on the question is managed, how the learner proceeds after answering a question will be influenced by the design paradigm underpinning a particular development. At the point of developing the objects dealing with question and answer strategies, the differences relating to the specific design paradigm must be taken into account. This is where object-oriented design becomes interesting because the question-answer object can inherit the generic properties of the behaviourist object, or any one of the other paradigm objects that have been defined. The result of this interaction is a behaviourist question-answer clone and when it interacts with content objects, the learning experience would be consistent with the design paradigm.

Another significant feature of the object-oriented design paradigm is that "object prototypes also define prototypical actions or behaviours for their clones" (Downes 2001: 11). This means that learning objects are not limited to the content aspects and pedagogic method of presentation. Objects, are capable of inheriting prototypical behaviours associated with specific groupings of individuals from their "parent" objects, for instance, in the case of a student, the action of registering for a course or in the case of a lecturer, the action of grading an assignment. These action objects can assume different states, for example "not complete", "completed", or "partially completed". The advantage of these meta-objects is that they are reusable and do not have to be re-written each time a student registers, or carries out any other defined activity — the unique student object of an individual student, simply inherits the relevant properties of the general parent object for a student or lecturer.

Given the capabilities of "prototypical behaviours", three meta-classifications for the development of pedagogically relevant objects have been identified and are being used by the IMS consortium regarding the development of meta-standards for learning objects (see for example Koper 2000 and Koper 2001):

- *Role* includes the prototype roles associated with students, lecturers, tutors, and administrators;
- *Activities* would include, activities associated with learning, student support, adminstration;
- *Environment* refers to the resources required for specific activities depending on the role of the user. For example, the student role regarding the activity of taking a test would require resources including test questions and security access protocols.

These dimensions are some of the building blocks that are being used to develop international interoperability standards for learning objects. In the discussion above, they are not put forward as technical standards, but are introduced to show the levels of sophistication that can be achieved with the technology of learning objects.

Learning Objects, uncertainty and imperatives for change

In conclusion, reusability, interoperability and granularity are important characteristics of learning objects that promote scalability. Paradoxically the benefits of scale can still be utilised despite increasing potential for highly customisable learning resources. For example, assuming that a common repository is used to store content objects and form objects, it is now possible for users to generate unique courses that are combined automatically without increasing the marginal cost of delivery because the objects are reused for each offering. Furthermore, through the convergence of digital ICTs, knowledge granules can be medium independent. Therefore, it is possible for users or providers to select a variety of delivery platforms with relative ease. Again such systems will depend on the successes of the standards generating consortia in adhering to the principles of openness and interoperability (see for example Porter 2001). Clearly, learning objects are a subcomponent of the mass-customisation uncertainty because the levels of customisation that can be achieved in the future will depend on the extent to which learning objects are developed, refined and implemented.

The possibilities for economies-of-scope, that is scalability through customisation will radically alter the cost structures and cost behaviours of asynchronous teaching. In addition, digital knowledge granules will enable learning resources to be designed in such a way that they are delivery technology independent but nonetheless reusable in a variety of contexts. Eli Noam, in his provocative essay "*Electronics and the dim future of the university*" (1995) has the following to say about the future:

> *Thus, while new communications technologies are likely to strengthen research, they will also weaken the traditional major institutions of learning, the universities. Instead of prospering with the new tools, many of the traditional functions of universities will be superseded, their*

> *financial base eroded, their technology replaced and their role in intellectual inquiry reduced. This is not a cheerful scenario for higher education. ... Change the technology and economics, and institutions must change, eventually.* (1995: 247)

Noam is not celebrating the demise of the university, but is interrogating the stark reality facing universities in the hope that they will be able to transform in a meaningful way for future society.According to Noam, the reality of the future challenge is predominantly economical:

> *While it is true that the advantages of electronic forms of instruction have sometimes been absurdly exaggerated, the point is not that they are superior to face-to-face teaching (though the latter is often romanticized), but that they can be provided at dramatically lower cost. ... The question is not whether universities are important to society, to knowledge or their members — they are — but rather whether the economic foundation of the present system can be maintained and sustained in the face of the changed flow of information brought about by electronic communications. It is not the research and teaching that will be under pressure — they will be more important than ever — but rather their instructional setting, the university system.* (1995: 248 & 249)

It is interesting to note that Noam's observations and concerns were made in 1995 — before the noteworthy achievements regarding the technology of learning objects. Combine the developments in the technology of learning objects with anticipated developments in Personal Access Devices (PADs) — which will be lightweight devices with high speed wireless internet access — the imperative for continued refinement is inevitable, and the levels of uncertainty concerning the maintenance of the status quo of current forms of university delivery increase significantly. The first PADs are already being marketed, thus proving Downes's prediction on the availability of these devices a few years ago (see Downes 1998: 3 — online).

Downes described the features of this new technology as follows:

> *The PAD will look like a contemporary clipboard and will weigh about as much. Its high-resolution screen will deliver easy-to-read text, video and multimedia. The PAD will accept voice commands, recognize your handwriting, or accept input via a touch-screen keyboard.* (1998: 3 — online)

Personal computer tablets currently provide all the functionality envisaged by Downes in 1998. Notwithstanding the media independent features of digital knowledge granules, PADs will amplify two major consequences: "Education will become truly personal, and it will become truly portable" (Downes 1998, online version: 3). Clearly, the evolving technology of digital learning objects cannot be ignored when developing scenarios about the future of DE delivery systems.

Examples of initiatives working on the technology of digital learning objects

The technology of digital learning objects is still in its infancy and although considerable development work is being carried out in this area, "the end is not anywhere near" (Koper 2000: 6). This alludes to the uncertainty associated with the technology, but achievements to date are nonetheless impressive. In this section a brief overview of a few selected initiatives working in the area of learning objects is provided to demonstrate the plausibility of the continued evolution of the technology introduced in this Chapter. Three examples have been selected to demonstrate that continued development of the technology of digital learning objects is likely, but also to document some of the achievements to date:

- First, the Educational Modeling Language initiative of the Open University of the Netherlands — one example of a number of initiatives in this area (see for example CEN/ISSS 2002);
- Second, the IDXelerator™ prototype — an instructional development system which is designed to implement the principles of rapid application design using the technology of learning objects (see for example Bannan-Ritland, Dabbagh & Murphy 2000; Merrill & Thompson: In Press)
- Third, international initiatives working towards the development of interoperability specifications for learning objects, for example: the Instructional Management System (IMS) project; the Learning Object Metadata (LOM) standard of the Learning Technology Standards Committee (LTSC) of the Institute of Electrical and Electronics Engineers (IEEE); and the Sharable Content Object Reference Model (SCORM™).

The list is not intended to represent an exhaustive summary of all the initiatives in this area, but the introduction of a few selected examples is necessary to validate that future delivery systems using learning objects is not only conceivable but also to demonstrate that considerable levels of technological sophistication have already been achieved.

The Educational Modeling Language (EML) initiative of the Open University of the Netherlands

The Educational Modeling Language (EML) initiative began as a research and development project (originally funded by the Dutch national government) to promote innovation in education. EML is a notional system based on XML and is specifically designed to use the power of XML for educational applications. The purpose of the EML research project is primarily focused on developing standards for coding digital educational resources and developing prototypes for testing the technology. The project began in the late 1990s and the Open University of the Netherlands published version 1.0 of EML as a free and open standard in December 2000 (Open University of the Netherlands 2001a).

The EML website explains the concept as follows:

> *To date no comprehensive notational system exists that allows one to codify units of study (e.g. courses, course components and study programmes), in an integral fashion. EML is the first system to achieve precisely this. EML describes not just the content of a unit of study (texts, tasks, tests, assignments) but also the roles, relations, interactions and activities of students and teachers.* (Open University of the Netherlands 2001a: online)

It is important to note that EML is not limited to developing standards for content, but is based on the object-oriented design philosophy described earlier, in that EML includes the development of standards for defining roles, relations, interactions and activities. In other words, EML is based on the philosophy of distinguishing between content and form in the coding of digital resources. Moreover, EML is being developed to accommodate a variety of pedagogies, for example problem-based learning, performance support, self-study packages as well as traditional face-to-face teaching (see Open University of the Netherlands 2001a). EML aims to be medium independent in order to promote "interoperability, re-usability, and compatibility of learning materials in the future" (Open University of the Netherlands 2001a: online).

The project has advanced to the stages where real educational materials have been developed using EML and are being used in practice at the Open University of the Netherlands. Furthermore the Technical Board of the IMS Global Learning Consortium has recently incorporated EML into the learning design specification (see Open University of the Netherlands 2001b).

Example of a prototype system based on learning object technology

Developments in the field of learning objects have not been limited to the focus of developing interoperability standards for learning objects. There are prototype examples of electronic instructional systems that assist with the design, development and delivery of learning objects. Deserving particular mention is the work of David Merrill and his associates on knowledge objects combined with the prototyping of an instructional development tool called IDXelerator™ (cf Bannan-Ritland, et al 2000; Merrill & Thompson: In Press). The significance of IDXelerator™ is threefold: (1) It is founded on the scientific principles of instructional design; (2) It is based on the philosophy of separating *content* and *form* at a meta-level and finding practicable ways of integrating the relationships between content and form at the micro-level utilising the power of digital technologies regarding automation; and (3) It has recognised and applied the potential of rapid application design to the development of an instructional development tool.

The work of Merrill and his associates is characterised by analysing and applying the theoretical constructs of instructional design to practical learning situations, including those now evolving with the technology of learning objects. Bannan-Ritland et al correctly emphasise that "[o]nly through sound pedagogical grounding will learning object systems have the potential to be used as effective learning environments" (2000: 3). In this regard, Merrill's work on learning objects and IDXelerator™ is founded on the principles of instructional design and is unique because, all too often, digital instructional systems are developed by IT specialists with little adherence to the principles of sound instructional design.

Merrill argues that "[i]f an instructional strategy does not include presentation, practice and learner guidance consistent with the knowledge and skill to be taught, then it will not teach" (1998:1). An effective instructional strategy is one that is able to effectively balance the components of "what to teach" (content) with "how to teach" (form). Merrill's research has focused specifically on various approaches of knowledge analysis and how to match these with appropriate instructional strategies. One of the outcomes of this research has been what Merrill labels "Instructional Transaction Theory (ITT)" (see Merrill 1999).

Instructional Transaction Theory is a development based on Merrill's earlier work on Component Display Theory (see Merrill 1983 & 1987). Component Display Theory is an instructional design theory which provides a list of recommendations for designing instruction for different kinds of instructional outcomes. However, Merrill found that Component Display Theory was not sufficiently precise to "allow computer implementation of expert system technology that would prescribe instruction" (Merrill 1999: 1). Merrill views Instructional Transaction Theory as an initiative that provides greater precision to Component Display Theory, in that it may result in automated instructional design becoming a plausible possibility. IDXelerator™, based on Instructional Transaction Theory, draws extensively on the principles of rapid application design described earlier.

IDXelerator™ transcends the limitations of conventional computer-based instruction, largely because developments in computer-based instruction have not been able to effectively separate content from form.

In conventional computer-based instruction, content and form are embedded together within the instructional frames used in each screen presentation. Therefore these instructional strategies are pre-determined by the designer of the learning content and are incorporated within the individual records of the database.

Outside the field of instruction, many computer programmes are based on an algorithmic model drawing on the technology of object-oriented design. This means that data can be manipulated by one or more algorithms used for processing and displaying this data. Extending this software application to instructional settings, Merrill points out that: "If the knowledge to be taught [content] is thought to be data, and the strategies for teaching this knowledge [form] are thought to be instructional algorithms, then an algorithmic model of computing can also be applied to instruction" (1999: 2).

Such an algorithmic system of instruction necessitates that the knowledge must be accessible in a form that enables processing by the instructional algorithms, hence Merrill's extensive work on defining knowledge objects. Instructional designers recognise the importance of analysing subject matter with specific regards to knowledge selection, organising, sequencing and determining instructional strategies based on the outcomes of this knowledge analysis. Merrill and his co-workers have analysed knowledge structure and its relationships and hypothesise that these structures can be captured as knowledge objects (see Merrill 2000). Merrill articulates the characteristics of knowledge objects as follows:

> *A knowledge object is a precise way to describe the subject matter content or knowledge to be taught. A knowledge object is a framework for identifying necessary knowledge components. A knowledge object is a way to organize a data base (knowledge base) of content resources (text, audio, video, and graphics) so that a given instructional algorithm (predesigned instructional strategy) can be used to teach a variety of different contents. Knowledge objects should consist of components that are not specific to a particular subject matter domain. It is desirable to have the same knowledge object components (knowledge object syntax) for representing a variety of domains (e.g. mathematics, science, humanities, technical skills, etc.). It is desirable to have a predetermined knowledge syntax rather than have user defined knowledge components. A predetermined knowledge object syntax enables prespecified and preprogrammed instructional algorithms (strategies). User defined knowledge components seriously limit the generalizability of a knowledge base.* (1998: 1)

In other words, Merrill has defined a meta-level knowledge object. It is a way to organise knowledge so that specific content objects can inherit the properties of the parent knowledge object without compromising the ability to apply instructional algorithms (form objects) in the instructional setting.

IDXelerator™ is a prototype instructional development tool that is built on using the power of rapid application design that is made possible by the definition of knowledge objects and instructional objects. The system contains an array of preprogrammed instructional strategies designed to accommodate the instructional requirements of presentation, practice and learner guidance as well as the corresponding knowledge structure appropriate for the specific instructional strategy. IDXelerator™ as an authoring system prompts the user to select an appropriate learning goal and instructional strategy and then the system will automatically provide the necessary multimedia resources and then "automatically generates the instructional strategies, including practice, learner guidance, and knowledge structure" (Merrill & Thompson: In Press). The advantage of IDXelerator™ is that no programming is required by the user of the system, yet well-founded instructional strategies can be generated and incorporated into the learning experience.

IDXelerator™ is an early prototype and is not an open system because it has been designed to run with Multimedia ToolBook™ — a proprietary system. The instructor still, to a large extent, determines learning goals and instructional strategy. Nonetheless it is conceivable that an open system can be developed that will incorporate student-specific instructional strategies based on properties and preferences defined by the user or even generated, based on previous learning experiences by the system history records. The work of Merrill and his associates, with the tangible achievements of IDXelerator™, provides persuasive evidence concerning the possibilities of learning-object technology in the future.

International initiatives aimed at developing standards for interoperability of learning objects

The future of digital learning objects will partly be determined by the interoperability of learning objects. Learners and other potential users of learning objects, will be more likely to use the technology of learning objects if they will work on their own systems without having to purchase additional proprietary software for each different object developer. Ideally the same learning objects should be able to run on different proprietary systems like WebCT, BlackBoard, or any other system to be developed in the future. Clearly this will not be possible without developing a set of de facto standards commonly agreed upon by a range of educational providers, software developers and vendors, publishers and general users. Downes illustrates the need for these standards in the following way:

> *If one program is expecting a grade as a digit and calls it 'grade', and the other sends it as a word and calls it 'score' then the two programmes are unable to interact. A document like the Question and Test Interoperability Information Model Specification* [from the IMS project of the Global Learning Consortium] *... defines the manner in which various components of a testing system interact with other elements of a wider instructional management system.* (2001: 13)

Therefore, in the absence of initiatives working towards the development of meta-data standards for learning objects, the probability of this technology being adopted by educational providers in the future will be greatly reduced. However, there are a number of international consortia working towards the development of interoperability standards in defined areas of interest and this will ultimately promote interoperability of learning objects. The standards generating bodies are a long way from developing detailed standards for the widespread implementation of learning objects, but the range of consortia and their respective collaboration arrangements points to the potential for the ubiquitous adoption of learning object technology some time in the future. Certainly, it is not a foregone conclusion that learning objects will dominate educational delivery in the future, but there is sufficient evidence to suggest that the technology will continue to evolve.

In justification of the momentum to develop interoperability standards for learning objects, various international initiatives working towards the development of universal standards for learning objects will briefly be summarised. Several activities are in progress to develop a tagging scheme for learning objects including: the Instructional Management System (IMS) Project, under the auspices of the Global Learning

Consortium Inc; the Dublin Core Metadata Initiative; and the Learning Technology Standards Committee (LTSC) (see for example Quinn 2000). Each of the standards bodies listed here focuses on a defined area of standards development, and a number of collaboration agreements exist among the different bodies to avoid duplication and compatibility problems. These projects are summarised briefly below.

The IMS project

The IMS project is being lead by the Global Learning Consortium Inc, and includes members from educational, commercial and government organisations (IMS 2002a). The IMS project has identified the following different categories of members: (1) contributing members who have voting rights, set the direction of IMS and guide the development of specifications; (2) working group members who participate in the development of standards in different areas of interest, for example the working groups such as the Questions and Test Team, the Content Management Team, the Meta-data Team and the Digital Repositories Team; and (3) the developers network which get preferential access to the standards being developed (see IMS 2002: b&c). IMS specifications are provided free to individuals.

The IMS project boasts an impressive list of contributing members including, for example: Apple Computer; The Boeing Company; the British Educational Communications and Technology Agency (BECTA); California State University; Carnegie Mellon University, Cisco systems; Australia's Department of Education, Training and Youth Affairs; Educause; Microsoft; NYUonline; Open University of the Netherlands; Oracle, Thomson Learning; University of California –Berkley; University of Cambridge; and WebCT Educational Technologies Corporation among others. The reader will notice that a number of large software companies and a number of well-respected universities are included in this abridged list, and this promotes the credibility of the IMS project (see IMS 2002d). Moreover, the IMS members have committed themselves to use and/or develop IMS-compliant products. The IMS project collaborates with other standards generating initiatives, including for example: the Dublin Core Metadata Initiative; the European Committee for Standardisation/Information Society Standardisation System (CEN/ISSS); and the Institute of Electrical and Electronics Engineers (IEEE) (see IMS 2002e).

The prime area of standards development adopted by the IMS project concerns the development of open specifications for distributed learning activities. The IMS project has a strong learning management systems focus regarding the interoperability of learning content and the ability to track student progress, to exchange student files and to report on student achievement across different administration systems. Therefore, as the specification project develops, it would be possible, to track learning progress of distributed learning resources over the internet that were developed using different proprietary authoring systems (e.g. Authorware, Toolbook or Quest).

The Dublin Core Metadata Initiative (DCMI)

The Dublin Core Metadata Initiative (DCMI) is dedicated to the development and widespread adoption of interoperable metadata standards as well as the development of specialised metadata vocabularies for describing resources that will enable more intelligent information discovery systems (DCMI online: undated.a). This initiative has already established a widely accepted technical specification for the metadata of digital libraries. The Dublin Core Metadata initiative recognises that there are many groups working on additional aspects of metadata and have relationships with many of the other standards bodies. They emphasise the importance of understanding who the different groups are and how they relate to the Dublin Core Initiative. For example, there is an education working group among the list of active working groups at DCMI, and this group focuses on the discussion and development of proposals for the use of DCMI metadata in the description of education resources (DCMI online: undated.a).

The European Committee for Standardisation/Information Society Standardisation System (CEN/ISSS)

The European Committee for Standardisation/Information Society Standardisation System (CEN/ISSS) is an international association recognised by the European Community to oversee the cooperation of national standards bodies of the European Union, Iceland, Norway, Switzerland and the Czech republic. It has recently commissioned a survey of current Educational Modelling Languages (EMLs). The purpose of this survey is to investigate the feasibility of a standard EML (CEN/ISSS 2001: 4). Several EMLs are being studied in this project, including the EML being developed by the Open University of the Netherlands (introduced already).

Learning Technology Standards Committee (LTSC)

Another standards generating initiative is that of the Learning Technology Standards Committee (LTSC), working under the auspices of the Institute of Electrical and Electronics Engineers (IEEE). The purpose of the LTSC is to develop standards that fully or adequately describe a learning object. The purposes of this project are comprehensive and ambitious. However, should they succeed in developing and implementing these standards, a radical re-conceptualisation of how online delivery is conducted, designed and developed will be necessary. In support of illustrating the potential of learning objects to transform educational delivery, the purposes of the LTSC project (as defined in their scope and purpose document) are listed:

- *To enable learners or instructors to search, evaluate, acquire, and utilize Learning Objects.*
- *To enable the sharing and exchange of Learning Objects across any technology supported learning systems.*
- *To enable the development of learning objects in units that can be combined and decomposed in meaningful ways.*
- *To enable computer agents to automatically and dynamically compose personalized lessons for an individual learner.*
- *To compliment the direct work on standards that are focused on enabling multiple Learning Objects to work together within an open distributed learning environonment.*
- *To enable, where desired, the documentation and recognition of the completion of existing or new learning and performance objectives associated with Learning Objects.*
- *To enable a strong and growing economy for Learning Objects that supports and sustains all forms of distribution; non-profit, not-for-profit and for profit.*
- *To enable education, training and learning organizations, both government, public and private, to express educational content and performance standards in a standardized format that is independent of the content itself.*
- *To provide researchers with standards that support the collection and sharing of comparable data concerning the applicability and effectiveness of Learning Objects.*

- *To define a standard that is simple yet extensible to multiple domains and jurisdictions so as to be most easily and broadly adopted and applied.*
- *To support necessary security and authentication for the distribution and use of Learning Objects.* (LTSC 2001: 1&2)

With reference to the scope and purposes of the LTSC project listed above it is important to emphasise that the envisaged capabilities of learning objects include capabilities that were simply not possible with previous generations of technology:

- the capabilities of aggregating and disaggregating learning objects in meaningful ways;
- the ability to dynamically compose personalised lessons for individual learners; and
- the intention for learning objects to operate in an open distributed learning environment.

These inherent capabilities of learning objects now enable levels of pedagogical innovation that were not possible before, and the extent to which these can be achieved adds to the levels of uncertainty associated with this scenario factor.

The Sharable Content Object Reference Model (SCORM™)

The last example relating to the development of learning object standards to be discussed in this section is the SCORM™ (Sharable Content Object Reference Model) initiative. SCORM™ is a project of the Advanced Distributed Learning Initiative (ADL) which was set up as a collaborative initiative between the US Department of Defence and the White House Office of Science and Technology to develop the necessary guidelines for large-scale implementation of efficient and effective distributed learning. ADL's work focuses on learning technologies that ride on top of emerging Internet technologies (ADL: 2002). While many of the standards generating initiatives are focusing on the development of metadata standards for various aspects of learning objects, SCORM™ is working on the implementation level by collaboratively developing a distributed learning environment building on the interoperability specifications being developed by the standards generating bodies.

SCORM™ deals with the concept of content packaging and is intended to provide the technical means for content objects to be shared across multiple delivery environments. SCORM™ recognises that before learning content can be developed on a large-scale, content packaging standards are necessary for interoperability. In other words, SCORM™ is working on the development of content objects and has a strong content focus. The SCORM™ website points out that other initiatives focusing specifically on instruction (form objects) will be needed, but should nonetheless build on the SCORM™ foundation (ADL: 2002). SCORM™ will enable small, reusable, sharable course content that is searchable over interoperable repositories and it is envisaged that vendors will ultimately become SCORM™ compliant.

Given the wide array, diversity and sometimes confusing scope of activities in the standards generation arena, sceptics may question whether the ideals of a universal interoperable standard for learning objects can realistically be achieved. It is too early in the process to risk making predications as to whether the objectives associated with digital learning objects will be attained. Nonetheless it is conceivable that they can be achieved. This is largely due to the fact that it is in the interests of everyone involved that interoperable standards are developed. It is encouraging to see the levels of collaboration and consultation among the different initiatives. Moreover, there is a natural ethos evolving in this area to avoid unnecessary duplication and competition and this is evidenced by the fact that each initiative is focusing on a specific dimension of the learning object landscape.

The spirit of this ethos is encapsulated in a recent press release announcing cooperation among the IMS project, ADL and MIT's Open Knowledge Initiative[2] aimed at narrowing the gap between pedagogy innovation and the development of learning resources: "We recognise that each of us confronts the same complex problem from different perspectives. By sharing our results and working together where possible, each of us can focus our time on critical tasks" (IMS 2002f).

Summary and pedagogical implications of ODL digital knowledge granules

This section has established a working description of a digital knowledge granule specifically for the purposes of the scenario building exercise. With reference to Figure 3.6, an ODL digital knowledge granule is defined as a fragment of understandable knowledge that in terms of presentation is both multi-mode and multi-media. A knowledge granule is the aggregation of two subcomponent parts — content objects and form objects — that interact dynamically with each other as determined by the learning paradigm preferences established by the learner.

The following three types of objects help determine the user-specific manifestation of the knowledge object concerned:

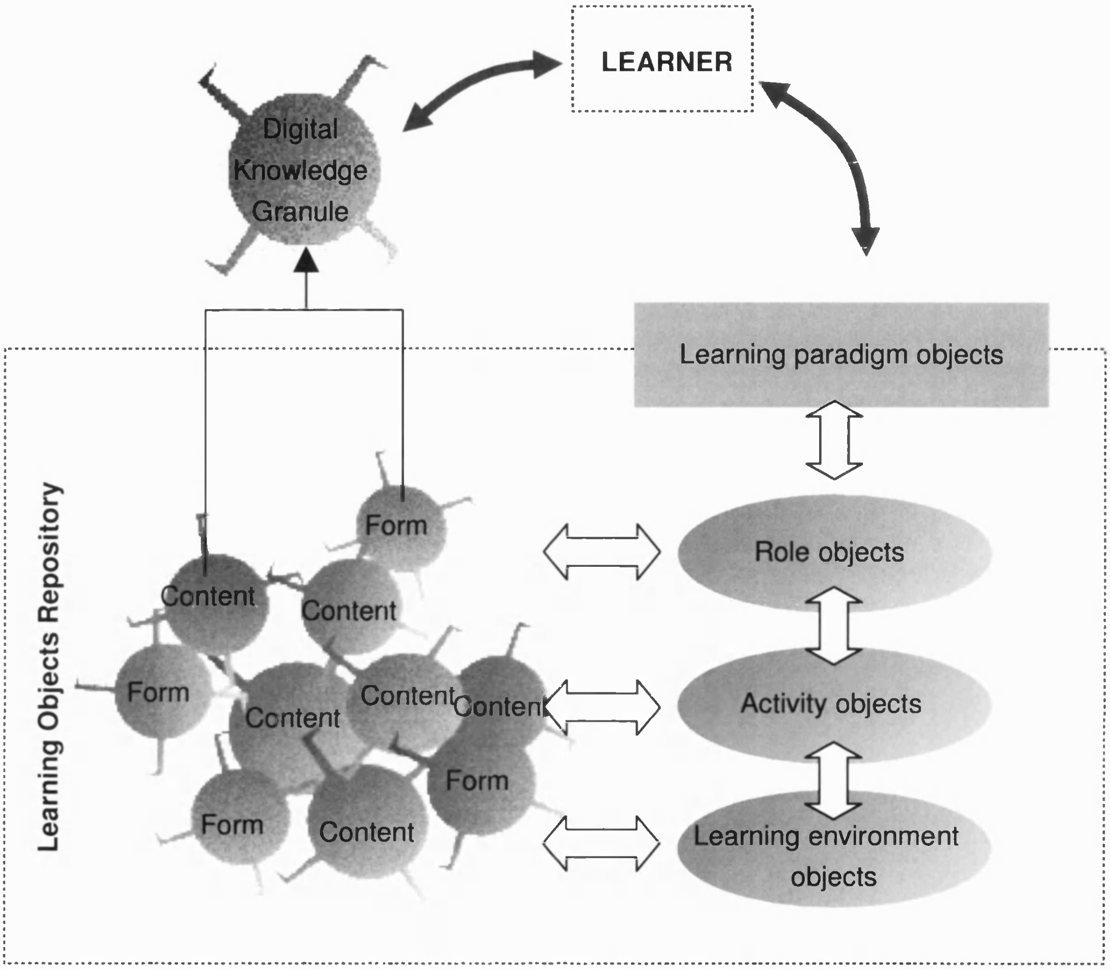
- Role objects (e.g. lecturer, learner, tutor);
- activity objects (e.g. viewing video clip, taking a test); and
- learning environment objects (the resources required by the learning task).

These objects also assist with managing the execution of the four functions of asynchronous teaching that were introduced under the discussion on the institutional-pedagogical matrix (see Section 2.2.2 of Chapter 2): (1) presentation of content (2) forms of interaction (3) assessment and (4) student support. Knowledge objects are hierarchy- and structure-intelligent with "conceptual" hooks to assist with sequencing of the learning experience and relationships with other content objects, depending on the demands of the learning task and user needs. Digital knowledge objects are interoperable and stored using open standards for learning objects. Accordingly, they are delivery-medium independent.

---

[2] MIT OpenCourseWare (OCW) is an initiative conceived by MIT to make the materials of virtually all their courses freely available on the World Wide Web for non-commercial use. MIT's vice president, Charles Vest, says "OpenCourseWare looks counter-intuitive in a market-driven world. It goes against the grain of current material values. But it is really consistent with what I believe is the best about MIT. It is innovative" (see http://web.mit.edu/ocw/)

Figure 3.6 Relationship between a digital knowledge granule and a learning object repository



When putting together the tapestry of initiatives currently working in the area of learning objects, a picture emerges which suggests that an ODL delivery system based on knowledge granules is conceivable because many of the pieces that will be necessary for the effective functioning of such a distributed learning environment are evolving. Also, the levels of sophistication that are emerging are quite impressive. The following table summarises these initiatives and collectively represents a wide domain of issues that are in the processes of being developed.

Table 3.1 Summary of initiatives working on the technology of digital learning objects

Initiative	Main focus
EML Initiative of the Open University of the Netherlands	Learning design focus aimed at developing an educational notational system and corresponding standards based on the power of XML regarding the separation of content and form.

Initiative	Main focus
IDXelerator™	Prototype instructional authoring system based on the technology of knowledge objects and instructional algorithms. Capable of automated generation of specific instructional strategies & delivery.
IMS project	Generation of interoperability specifications for learning objects with a strong management systems focus to ensure interoperability regarding student tracking, exchange of student files and reporting on student achievement, etc.
Dublin Core Metadata Initiative	Development of metadata standards for cataloguing information to enable more intelligent information discovery systems.
Learning Technology Workshop of CEN/ISSS	Survey of current EMLs to explore the feasibility of a standard EML.
LTSC of the IEEE	Comprehensive initiative aimed at developing standards that fully or adequately describe a learning object.
SCORM™	To develop solutions for large-scale implementation of a distributed learning system. This initiative has a dominant content packaging focus and is working on the implementation level.

Taking into account that learning objects will be designed to be medium independent combined with anticipated developments in multi-media, wireless PADs, then asynchronous delivery of educational material can truly become portable. Viewed from a pedagogical perspective, there are exciting opportunities for learner-driven customisation of learning experiences based on the technology of automated intelligence that draws on the theoretical foundations of instructional design. Seen in this way, DE can provide pedagogy that was previously not possible in a cost-effective way, given the cost-behaviours associated with mass-customisation which will be discussed in the following section.

3.4.2 The shift to post-Fordism and mass-customisation in DE

The ODL business model underpinning the future of DE practice will be characterised by either a dominantly Fordist or post-Fordist orientation. The selected business model for future ODL practice represents the second uncertainty of the two-by-two matrix being used as the conceptual foundation for the scenarios being generated in this thesis (see Figure 3.1). However, notwithstanding popular notions that the future will inevitably be post-Fordist, this shift is not a foregone conclusion and is therefore classified as a scenario uncertainty. Fortunately, the technique of scenario planning can effectively accommodate the analysis of the dynamic among the multiple variables discussed in this thesis under the two distinctly different business models.

Three issues relating to the shift to post-Fordism as a scenario uncertainty require more discussion:

- First, a brief synopsis of why the shift to a post-Fordist system in DE is classified as a scenario uncertainty;
- Second, a concise overview of the key implications of a shift to a post-Fordist business model in DE; and
- Third, translating the business philosophy of mass-customisation —a practical manifestation of a post-Fordist approach in industry — for the ODL context.

A number of the most prominent features of Fordism, neo-Fordism and post-Fordism in DE were discussed previously in Section 2.3.2 of Chapter 2, and to avoid unnecessary duplication, they will not be repeated here. Consequently, the discussion of the second bullet listed above will be limited to important aspects that where not covered in the initial discussion of Chapter 2.

The dominant focus of the discussion of this uncertainty factor will rely on interpreting the meaning and implications of mass-customisation for ODL, drawing extensively on the business experience in this area.

The uncertainty associated with post-Fordism in ODL

The natural trajectory for the future evolution of DE practice appears to favour a post-Fordist orientation. As indicated earlier in the thesis, Garrison (1997) has euphorically announced that the advent of digital ICTs signifies the shift to a post-Industrial approach in DE. Rumble (1995c) has also suggested that the move to post-Fordism in DE is inevitable. While these predications can be motivated and justified, the global practice of mainstream DE provision is still predominantly Fordist. Notwithstanding the allure of a post-Fordist future, this transition is not a foregone conclusion and therefore — from a scenario-planning perspective — highlighting reasons why DE could remain Fordist justifies the classification of this factor as an uncertainty.

The advantage of scenario planning as a strategy tool is that it does not necessarily require organisational leadership to take up a judgemental position about the inevitability (or not) of the shift to post-Fordism in DE — irrespective of how seductive (or not) this trend may appear. Scenario planning can accommodate both positions of the spectrum in its strategy and independently consider the dynamic interaction of the other significant variables in the evolving DE context. The uncertainty status of this factor is attributed to the fact that on the one hand Fordist DE systems could continue to dominate the expansion of higher education. Yet on the other hand, it is equally plausible that developments in technology and mass-customisation will precipitate the transformation to post-Fordist delivery systems in DE.

This section will focus on highlighting some of the reasons why DE would arguably remain Fordist, whereas the plausibility for the evolution of post-Fordist DE systems will be analysed in more detail under the heading of mass-customisation and DE futures. The purpose of the discussion here is not intended to present an exhaustive justification of all the factors that would keep DE Fordist. From a scenario-planning perspective, all that is required is a plausible justification that DE *could* remain Fordist, or stated differently, that the shift to post-Fordism in DE is more unlikely than likely.

Viewed from a global perspective, it is unlikely that world provision of DE will be forced into a post-Fordist direction because of student demand alone — for example that demand pressure and competition among providers would force tertiary education institutions to become more responsive to customer needs (a shift away from mass-standardised products would suggest a post-Fordist disposition). Student demand is arguably the dominant market force driving tertiary education and can be reduced to the core assumption that the future of the university as institution will depend on the number of students that are prepared to enrol (and pay) for a university-level education. Given that only a few countries have reported a gross enrolment ratio in excess of 50%, considerable expansion of tertiary education in most of the countries of the world will be required, given the growing skills demands of the emerging global knowledge economy. Furthermore, rapid growth in the world's population is predicted and that by 2050 the global population could be as many as 10 billion people (Oblinger 2001: 10). Clearly, education is "faced with enormous challenges to provided education and training to this population" (Oblinger 2001: 11).

Taking the above into account, it is fair to conclude that the global demand for tertiary education far outstrips current levels of supply; that this demand will not be able to be met with the existing capacity of the tertiary education sector; and that the situation is likely to get worse in the future, taking population expansion into account. While some analysts suggest that e-education is the only way forward in this situation (Roll cited by Oblinger 2001: 11), reality suggests that there will be little pressure exerted on the providers of tertiary education around the globe to transform into post-Fordist organisations, especially on the grounds that a diminishing demand for university-level education would necessitate a more customised and responsive learning product. Moreover, industrialised models of DE provision have successfully extended access in a cost-effective way. Thus, given the past successes of this Fordist model, it will be extremely difficult to deconstruct an established track record, particularly in a situation where demand exceeds supply and student numbers of individual single-mode providers continue to grow.

Conversely, it could be argued that in a situation where demand considerably exceeds supply, the tertiary education sector will be able to sustain continued growth, irrespective of price. Using this rationale, it could be argued that a significant and sustainable tertiary education market exists and the for-profit providers could erode the public university market base, perhaps even applying pressure on the public providers to shift towards a post-Fordist orientation in order to remain competitive. However, education is not a perfect market where the interaction between demand and supply determines price (Hammer 1996). This is why the provision of tertiary education is largely publicly funded — affordability will remain an important dimension of the higher education market place. Certainly, there will be increased competition among a number of providers within niche markets, and pressures of reduced funding will require universities to become more efficient. However, this does not necessarily signify that universities must shift to a post-Fordist orientation in order to survive. Evolving technologies provide ample opportunities for improving the efficiency and quality of educational provision (from a sustaining technology point of view) without the institution necessarily perceiving the need for greater efficiency as a crisis that demands a shift to a post-Fordist orientation.

In addition, given that the greatest proportion of the demand for tertiary education is found in the developing regions of the world where access to digital ICT infrastructure is limited, and given the fact that post-Fordist delivery systems would be dependent on sophisticated technologies, it is reasonable and conceivable to assume that demand push will not be a dominant force in transforming university-level systems to a post-Fordist direction.

The cost effectiveness of post-Fordist DE systems is yet to be proven. In the current context where most educational institutions are seeking to exploit the potential of electronic learning, Rumble attempts to answer the compelling question: "Just how relevant is E-education to global education needs?" (2001: 223). Analysing the cost structures of electronically mediated education, Rumble concludes that it is more costly than previous generations of DE and that he suspects "that it may prove to be more costly than traditional education" (2001: 230). It is therefore unlikely, taking the global need for cheap, affordable education into account, that a shift to customisable e-learning is inevitable. Customisability is often considered to be a driving force for the move to a post-Fordist delivery system and in the absence of convincing evidence that customised e-learning is more cost-effective than existing modes of DE delivery, Fordist-based systems are likely to remain intact.

The magnitude of a prospective shift to post-Fordist systems is, in itself, a factor that will favour continuation of Fordist-based DE delivery. Peters, for example, has analysed the implications of DE in a post-industrial society, and while he has identified a number of advantages for such a shift, he emphasises that dealing with this topic "means leaving firm ground and entering the sphere of speculation" (1994: 222). Moreover he recognises that the anticipated changes might not be realised at all. Concluding his analysis of the implications of DE in a post-industrial society, Peters demonstrates that the changes are fundamental and has labelled such a shift to be "a Copernican one" (1994: 239). Universities do not change easily, and fundamental transformation — such as a shift in DE from industrial to post-industrial — is likely to favour the status quo of Fordist delivery systems.

Universities are established institutions of society that have been in operation since medieval times, and this legacy is without doubt a robust motivation that will work against any shift to post-Fordist delivery systems. In their compelling essay, *Universities in the digital age,* Brown and Duguid (1995) point out that universities offer something of value that is difficult to measure, yet it is one of the prime reasons for the continued success of the university as institution. Notwithstanding the continued pressure for universities to widen access, reduce costs and improve efficiency through technology, Brown and Duguid argue that there are important reasons "why people think them [universities] worth the often huge sums of money invested in an education" (1995: 4). Many of these reasons are deeply embedded in the fabric of society, and although they are difficult to quantify, these social reasons will support universities in maintaining their traditions and current modes of operation.

For example, the credentialing function of the university provides students with a tradable token — a degree — for a future career, social status or an immediate job. Brown and Duguid note that the "exchange value of that token provides both a measure of a university's status and, if the exchange value is high, cover for many practices that are not themselves so easily valued" (1995: 6). In other words, if the exchange value of a university degree is high, it provides universities with a licence to do things behind the front of a degree but which cannot be directly acknowledged. There are things that have social and academic value but which are not easily recognised or measured by the market. For instance, allowing students to engage in the "game" of intellectualising through interaction with a community of scholars, helping students to learn about learning or establishing lifelong networks with other students or groups of students, which continue long after leaving the campus. The details of the content acquired in the classroom are usually forgotten once the final exam is passed, yet society still values the credentials that a degree generates. Very often universities are criticised that they are too far removed from the market place in that students do not necessarily gain relevant experience. In this regard Brown and Duguid cleverly articulate the value of a degree as follows:

> *... in our highly commodified society it is naïve to believe that access on its own is enough. Those who have the label but not the experience present one problem. But those who might have the experience but not the label face another. Experience without a formal representation has very limited exchange value — as those whose only degree is from the university of life well know.* (1995: 10)

Even with the pressures for universities to change and blindly embrace the potential of distance learning futures, Brown and Duguid believe that universities are "too deeply enmeshed within current arrangements to produce sufficiently radical change" (1995: 25). Although Brown and Duguid are concerned that without different institutional arrangements, technologies will remain under exploited at the possible expense of learning quality, the reality is that the value society attaches to the degree will not necessarily force universities to go in a post-Fordist direction.

There is, of course, the reality of Fordist and post-Fordist systems operating in parallel with each other. This may have a number of social implications that would need to be considered. For example, the more expensive but flexible post-Fordist delivery systems may cater for a smaller number of "elite" students while the Fordist models of delivery would be reserved for the poorer sectors of society (Rumble 1995c and Rumble 2001). The desirability and ethical consequences of a future DE system like this will not be discussed here, but will understandably require in depth interrogation and social analysis by all involved.

Whether or not university level DE will shift to a post-Fordist foundation is a complex debate, and certainly the cursory discussion above will not be able to generate a finite conclusion. However, this discussion has demonstrated that there are justifiable reasons why DE systems of the future could remain essentially Fordist, and the fact that this alternative is plausible qualifies this position as a nucleus for one of the scenarios.

Implications of a post-Fordist business model for ODL systems

Traditional large-scale ODL provision has relied on Fordist-style approaches of mass-standardisation; a small range of products; high division of labour; a relatively long shelf-life; centralised planning and a bureaucratic hierarchy to capitalise on the efficiencies of economies-of-scale in DE. In contrast, post-Fordist DE systems would be based on a model of flexible specialisation characterised by customised production; a wide variety of options; a multi-skilled professional workforce; decentralised planning; and a networked, but flatter organisational structure. The main tenets of Fordist versus post-Fordist DE delivery were introduced in Chapter 2 and will not be repeated here. The purpose of this section is to introduce a few practical examples of what post-Fordist delivery might entail for DE systems.

Multiskilled flexible workers are seen to be crucial for being able to provide greater flexibility and innovation associated with post-Fordist principles (see for example Edwards 1991). This will impact on DE providers in a number of ways:

- The need for continuous training in the market place will influence the curriculum taught by the university, requiring a more flexible range of courses to be developed in a relatively short time frame when compared to the significant lead time associated for the development of standardised courses;
- The composition and size of the demand for DE offerings is likely to change. The traditional divisions in the demand for DE among undergraduate, postgraduate and vocational courses will lean towards catering for a larger proportion of inservice learning from learners who want to upgrade or improve their skills base. Furthermore, dual mode institutions are likely to experience an increase in the ratio of distance learners to face-to-face learners as the demand for DE courses increases;
- The skills requirements of university staff will also need to change in order to cater for the ever-changing design, development and delivery requirements of multi-mode, multi-media learning materials. For example the need for project management skills will increase as the number, range and complexity of resources used in courses increases and turnaround time for new courses gets shorter. Also, new skills will be required for the development of multi-media learning materials and new technologies as they emerge (see Bates 1997a);

- The traditional division of labour roles in Fordist systems — for example distinguishing between course writers and tutors who mark assignments — is likely to collapse with individuals being responsible for a wider range of functions and processes.

Raggatt (1993), Farnes (1993) and Rumble (1995c) have listed a number of concrete examples of the implications of post-Fordism for DE systems:

- Small-scale production and rapid changes to course content would necessitate decentralisation of decision-making regarding decisions associated with course design, shelf-life of the course, project planning and budgeting;
- Large-scale DE providers may reduce their core full-time staff and use a higher proportion of part-time flexible staff in its system;
- Post-Fordism is likely to contribute to greater differentiation in the tertiary education sector, not only in terms of content specialities but also in terms of delivery modes, where different systems operate in parallel with each other afford students greater choice whether or not to study at a distance and a greater range of choices between full-time and part-time study. Thus more sophisticated and effective mechanisms for articulation among different providers will be necessary;
- The organisation of design and production in post-Fordist DE systems will change as a result of the need to support multi-skilled professional teams that undertake a wide range of responsibilities. Coupled with these structural changes, technologies and systems will need to be developed that can accommodate the complex networking and communication necessary for the effective functioning of these systems;
- To reduce costs of inventory, post-Fordist DE systems would rely more on just-in-time production methods as well as on sophisticated supply-chain communication systems;
- More sophisticated networks of organisations are likely to evolve instead of a single institution taking responsibility for the entire design, development and delivery process (this will result in vertical de-integration of the supply chain);
- In large-scale Fordist systems there is a clear distinction between academic decision-making and administrative decision-making. In post-Fordist systems this distinction would dissappear requiring workers to become multi-skilled academics, and administrators with the corresponding systems to support these roles;
- Frontline staff would need to be empowered to react directly with customers without having to clear decisions with superiors. For example, a student counsellor should be able to take a decision on the late submission of an assignment without prior approval of the senior academic. However, frontline workers would require the appropriate systems to support them with these kinds of decisions.

The list of examples above is very brief: nonetheless, it gives meaning to what a post-Fordist DE system might entail. Although some of these features are slowly been adopted and implemented by various institutions, to date, no comprehensive example of a post-Fordist DE system exists. Hence many of the examples are speculative in nature, and it is not clear how the individual examples of post-Fordist DE will interact with each other in a dynamic system. Consequently this is an important area for future research.

Mass-customisation and DE futures

Historically, the manufacture of customised "made-to-order" goods could only be achieved through artisan-based craft economies, whereas the low cost, "one-size-fits-all" solutions were characteristic of the business models associated with economy-of-scale, mass-production systems. The concept and practice of mass-customisation combines these two philosophies. It is now possible to offer customised goods and services that are designed and manufactured at considerable scale.

Pine (1993) points out that Alvin Toffler anticipated the concept of "mass-customisation" in 1970 in his work, *Future Shock* and that the concept was first coined and delineated by Stan Davis in 1987 in his best seller, *Future Perfect* (in Pine 1993). The advent of more sophisticated technologies and computer processing power are slowly eroding the apparent paradox of combining mass production with customised offerings. In this regard, Davis had the following to say over 15 years ago:

> *The world of mass customizing is a world of paradox with very practical implications. Whether we are dealing with a product, a service, a market, or an organization, each is understood to be both part (customized) and whole (mass) simultaneously. New technologies are now coming on–stream which deal with infinitesimal parts of the wholes that interest us. They are able to get specific about parts that earlier technologies had to leave undifferentiated. In addition, they operate at such fast speeds that we may consider their treatment of parts simultaneous. Speed and specificity are the hallmarks of these new technologies, and the foundation for the mass customizing of products and services that follow. Speed and specificity enable us to see how the whole is actually present in each one of the parts.* (1987: 140 & 141)

Pine summarises the interaction between the business models of mass production and customisation as follows:

> *Mass customisation, then, is a synthesis of the two long-competing systems of management: the mass production of individually customized goods and services. The pioneers of this new frontier in business competition are finding that great variety — even individual customization — can be achieved at prices that approach, and sometimes beat, those of mass producers.* (1993: 48)

Until the 1990s, the success of DE — when viewed globally — has largely been limited to the operations of the mega-universities (a mass-standardisation approach), particularly when measured against the combined criterion of quality and cost. This is not to ignore the pioneering work of the dual and parallel-mode systems of Australia or the DE independent study initiatives of the United States of America. The latter DE systems evolved in response to significantly different purposes — they were never designed as cost-effective substitutes for mainstream campus-based systems. In contrast the mega-universities were purposefully designed as mainstream, low-cost alternatives to universities following the campus-based model.

The Australian dual-mode systems were initiated as a means to provide access to higher education over large geographical distances to populations residing in the outback, irrespective of the marginal cost of this delivery system. In the case of the US, prior to the 1990s, DE was largely focused on continuing adult education objectives and summer school alternatives in support of the mainstream campus-based higher education system. However, since the 1990s, this situation is changing radically, largely due to the influence of emerging technologies and market shifts away from the dominant pre-service university education objectives to a focus encompassing a wider range of tertiary education offerings and growing emphasis on lifelong learning.

Interestingly, notwithstanding its success in the business world, the practice of mass-customisation has not had a noticeable influence on educational delivery systems, despite its huge potential for implementation. Furthermore, given that the mass-provision models have dominated DE in the past, the developments associated with mass-customisation in industry require special attention when considering opportunities for its adoption in future strategies in the ODL arena.

Mass-customisation refers to the process of designing, manufacturing and delivering a product or service in response to an individual customer's needs in a cost-effective way (Gerber Scientific 2001). It is not difficult to see why mass-customisation has been called the "holy grail" of marketing (Liechty, Ramaswamy, and Cohen 2001). The capacity for organisations to provide the right quality, at the right price for increasingly heterogeneous markets in a mass-production environment appears to be a contradiction in terms. This is why Gerber Scientific, a leading supplier of intelligent manufacturing systems, refers to mass-customisation as "the silent revolution" (Gerber Scientific: undated online). "Simply stated, mass-customization is about giving consumers a unique end product when, where and how they want it — at an affordable price" (Gerber Scientific: undated online).

Sceptics would arguably label claims such as those listed above as superficial marketing ploys, but mass-customisation has been successfully implemented by a large number of producers of goods and services, and has received considerable attention in the management literature. Joseph Pine — considered one of the world's leading thinkers on mass-customisation in management circles — refers to mass-customisation as "the new business frontier in business competition" (1993: xvii) and has suggested that it could well become the new organising principle of business in the current millennium (see for example Gerber Scientific: undated online).

Examples of successful implementation of mass-customisation in the business world include the following:

- Dell Computer Corporation builds computers to order using a virtual system. They have established direct virtual relationships that close the gap between customer, manufacturer and supplier. The Dell business model differs from the traditional vertically integrated IT companies that design, manufacture and supply proprietary technologies at a premium price, which was previously the main source of competitive advantage in the IT sector. The Dell corporation has succeeded in building a $14-billion business in just 14 years, and using the Internet combined with the principles of mass-customisation, Dell is redefining the traditional "supplier-vendor-customer chain". Dell creates individual web pages for its customers, and hardware configurations are built to order just-in-time to be delivered almost anywhere around the globe. The Dell business model has resulted in phenomenal increases in efficiency; for example, inventory turnaround has been reduced from more than 30 days a few years ago to fewer than eight days currently (see for example, ManufacturingNews.com 1998).
- National Bicycle in Japan has designed a smart bike that is located in their showrooms. Prospective customers sit on the smart bike, which records vital statistics such as height, weight, length of legs, and automatically relays this information to the factory. A customised bicycle can be manufactured within 3 minutes. Levi, the jeans company, have adopted a similar system for manufacturing individualised women's jeans. (see Glazer 1999).
- Creo Interactive (www.creointeractive.com), a German-based shoe manufacturer, has implemented a system that allows customers not only to

design their own shoes, but Creo will also manufacture the customer's unique creation according to the specific measurements of the client's feet (see Piller 2000). Creo Interactive works on a modular concept, by providing a range of designs, styles and colours for the constituent components of a shoe: the sole; body of the shoe; and the tongue. The customer's feet are scanned using a three-dimensional scanner, and this data is transformed into a generic foot model for the client and is also stored for subsequent purchases. The generic model is matched with compatible designs whereafter the customer can choose from a range of styles and colours. This data is transformed automatically into production data and the automated production planning system automatically reserves capacity in the system to ensure delivery by the specified date.

- Motorola has developed a manufacturing system using software and hardware systems that can produce pagers in lot sizes as small as one within a few hours of receiving a customer's order (see Pine & Bart 1993, and Pine 1993: 146-147). The sales representative meets with the client and together they design a customised pager (from 29 million possible combinations) on the representative's laptop computer. The representative then dials-up the factory and transmits the design. At this point a fully automated dynamic network takes over and within minutes a unique barcode is generated that contains all the steps that are necessary for the flexible manufacturing system to produce the order.
- Bandag is planning to embed computer chips in its retread tyres for the truck-tire industry. This chip will record the tyre pressure, number of revolutions and temperature, enabling Bandag to customise its service according to the client's unique operational conditions. Bandag will be able to determine the optimal time to replace old retreads, thus reducing down time caused by blowouts but also helping its clients to improve the efficiency of their respective businesses (see Pine & Peppers 1995).

Many examples of mass-customisation have been reported in the literature, depicting a wide variety of variations in the specifics of how this emerging business philosophy manifests itself in practice. The list is impressive, but is too long to discuss in detail in this section. Suffice it to say, the list spans all sectors of business (see for example Pine 1993; Pine & Bart 1993; Pine & Peppers 1995; Piller 2000). This list is as varied as Hertz (motorcar rental); Ritz-Carlton (hotel industry); Hallmark (discount retailing); Hewlett-Packard (IT industry); AT&T (telecommunications service provision); Dow Jones (business and financial news); Hallmark Cards and American Greetings (greeting card industry); and United Services Automobile Association (vehicle insurance, travel services and buying service for clients).

Notwithstanding the successes of mass-customisation in the business world, there have also been visible failures. These failures attest to the complexity of implementing mass-customisation effectively, but also suggest that its potential application in DE does not come without risk and uncertainty.

Consider for example, Toyota Motor Company. In the late 1980s, Toyota's leadership embarked on a strategy to use their highly skilled and flexible work force to begin producing a varied and customized product at the same low cost as that of their standardised mass-produced vehicles. By 1992 Toyota had made considerable progress with these objectives as evidenced by lowering the development time for a new vehicle to 18 months and offering customers a wide range of options for each model, including the manufacture of a car made-to-order that could be delivered within 3 days (Pine & Bart 1993). However, by 1993 Toyota began experiencing problems with soaring production costs and began extending the product development cycle and "shelf-life" of new models as well as unwelcome requests to dealers to carry more inventory. Other motorcar manufacturers, including Nissan, Mitsubishi and Mazda who had embarked on customisation initiatives ran into similar problems (Pine & Bart 1993).

Custom Foot, one of the early pioneers of mass-customisation, who captured the attention of the business media including the New York Times, Forbes and Fortune (Holusha 1996; Martin 1997; and McHugh 1996) and was also frequently cited as a case model by management authors, ran into problems forcing them to close business in 1998. Custom Foot used sophisticated technology to design customised Italian shoes according to client's measurements and relayed this data to sub-contracted shoemakers in shoe factories in Italy. Customers were promised delivery within three weeks at prices below the off-the-shelf equivalents. Custom Foot shoes were in very high demand and the business analysts predicted considerable success for the innovative business model of this company based in Westport, Connecticut. Yet, something went wrong. Piller (2000) articulates the following reasons for the demise of Custom Foot: Cultural differences between the United States and Italy that impacted negatively on the business; Italian shoemakers — world renowned for their skills — were unable to meet the delivery time frames as their factories were designed for long production runs associated with standardised mass production; masters in the mass production system, workmen did not appreciate the reasons for small variations in the design of the shoes and did not adhere to the customised measurements meticulously. In short, the Custom Foot system was not able to manage the complexity of customised production by using the traditional standardised manufacturing model. More importantly, according to Piller (2000), Custom Foot was not able to manage the information cycle that is critical for mass-customisation in a seamless way. The information cycle includes the total system for capturing customer's needs, configuring the design specifications, production planning and scheduling, effective supply chain integration and relationships management.

Reflecting on the many failed attempts of mass-customisation, Pine and Bart (1993) point out that all too often, these companies have been pursuing continuous improvement as opposed to the transformation to mass-customisation. Continuous improvement is an experienced-based strategy aimed at reducing cost and improving quality of manufactured products by implementing new technologies and processes within existing production models, in other words a "sustaining technology" using Christensen's (2000) terminology. The critical difference is that "[c]ontinuous improvement and mass customisation require very different organisational structures, values, management roles and systems, learning methods and ways of relating to customers" (Pine & Bart 1993: 109).

Thus it is necessary to examine how mass-customisation differs from continuous improvement as well as the implications of these differences for the potential of applying the philosophy of mass-customisation in future DE practice. This will be done using a two dimensional approach: first examining the basic approaches for customising goods and services; and second, demonstrating how mass-customisation can be analysed from the perspective of Michael Porter's concept of the value chain (see Gilmore & Pine 1997; Lampel & Mintzberg 1996). In each case the implications of mass-customisation for DE futures will be highlighted.

The basic approaches of mass-customisation and implications for DE futures

Gilmore and Pine (1997) identify four basic approaches to customisation. The approaches are distinct from each other and are called collaborative, adaptive, cosmetic and transparent. The four approaches are not mutually exclusive and some overlap may occur. These authors recommend that:

> *When designing or redesigning a product, process, or business unit, managers should examine each of the approaches for possible insights [into] how best to serve their customers. In some cases, a single approach will dominate the design. More often, however, managers will*

> *discover that they need a mix of some or all of the four approaches to serve their own particular set of customers.* (Gilmore and Pine 1997: 91)

Each approach will be introduced and possible applications in DE will be illustrated. The discussion in this section will serve to justify the plausibility of applying the mass-customisation business model in DE systems.

Collaborative customisers co-design a unique product with the customer. This approach is particualrly appropriate for contexts where it is difficult for customers to articulate their needs; where they grow frustrated with innumerable choices; or where the selection of alternatives is too complex. The Motorola example introduced earlier in this section is a good example of a collaborative customiser.

Gilmore and Pine (1997: 92) use the example of a Japanese eyewear retailer, Paris Miki, to illustrate this approach to customisation. Paris Miki spent a number of years developing a software based design system which reduces the complexity of choosing a pair of rimless glasses from a plethora of choices. A digital photograph is taken of the customer's face, and its attributes are analysed digitally. Customers also provide inputs such as the kind of look they want, and this is combined with their own facial attributes to automatically suggest an appropriate lens size and shape, which is then superimposed on the digital image of the client's face. The client and retailer collaboratively adjust the size and shape of the lens until the customer is happy with the result. Similarly, hinges, arms and bridges are selected and adjusted to complete the design. A photo of the client with his/her newly designed eyeglasses is provided and the system automatically generates the design specifications for the technician to grind the lenses and assemble the glasses within an hour.

In a tertiary education context, for example, the choices facing school-leavers regarding appropriate fields of study and specific subject choices is becoming increasingly complex. Consider for example the difficulties and possible frustration associated with making subject choice decisions for an individual student at a large university like Unisa, which offers in the region of 2 000 different year courses (or approximately 4 000 semester courses). The complexity of this decision is illustrated more clearly when you combine the large number of course offerings with other relevant factors in this decision like:

- the unique aptitude, ability and personal interests of the learner;
- ever-changing requirements of professional bodies who dictate the curricula and specific subject combinations for different professional qualifications;
- emerging possibilities for constructing unique content packages in a wide range of subjects instead of, for instance, a generic first year English course, you could have courses customised as English for Business, or English for Law or a more traditional English Literature course;
- more complicated rules and regulations concerning subject combinations and requirements for specialised degrees; and
- possibilities and regulations for credit transfer nationally and internationally;

Assume that an expert system can be designed to assist with narrowing the spectrum of choices for a customised degree, in a co-design situation where learner needs are taken into account. The expert system would be based on a dynamic systems model using inputs from the student in consultation with a student counsellor and would simulate the interaction and dynamic among the variables listed above. With such a system it is conceivable that a more customised and effective service can be offered to prospective students. There are already examples of software-based systems that assist with the complex administration of subject choices during registration, but these tend to be examples of continuous improvement as opposed to mass-customisation.

For instance, at Unisa there is an expert system connected to the student registration system which checks whether individual subject choices meet the Senate regulations regarding prerequisite courses and specific subject combinations among the 2000 course offerings at the University. Should there be a conflicting subject choice, the student can immediately be advised at the registration counter about this problem. However, this system is not an example of collaborative mass-customisation, because the specific learning product is not co-designed according to unique needs of the customer, but is rather an automated control measure to ensure that the choice from a myriad of standardised alternatives meets the university generated rules and regulations. Nonetheless it does illustrate the possibilities for developing such expert systems for educational applications.

The subject choice example illustrated above is not DE specific, and could of course be applied as an example of degree customisation through subject choice at campus-based institutions. Yet campus-based models would, of necessity, have to limit the number of subject combinations because of the inevitable timetable clashes of face-to-face lectures. In the DE context, expert systems for co-designing customised DE learning products would include options for preferred mode of delivery; individually selected instructional paradigm; assessment alternatives; chosen forms of interaction; customer and stakeholder driven content objectives; greater freedom to select the pace of learning according to individual situations. These are now possible given the technology of learning objects and evolving mass-customisation expertise. In many ways the nature of distance education lends itself to realising the opportunities that can be generated from the application of the mass-customisation business model better than in campus-based models. However, campus-based institutions may demonstrate greater flexibility to adapt their delivery models than the bureaucracies associated with large-scale providers.

The system of customisation envisaged above would get a lot closer to realising the ideals of independent learning that are embodied in the foresight of Charles Wedemeyer and discussed under the vision of open learning in Section 2.2.1 of Chapter 2. This is why Chapter 2 hypothesised that the vision of open learning would continue to guide the strategic futures of DE, and why it is necessary to understand the unique characteristics and requirements of asynchronous DE systems, because the vision of highly customised learning is difficult to achieve within cohort-based face-to-face systems.

Adaptive customisers produce one standardised product, but the product contains the inherent capabilities of customisation by the users themselves. Adaptive customisation is appropriate for clients who would like the same product to perform in different ways on different occasions.

Gilmore and Pine (1997) use the example of a lighting system developed by Lutron Electronics Company to explain this approach of customisation. By using Lutron's Grafik Eye System™, users can programme different lighting effects, for instance, evenings of quite readings, dinner parties or television viewing. The Grafik Eye System™ connects different lights in a room, and depending on the user's selection of a desired lighting programme, the room is automatically illuminated according to the desired effect without having to adjust separate light switches until the desired lighting is achieved.

There are a number of ways in which DE providers could become adaptive customisers. For example, the same standardised course materials of a DE course could contain multiple-learning tracks for different classifications of learners. The differentiated learning experiences could, for instance, include contextually relevant sets of case studies, learning activities and assignments, depending on the learner's specific needs. For instance a course in teaching methodology may include different categories of learners, for example, practicing teachers taking the course to improve their qualifications, nurses studying to become trainers in the nursing profession, or pre-service students aiming to become teachers. In each case, a distinctive set of assignments or contextually relevant case studies could be included in the standardised package and customised by the learners themselves according to their own circumstances.

Viewed from another perspective, a standardised course could be designed to provide for a "fast-track" and a "support-track" in the same package. The nature of the pre-designed teaching, interaction and assessment strategies would differ for each track. Arguably different groups of students experience different problems with understanding certain concepts in a given course depending on ability, prior knowledge and experience with the specific concept being learned. Therefore a learner may opt for using the "fast-track" in one section of the course, but in another section may prefer to use the "support-track" alternative, according to individual learning contexts and needs.

Cosmetic customisers present a standard product differently to different customers. Originally, Planters could only sell their various nuts in small, medium and large cans (see Gilmore & Pine 1997). However different merchandisers had different needs. For example, Wal-Mart wanted to sell peanuts in larger quantities than 7-Eleven stores, both of which could not be accommodated by the three standard sizes. Today Planters can quickly switch between different sizes, types of packaging and labels, depending on each retailer's needs. These needs do not only fluctuate between different suppliers, but may also have seasonal fluctuations. For example, the same retailers may request different packaging and container sizes during the Christmas period than other times of the year.

In DE, for example, a provider working in the field of lifelong learning or corporate training may wish to package courses differently for different corporate clients, not only in terms of course packaging, but also in terms of pacing, assessment strategies, etc. For instance, a construction company may require a course to be presented intensively during a quiet period in the construction industry, while the same course may be needed by another company to be spread over a different period. These different pacing alternatives will have implications for the assessment strategy, for example, how the provider can accommodate these differences effectively within their respective delivery systems.

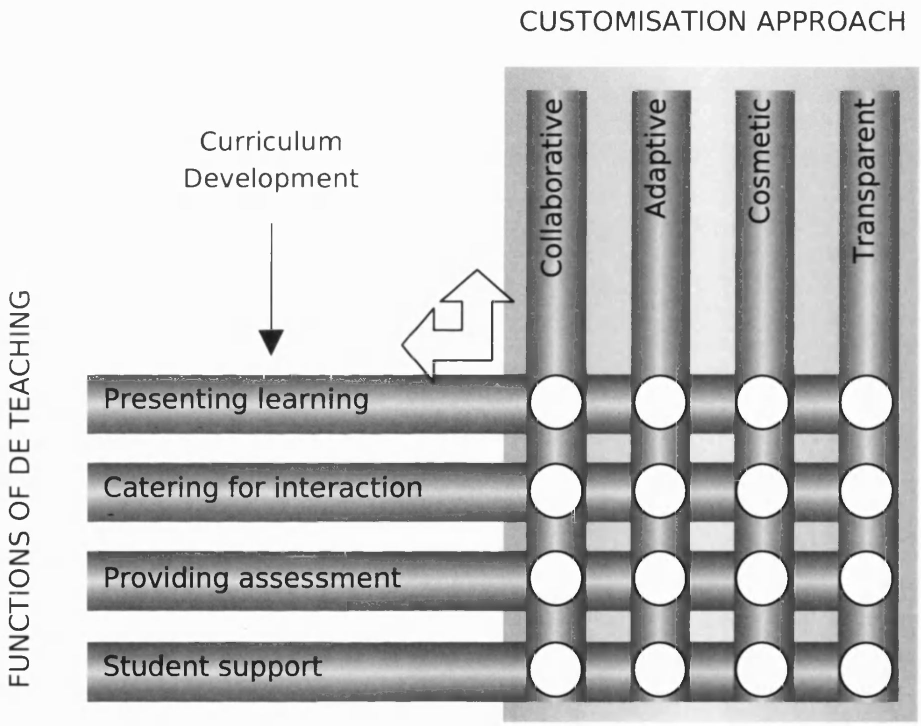
Transparent customisers provide clients with unique products without them knowing explicitly that the goods or services have been customized for them. This approach is suited to customers whose needs are predictable and can be deduced from indirect observation without clients repeatedly having to state specific needs. Gilmore and Pine (1997) use ChemStation of Dayton, Ohio as an example of a transparent customiser. ChemStation are in the business of supplying industrial cleaners and they have a wide range of different clients, for example, car washers, factories, restaurants etc. Each client has different cleaning needs in terms of the type of soap, strength of detergent, and specific consumption rates. ChemStation provides each of its clients with a standard container with the ChemStation logo, and carefully monitors each client's usage patterns. ChemStation then delivers the right soap before the client needs to request a new order. Clients are unaware of the soap formulation they use, how much stock they carry or even when the soap was delivered — they simply know that it works and that there is always detergent when they need it.

A good future example for the DE context would be an application like IDXelerator™ using the technology of digital knowledge granules. An automated instructional design system would be able to monitor individual learners progress and preferences and provide contextually relevant learning resources in accordance with the instructional design information that is electronically tracked without them knowing that their individual learning experiences have been customised.

Certainly, the design of customised DE delivery systems will require considerable research and experimentation to find the optimal number of cost-efficient variations, and accordingly this factor is classified as an uncertainty. A conceptual approach for designing and researching a future DE mass-customisation system is illustrated in Figure 3.7.

The challenge for DE leaders and innovators is to design suitable systems for customising DE delivery systems that are cost effective and of an acceptable quality. With reference to Figure 3.7, the systems framework — based on the functions of distance teaching that was analysed and discussed in Chapter 2 — has been adapted for purposes of illustrating a conceptual foundation for the design of mass customised systems in DE. For each distance teaching function, it is possible to apply one or more of the customisation approaches discussed in this section, as indicated by the white circles on the intersection points of Figure 3.7. The extent to which customisation can be achieved in DE systems will depend on the state of available technologies and the economies that can be generated from such systems.

Figure 3.7 Designing alternatives for mass-customisation in DE: A conceptual framework



However, there is a significant difference relating to economies when comparing mass-standardised systems with mass-customised systems. Chattel, speaking from a business perspective, points out that: "The new paradigm achieves its scale not through monotony, but through continuous variation" (1995: 57). Whereas in mass-standardisation low cost is achieved through economies of scale, mass-customisation achieves low cost through economies of scope (see Pine 1993: 48). In this regard, continuous improvement differs significantly from mass-customisation and is one of the reasons why Toyota experienced soaring costs with its early attempts at customisation.

Furthermore, different organisational structures will be necessary when comparing Fordist and post-Fordist business models in DE. In the business world, these paradigm shifts have forced organisations "to make changes to their organisational structures" (Johnston 1996:48) and in DE organisations, the situation is not likely to be very different. The challenges facing DE managers of the future regarding systemic organisational transformation will be highlighted in the following section.

Clearly, the shift from a Fordist-based business model to a post-Fordist business model will have a significant impact on the business as new structures, processes and values will be required. Mass-customisation is a process that distinguishes itself from the practices of continuous improvement and consequently this factor meets both criteria for a scenario uncertainty: its future outcome is unknown and that the impact on the business model must be significant.

Mass-customisation, the value chain and DE futures

The concept of "value chain customisation" provides a useful framework to classify and understand the dynamics of mass-customisation and the tensions between aggregation and individualisation. The concept is introduced here as a basis to explain the plausibility of customisation in DE systems, but also to illustrate the interaction between the type of customisation and corresponding implications for systemic organisational transformation. This interaction will become an important determinant of the specific uncertainty matrixes of the individual scenarios with reference to the degree of customisation implemented in a given system.

Value chain analysis is helpful when identifying which functions lend themselves to standardisation and which lend themselves to customisation within the constraints of the nature of the business concerned, the specific market context and alternative strategies for the future. A number of different customisation alternatives can be configured when applying the notion of customisation to one or more of the key components of the value chain. The key components of the value chain include design and development; production; marketing; and delivery. Conceptually, customisation can be analysed according to the extent to which each of the components of the value network are customised. These key components are illustrated in Figure 3.8.

Since the cost of customisation tends to increase in relation to the number of component changes in a product, "it makes sense to customise the downstream functions" (Lampel & Mintzberg 1996: 25). In other words, those component activities closest to the market place which may then spread upstream towards the customisation of the design of the product — that is starting at the right-hand side of Figure 3.8 and working down towards the left.

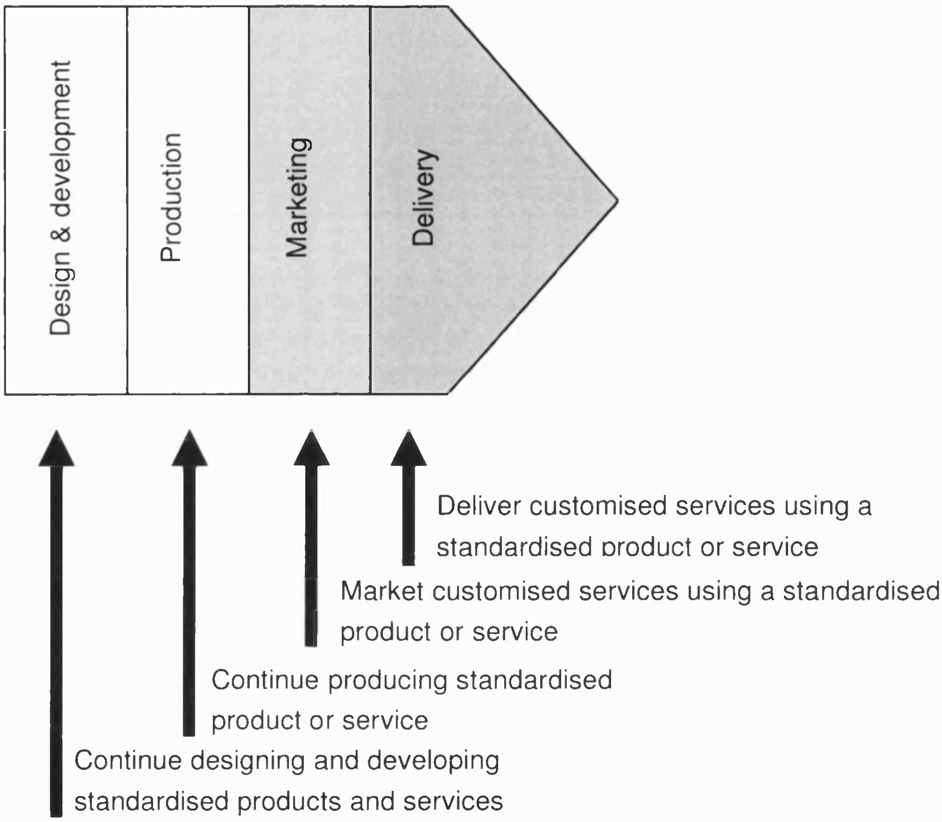
Therefore the easiest way to begin with mass-customisation is to customise services around standardised products and services. This can be achieved by customising the marketing and delivery components of the value chain as indicated by the shaded areas of Figure 3.8. In the DE context, there is already one successful example that applies this philosophy in its delivery system, namely the British Open University. The British Open University is able to provide a customised learning experience around standardised learning materials through its decentralised system of tutorial support. A personal tutor is assigned to each learner, and the student-tutor ratio rarely exceeds 25:1. Operating at significant scale regarding the production of standardised learning materials in conjunction with the use of part-time tutors, the British Open University is able to provide customised learning experience at a unit cost which is considerably lower than the unit-cost of the face-to-face university teaching model[3].

Even with the success of the British Open University approach, clearly there is considerable scope for more sophisticated forms of customisation in DE delivery systems. Moreover, given the continued evolution of digital ICTs in conjunction with the almost universal interest in DE at all tertiary education institutions, it is unlikely that the

[3] Refer to the discussion on student support as one of the distance teaching functions in Section 2 of Chapter 2 as well as well as the phenomenon of mass open distance learning and managing the eternal triangle in Sections 1.3.4 and 1.3.5 of Chapter 1 respectively.

model of customisation referred to above will be able to maintain continued growth in the DE market space.

Figure 3.8 Customising services around standardised products and services



(Adapted from Pine 1993: 173)

There are two important issues that require introduction regarding how this factor of the two-by-two matrix will play out in each of the scenarios: first, what further and more sophisticated forms of mass-customisation might mean for future DE systems; and second, the corresponding imperatives for systemic structural transformation as a result of different customisation modalities.

Starting with the design and development component, It is possible to produce one standardised product, which has inherent capabilities for customisation by the user, as in the case of adaptive customisers. In this example providers would have the option (or not) of customising marketing and delivery in conjunction with the customisable product. Adaptive customisation will result in a higher unit cost of production, but can still be recouped within systems that operate at significant scale, without necessarily changing the underpinning economy-of-scale approach.

This form of customisation will enhance the quality of the learning experience given that it is more responsive to individual learner needs. Viewed from a technical perspective, it would not be too difficult to take the first steps towards a component-based, just-in-time assembly of customised learning resources because it is possible to integrate reasonably high levels of automation for this kind of flexibility. For instance, using the earlier example of customised content, learning activities and assessment strategies for the nursing students studying a course on teaching methodology, once the student is identified as a "nursing" education student on registration, the pre-flagged content and contextually relevant learning activities and assignments can automatically be included in the learning resources from a central repository instead of a generic "one-size-fits-all" type of course. This is an application where developments of EMLs will become particularly useful, and the Open University of the Netherlands, for example, has already experimented with the concept of customising content for different categories of learners thus pointing towards the plausibility of more sophisticated forms of customisation in DE.

These examples of customisation can be attained by adopting an approach of continuous improvement because the increased cost can be offset by applying the principles associated with economies-of-scale, particularly within the business models of the large-scale ODL providers. Viewed from a mass-customisation perspective, these examples of customisation are relatively unsophisticated when measured against the potential for more sophisticated modalities of customisation — despite the significant gains that can be achieved in the quality of the learning experience with these examples of customisation.

In the previous section, DE specific examples of more sophisticated customisation where each component of the value chain is customised was illustrated (see for example the discussion regarding collaborative and transparent customisers in the previous section). Technology is evolving to the point where it is conceivable that prospective DE students will be able to co-design unique learning resources including the following alternatives mentioned earlier: preferred mode of delivery; individually selected instructional paradigm; assessment alternatives; chosen forms of interaction; customer and stakeholder driven content objectives; greater freedom to select the pace of learning according to individual situations. In many cases the customisation can be done transparently without the learners being aware of how specific instructional strategies are generated in real-time from tracking learning interaction history.

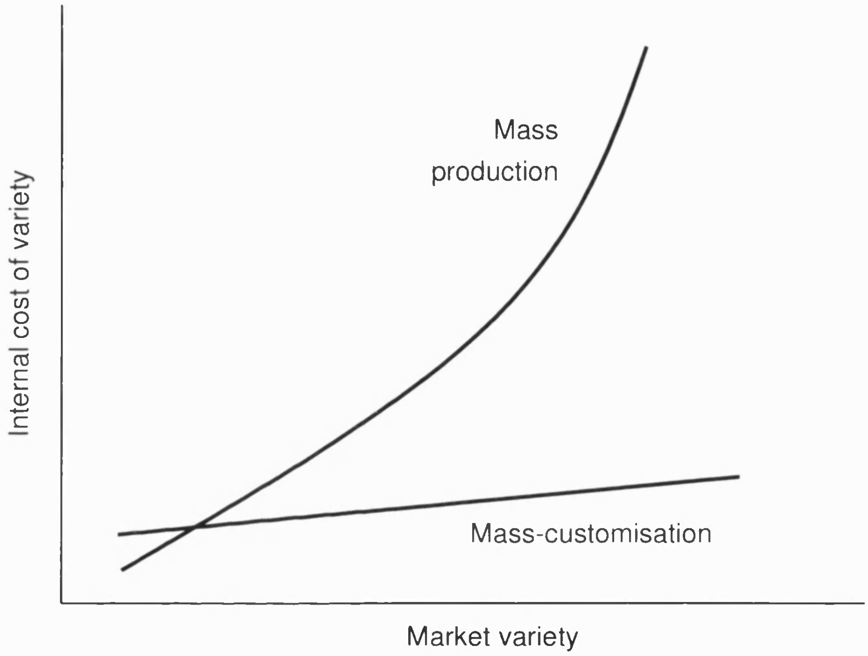
As indicated earlier, the cost of customisation will increase in proportion to the number of component changes in the customisation of the value network (see Lampel & Mintzberg 1996). Most manufacturers who produce a few relatively standardised products have adopted batch-processing techniques which translate into long runs of identical products based on the notion that the only way to get cost down is to increase volume.

Anderson (2000) explains the cost behaviour of mass-customisation using the useful concept of *cost of variety*. Cost of variety encapsulates the total costs of attempting to provide variety using mass production techniques where products, processes and market channels are essentially inflexible. Anderson explains the cost of variety in another way: the difference between the existing operation budget in cases where a variety of products are produced and the idealistic case of producing a single product at the same volume of current operations (Anderson 2000: 4).

Figure 3.9 shows that the cost of variety for mass production increases exponentially, whereas in the case of mass-customisation strategies, processes and marketing channels that are properly implemented results in a flatter curve. Mass-customisation requires the proactive management of variety instead of expending significant budgets on trying to make inflexible mass production systems become more flexible and responsive (Anderson 2000). Mass-customisation is able to contain the cost of variety curve by applying fundamentally different sets of values; systemic organisational structures; processing paradigms and marketing and delivery approaches. These differences must be recognised in order to get mass-customisation to work.

Taking the above into account, a breakeven threshold will eventually be reached where it will no longer be possible to sustain the marginal cost of component customisation using an economy-of-scale or continuous improvement strategy. There is growing evidence which suggests that sophisticated modalities of mass-customisation cannot be achieved through extensions of continuous improvement, but that it rather requires more fundamental company transformation. See for example Toyota Motor Company's early attempts at customisation through continuous improvement where production costs soared beyond reasonable levels (see Pine & Bart 1993). Christensen's (2000) work on the devastating effects of disruptive technologies can also be cited in support of the corresponding need for transformation when attempting sophisticated modalities of mass-customisation.

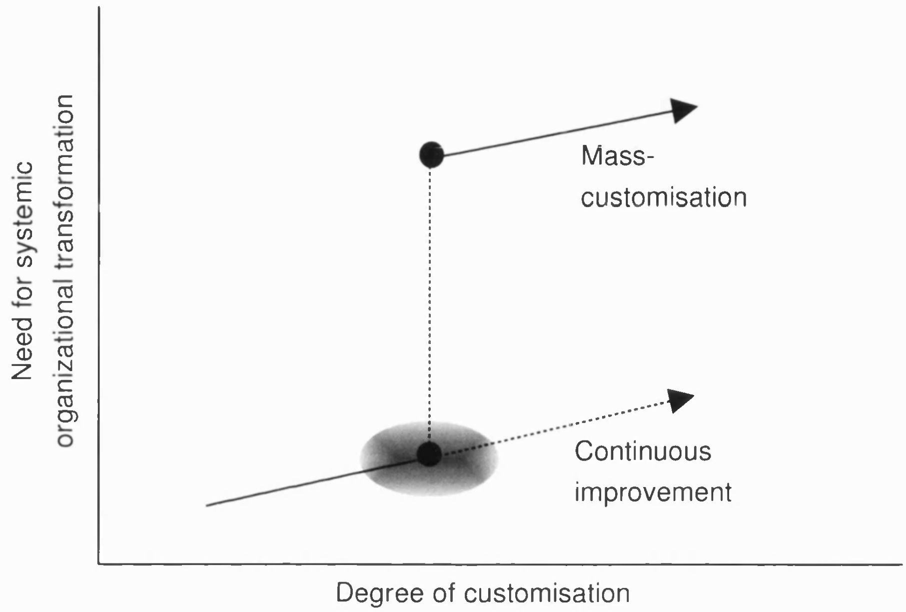
Figure 3.9 Comparing mass production and mass-customisation using the cost of variety



The need for systemic transformation of existing organisational structures and processes is a good example of fundamental transformation in the organisation that will be required in order to be successful with mass-customisation. Figure 3.10 illustrates that there is a theoretical threshold where less-sophisticated forms of customisation can still be accommodated within a continuous improvement paradigm. However, before more sophisticated forms of customisation can be implemented, systemic organisational transformation will be necessary. The important inference that can be made with reference to Figure 3.10 is that levels of customisation are possible under both paradigms of continuous improvement and mass-customisation. However, two distinct organisational orientations emerge: one which is essentially fordist, the other post-Fordist. These distinct orientations represent the two states that the dominant business model can assume for the purposes of this scenario factor.

This section is concluded with a few illustrations of how the dominant systemic organisation of an institution may differ under each distinct state of the selected business model. For example, with particular reference to the question of organisational design, Johnston (1996:51) points out that the "emerging trend in job design is to group tasks around processes rather than functions." This statement is particularly important for industrialised forms of education, which have traditionally structured themselves according to the functions of distinct divisions of labour associated with large-scale DE systems (see Chapter 2).

Figure 3.10 Need for systemic transformation in relation to continuous improvement and mass-customisation



For example, the following organisational changes would be more appropriate for a post-Fordist business model in DE:

- The organisational structures and processes of DE design, development and delivery will now be based on a *design* model as opposed to a *production* model. The previous mass production paradigm entailed the *production* of uniform parts for a uniform product, whereas customisation for mass provision focuses on the *assembly* of uniform parts into a unique, individual product (Chattel 1995:57);
- The requirements of creative design for innovative customised solutions will necessitate teams of transdisciplinary knowledge workers, requiring a different skills base from that associated with conventional mass-standardised DE systems. Hierarchical discipline-based organisational structures will become redundant because these kinds of structures are not sufficiently responsive to the demands of the new design environment.

The time-space separation in DE enables levels of customisation which are simply not possible in synchronous cohort-based systems. This combined with the fact that it is possible to achieve these levels of customisation at costs which compare favourably with the traditional mass production models, demonstrates the significance of mass-customisation as a component of the dominant business model for realising an ODL future which did not previously exist. However, corresponding with this potential is the need for fundamental systemic transformation, and the interaction of this factor must be analysed in conjunction with emerging potential for pedagogical innovation as a result of the technology of digital knowledge granules. Furthermore, the more sophisticated modalities of customisation and corresponding need for systematic organisational transformation cannot be accepted as a foregone conclusion (regarding future ODL systems). This dynamic must also be captured in conjunction with the emerging potential for pedagogical innovation. This is summarised in the conceptual framework that will be used for building scenarios for DE futures in the following chapter.

3.5 Conclusion

This chapter has argued that there are structural changes taking place in the tertiary DE market. The volatile nature of emerging distance education practice, combined with the uncertainties of potential pedagogical innovation as a result of digital knowledge granules and prospective opportunities associated with mass-customisation of ODL delivery systems may well change the course of DE evolution in fundamental ways. When faced with structural changes, managers are faced with difficult strategic decisions regarding whether to improve the efficiency of existing systems or to embark on an unknown course of more radical transformation. In this regard, Drucker's foresight deserves careful consideration by the university community at large:

> *Whoever exploits structural trends is almost certain to succeed. It is hard, however, to fight them in the short run and almost hopeless in the long run. When such a structural trend peters out or when it reverses itself (which is fairly rare), those who continue as before face extinction and those who change fast face opportunity.* (Drucker 1995: 41-42)

However, when considering the established traditions of the academy, "taking advantage" of structural changes should not be taken lightly, particularly with regard to preserving the core values of the university for the benefits of society at large. Yet the university cannot ignore the impact of these structural changes, and it is the responsibility of the university to tackle these strategic futures with a well founded and systematically sound approach. Scenario planning is ideally suited for this task and the university context, because it is capable of dealing with multiple and complex futures. Moreover scenario planning's prerequisite requirement for plausibility necessitates that strategies are measured against probable futures that are well-founded, thus accommodating the reflective scepticism associated with the academy. The following chapter will build scenario alternatives for the future of university-level DE drawing on the extensive analysis of various factors discussed in the first three chapters of the thesis.

Chapter 4

Plotting scenarios on the implementation of DE technologies at a traditional research university in New Zealand

4.1 Introduction

Three scenarios for DE futures will be plotted in this chapter. They will focus on the organisational alternatives associated with the implementation of DE technologies at a typical research-led university in New Zealand. At the onset of this scenario generation process, it must be emphasised that scenarios do not attempt to predict definitive futures, rather their critical purpose "is to challenge, test and, if necessary change decision-makers' assumptions about their present and future business environment" (Wilson 1998: 81). Scenario planning is particularly appropriate when attempting to address complex and uncertain challenges associated with the emergence of disruptive technologies (Shoemaker & Mavaddat 2000), such as the potential impact of digital ICTs on DE futures at traditional campus-based universities. Wilson (1998: 91) points out that good scenarios must meet the following criteria:

- *Plausibility,* that is, they must fall within the realms of what conceivably could happen;
- *Differentiation,* referring to the requirement that each scenario must be structurally different so that they are not simply variations of the same structural foundations;
- *Consistency,* meaning that scenarios must be internally consistent and not contain rationales that are inconsistent with the main tenets of the respective storyline;
- *Decision making utility,* to ensure that they can be used productively in determining strategies for the future;
- *Challenging,* in that they confront existing organisation wisdom about the future.

In addition this thesis contends that scenarios must clarify the tradeoffs between and within scenarios. This refers to the issues that are prioritised within individual scenarios and the respective opportunity costs of foregone choices.

With particular reference to meeting the requirement of plausibility, the scenarios are developed from the context of a research-led teaching university in New Zealand. This will facilitate comparative analysis of the core decisions facing universities with regards to the factors that must be taken into account when thinking about organisational structures and corresponding processes to support the implementation of digital ICTs at campus-based institutions. The value of this research lies in demonstrating the technique of scenario planning as one of the strategic planning tools universities can use to inform decisions about the future.

An analysis of the structural architecture used to build the scenarios reveals three hierarchical subsystems:

- the *macro system* consisting of the global drivers of change, basic trends, rules of interaction and the scenario uncertainty matrixes, analysed in the preceding chapters of the thesis (a synthesis detailing the interaction among these variables is provided in Appendix 1);
- the *meso system* covering New Zealand's tertiary education sector, within which the individual scenarios interact;
- the *micro system* where the dynamics of the individual scenarios associated with a research-led university in New Zealand play out in the storylines.

This chapter commences with an analytical overview of the tertiary education system in New Zealand and the operational context of a typical research-led university. A scenario blueprint, taking into account the assumptions underpinning the scenarios is presented before detailing the individual storylines of the three scenarios. The chapter concludes with reflections on the original research questions proposed in Chapter 1 based on the outcomes of the individual scenarios.

4.2 The New Zealand tertiary education system

The New Zealand tertiary education system is small, complex and highly competitive. It has achieved a surprisingly wide diversity of provision for a system of its size, serving a national population of only four million people. It is a complex arrangement of colleges, polytechnics, institutes of technology, universities, wānanga and private training establishments (PTEs). Since 1990, the New Zealand government has adopted a strategy focused on increasing access to tertiary education, and in recent years is now placing greater emphasis on the quality of the system. New Zealand compares favourably with OECD indicators of tertiary educational attainment. For example, in 2003, 40 percent of the population aged between twenty five and twenty six years in New Zealand had achieved a tertiary qualification compared with the OECD average of 27 percent (MOE 2004a: 18).

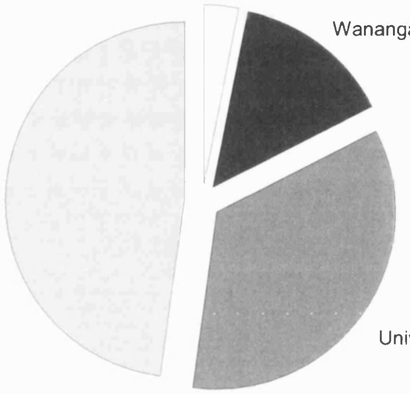
The tertiary education system comprises (see NZQA 2006: online):

- Eight universities
- Twenty polytechnics or institutes of technology
- Three colleges of education
- Wānanga (Māori centres of tertiary learning). There are three state funded Wānanga with Te Wānanga o Aotearoa being the largest tertiary education provider in New Zealand.

- Approximately eight hundred and sixty PTEs which are privately owned and funded, although some courses receive government funding.

Figure 4.1 shows the composition of the state funded, tertiary education institutions in New Zealand.

Figure 4.1 2004 Enrolment according to type of institution



Source: Ministry of Education 2004

Prior to 1990, the boundaries between individual public institutions were clearly defined and regulated, with the system differentiating between only three institutional types: universities, polytechnics and colleges of education. Historically these institutions had relatively low levels of autonomy. However, the passage of the Education Amendment Act in 1990, significantly changed the tertiary education landscape. The Education Amendment Act 1990 "set in place a number of far-reaching reforms to the structure, funding, governance and management of tertiary education" (Codling & Meek 2003: 85). In particular, the following changes are relevant to this review of the New Zealand tertiary education system:

- the addition of wānanga to the institutional types defined in the Act;
- devolution of autonomy and increased accountability at the institutional level through a system of institutional charters, where for the first time polytechnics had genuine control over their strategic directions;
- dramatic transformation of the polytechnic sector whereby they could offer degrees, with the corresponding power to diversify and compete for students with universities in a market-driven education sector.
- for the first time, legally defining the characteristics of a university to include all of the following:
    - primary focus on advanced learning to develop intellectual independence;
    - a requirement that the majority of teaching is done by people actively engaged in research thus establishing the link between teaching and research;
    - a requirement to meet international standards of research and teaching;
    - being a repository of knowledge and expertise;
    - accepting the role of critic and conscience of society; and
    - engaging in a wide diversity of teaching and research at a high level.

In the case of the other tertiary institutions defined in the Act, the freedom to incorporate one or more of the first five characteristics listed above.

- the introduction of "bulk funding" based on the number of equivalent full-time students (EFTS) combined with the ability for institutions to levy student fees as a contribution to the cost of their own education. A national student loan scheme was established to compensate for increased costs.

Consequently, the trade-offs between research and teaching with regard to the implementation of technology on campus must be explored in the scenarios as these are legislated activities of universities in New Zealand.

The principles underpinning the Education Amendment Act 1990 originated from the market driven reforms of the Labour Governments of the late 1980s, and were subsequently embraced by the National Governments of the 1990s. Utilising the mechanisms of increased diversity through a market-driven education system, the strategic objectives associated with the massification of higher education in New Zealand have been achieved. This is validated by an increase of 85 percent in the gross enrolment ratio for tertiary education from 40 percent in 1990 to 74 percent in 2002 (UNESCO 2005). Te Wānanga o Aotearoa is now New Zealand's largest institution with 66 729 students in 2004. This compares with 34 246 students enrolled at the University of Auckland (New Zealand's largest university) and 56 140 students at the Open Polytechnic of New Zealand, a single mode distance education provider.

Notwithstanding the significant achievements associated with increased access and diversity of provision for a system of its size, New Zealand's tertiary education strategy is faced with a number of challenges:

- Shifting the emphasis of the tertiary education strategy from massification to quality of provision. New Zealand's tertiary education strategy 2002 – 2007 (MOE 2002) is primarily focused on strengthening the capability and quality of the tertiary education system. The strategy aims to increase relevance, connectedness and quality of the tertiary education system. For example, the strategy seeks greater alignment with national goals; stronger linkages with business and other stakeholders; effective partnerships with Maori communities, stronger collaboration in the sector, and a future oriented approach to become more responsive to the needs of learners (MOE 2002). At a practical level the following changes have occurred:
  - Compulsory submission of new institutional charters and profiles to steer the sector;
  - The institution of New Zealand's first Performance Based Research Fund (PBRF) assessment in 2003, which will progressively replace components of the EFTs funding system using objective measures of research performance;
  - In 2004, cabinet agreed to the introduction of the Student Component Performance Measure which will make a small component (currently specified to a maximum of 5 percent) of student funding contingent on indicators of learner outcomes. This will be based on a composite of successful course completion rates, retention rates and surveys of learner satisfaction.
  - Plans to set up a National Centre for Tertiary Teaching Excellence funded through the Tertiary Education Commission.
- Managing the spiralling costs of education provision. The Education Amendment Act 1990, enabled institutions to levy student fees as a contribution to the cost of their own education. The national student load scheme was introduced in 1992, to reduce financial barriers to study. The scheme entitles students to defer repayments until they have completed their studies with the added flexibility of an income-contingent repayment schedule and favourable interest provisions. After twelve year's operation, the national student loan debt had reached seven billion dollars (TVNZ 2004) and is a growing national concern. Many young graduates are relocating offshore in order to pay back student debt by earning foreign currency. A recent study of junior doctors in

New Zealand revealed that the average debt on graduation was $65 206 and that the majority of junior doctors have considered leaving the country as a result of student loan debt (Moore, Gale, Dew & Simmers 2006). Already in 2000 government had introduced measures to contain increases in tuition fees with the introduction of an annual "Fee Freeze" negotiation between state and providers (MOE 2005). This system has been replaced by a Fee Maxima system whereby government sets the maximum limits on tuition fees and course costs that students can be charged (TEC: Undated). In practice this amounts to containing increases in tuition fees very much in line with the national inflation rate.

- Improving collaboration and efficiency gains in the system. The autonomy of individual institutions, combined with a student funding system that is primarily based on student numbers has resulted in a highly competitive environment with little incentive for institutions to collaborate and build efficiencies through shared infrastructure.

There are early signs that suggest changes in the enrolment trends New Zealand has experienced over the last few years. In 2004, for example, there was a decrease of 0.9 percent in the number of domestic students studying at bachelors level, compared with 2003 (MOE 2004a:17). This is the first recorded decrease in the number of domestic students studying at this level in recent years. Increases in the enrolment of first-time domestic students in the preceding period, were the result of population demographics rather than a greater proportion of the age cohort participating in tertiary education. Long term demographic projections indicate that the number of children under 14 years of age is expected to decline from 890,000 in 2004 to 820,000 in 2021 and to 790,000 by 2051 (Statistics New Zealand 2005). Similarly the fifteen to thirty nine age group will remain relatively constant for the next forty five years without significant increases.

4.2.1 The New Zealand research universities

The scenarios will be developed from the perspective of a typical research-led university in New Zealand. Given the highly competitive nature of the university sector in New Zealand and the corresponding need for confidentiality of strategic planning data, it is not appropriate to develop the scenarios for a single university. Furthermore, working with aggregated data for the entire university sector in New Zealand would result in a distorted analysis, given the high levels of differentiation in the sector. Massey University, for example, has a large cohort of extramural students as New Zealand's traditional distance education provider. Consequently, Massey University has a distinctive cost structure and processes that would not be representative of a typical campus-based research university. On the other hand, for instance, Auckland University of Technology (previously Auckland Institute of Technology) has a strong vocational education focus and has not had the time to invest in the research infrastructure since its transition to a university when compared to the older institutions. Therefore an objective selection mechanism is required to identify a representative sample of the research intensive universities for data analysis in preparation for the scenario building process.

The 2003 Performance-Based Research Fund (PBRF) assessment conducted under the auspices of the Tertiary Education Commission, provides a reliable empirical base for identifying the top research universities in New Zealand. The PBRF assessment was a rigorous and objective analysis of the quality of research output of the New Zealand university sector. Using the full-time equivalent weighted scores for research quality, the top four universities in the PBRF assessment (TEC 2004: 11) will be selected for further analysis in preparation for the scenarios. In rank order, the selected universities for building the baseline scenario will include the:

- University of Auckland (Auckland, North Island);
- University of Canterbury (Christchurch, South Island);
- Victoria University of Wellington (Wellington, North Island); and
- University of Otago (Dunedin, South Island).

In addition to the PBRF assessment, these institutions are also characterised by their age, relative size, proximity to major cities, and high proportion of full-time students (Codling & Meek 2003: 89).

This sample of research universities have been growing steadily at a rate of approximately 4.8 percent per annum over the last five years compared with an average growth of 13.2 percent for the tertiary sector for the same period of review (see Table 4.1). However, the growth in international student EFTs shows a very different picture (see Table 4.2). Since 2000, international EFTs have increased by 248 percent, compared with only 21 percent in total EFTs for the universities under consideration. Also, over the last five years the proportion of international students to total EFTs has increased from 5.49 percent to 15.79 percent (in other words an increase of 187 percent of this ratio over only 5 years). The significance of the increase in international students becomes evident when analysing the income structure of these universities. International students are full fee paying students, and while their numbers are relatively small by comparison to domestic students, the corresponding income stream is material (see Table 4.3).

Table 4.1 Total Equivalent Full-time Students (EFTS)

	2000	2001	2002	2003	2004
University of Auckland	22 932	24 338	25 979	27 205	28 158[1]
University of Otago	15 040	15 343	15 736	16 632	17 448
Victoria University of Wellington	11 608	12 392	13 162	14 286	15 129
University of Canterbury	11 204	11 254	11 519	12 388	12 731
Total EFTS	60 784	63 327	66 396	70 511	73 466
Increase		4.18%	4.85%	6.20%	4.19%

1. To facilitate comparison, students from the Auckland College of Education that recently amalgamated with the Univertsity of Auckland are not included.

Sources : University of Auckland Annual Report 2004 & 2002
University of Otago Annual Report 2004 & 2002
Victoria University of Wellington Annual Report 2004 & 2002
University of Canterbury Annual Report 2004 & 2002

Table 4.2 Total International Equivalent Full-time Students (EFTS)

	2000	2001	2002	2003	2004
University of Auckland	1 328	2 039	3 066	4 084	4 603
University of Otago	810	895	1 027	1 450	1 983
Victoria University of Wellington	620	1 059	1 448	1 914	2 525
University of Canterbury	578	883	1 238	2 094	2 490
Total International EFTS	3 336	4 876	6 779	9 542	11 601
Increase		46.16%	39.03%	40.76%	21.58%
Percentage of total EFTS	5.49%	7.70%	10.21%	13.53%	15.79%

Sources : University of Auckland Annual Report 2004 & 2002
University of Otago Annual Report 2004 & 2002
Victoria University of Wellington Annual Report 2004 & 2002
University of Canterbury Annual Report 2004 & 2002

Approximately 59 percent of operating income of the research universities is generated from sources other than government tuition subsidy. There is an increasing reliance on externally generated research revenue and international full-fee paying students at research universities in New Zealand. In some instances the proportion of international full fee paying students is nearing the ratio of domestic tuition fees (see Table 4.3).

Table 4.3 Relative composition of the major categories of operating income for 2004

	Average income composition	University of Auckland	University of Otago	Victoria University of Wellington	University of Canterbury
Government grants	41%	36%	40%	42%	44%
Tuition fees	28%	27%	24%	35%	33%
Domestic tuition fees	18%	---[1]	16%	19%	18%
International tuition fees	13%	---[1]	8%	16%	15%
External research, consulting and commercial income	19%	23%	26%	21%	6%
Total	88%	86%	90%	98%	83%

1. Income division between domestic and international students are not disclosed in the annual report.

Sources : University of Auckland Annual Report 2004
University of Otago Annual Report 2004
Victoria University of Wellington Annual Report 2004
University of Canterbury Annual Report 2004

As mentioned earlier, the New Zealand funding system for tertiary education is being restructured in accordance with Governments' strategic priorities to improve quality of the system. The PBRF is progressively replacing the research "top up" component of the EFTS system (TEC: Undated, Online). The funding allocation to the PBRF will be increased by \$75.5 million over four years bringing this component of funding up to \$193.7 million in 2008/09 fiscal year (Mallard 2005). The PBRF model has three elements:

- 60 percent of the fund will be allocated on the basis of rewarding and encouraging the quality of researchers at the resective institutions;
- 25 percent of the fund based on research degree completions;
- 15 percent of the fund to reflect external research income.

As in the case of most educational institutions, staffing costs constitute the largest expense category. The composition of the cost structures for the individual research-intensive universities used in this sample are similar across the board, with an average people to operating cost ratio of 3:1.

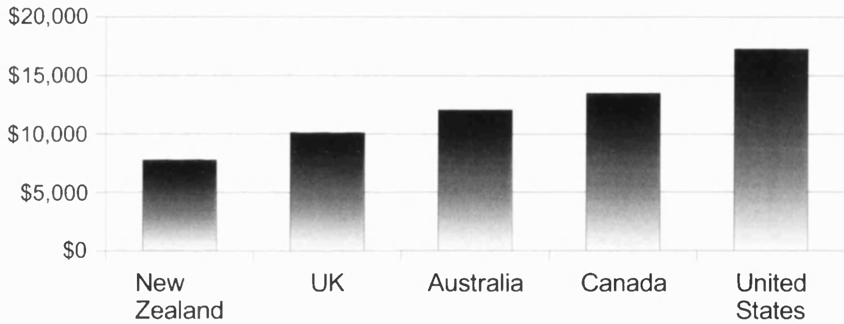
When comparing the resourcing of New Zealand universities internationally, it is interesting to note that funding on a per capita basis "continues to trail those countries with which they seek to compete on the international stage" (NZVCC 2004: 10). While domestic student fees in New Zealand are not expensive by international standards, academic salaries are lower than developed Commonwealth countries. Notwithstanding the fact that international comparisons are difficult, the New Zealand Vice-Chancellor's Committee have prepared an international comparison using current expenditure on a purchasing power parity basis (NZVCC 2004: 10). This comparison reveals that the resourcing of New Zealand universities is considerably lower than other Commonwealth countries.

Table 4.4 Relative composition of expenditure for 2004

	Average income composition	University of Auckland	University of Otago	Victoria University of Wellington	University of Canterbury
People costs	59%	56%	60%	60%	60%
Operating expenses	30%	34%	31%	28%	29%
Total	89%	90%	91%	88%	89%

Sources : University of Auckland Annual Report 2004
University of Otago Annual Report 2004
Victoria University of Wellington Annual Report 2004
University of Canterbury Annual Report 2004

Figure 4.2 Public investment for tuition per public student in New Zealand dollars



Adapted from NZVCC 2004

In the New Zealand context, the competitiveness among the research universities to recruit and attract the best intellectual talent should not be underestimated. Consider for example, the geographical composition of the student base at the University of Otago. In 2004, the number of students coming to Otago from the North Island grew to a record of 36.7 percent of the Otago role (University of Otago 2004: 20). The significance of this trend becomes more apparent, when domestic first-year students are considered. In 2004, 46.5 percent of New Zealand first year students at Otago came from the North Island (University of Otago 2004: 20). Taking into account the relatively small population in New Zealand, combined with long term demographic predications of the relevant age cohort showing a decline over the next 25 years, the intensity of the competition among the research universities is likely to increase.

The proportion of first year, domestic students expressed as a percentage of the total student roll has increased over recent years, reflecting the population demographics rather than an increase in the participation levels in tertiary education. However, in 2004 there was a decline in the number of first-year domestic students — the first decline in the last decade. Of particular interest is the relative success that the research-intensive universities have had in increasing the proportion of first-year students when compared to the New Zealand university sector as a whole (see Figure 4.3). Of particular concern is the negative trend in the proportion of postgraduate students in the composition of the student population in the tertiary sector. Increasing postgraduate enrolments is a strategic priority for the research-intensive universities.

Figure 4.3 Proportion of domestic first year students in the tertiary sector

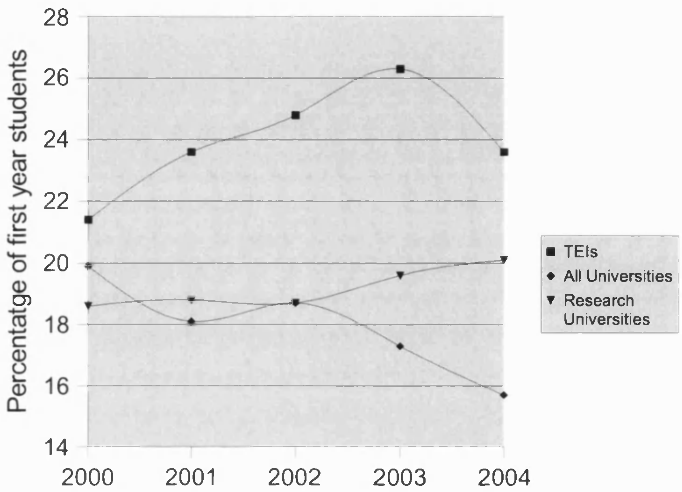
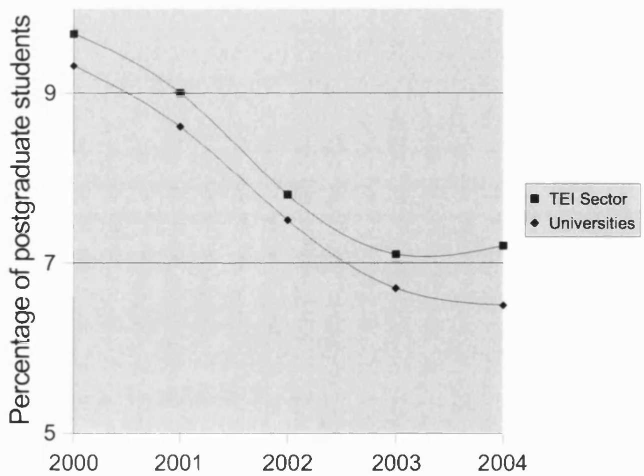


Figure 4.4 Proportion of postgraduate students in the tertiary sector



4.2.2 Export education in the New Zealand university sector

International education is New Zealand's fourth largest export industry (Marsh 2005). It earns 2.1 billion New Zealand dollars in foreign exchange (Education New Zealand 2005a). The proportional earnings from the university sector represent the largest component of this market at approximately 40 percent followed by the English language sector at 18 percent, with the remainder spread across secondary education and the polytechnic sector (Education New Zealand 2005a). Stevens quantifies the exponential growth of the sector: "In the eight years that the analysis has been undertaken, the value of international education to New Zealand has gone up nearly 500%. It has tripled since the new millennium" (cited in Education New Zealand 2005a).

The importance of export education to the New Zealand university sector is illustrated by a recent High Court injunction sought by New Zealand universities to prevent an international comparison being published by the Tertiary Education Commission in the PBRF report of 2004. The major contention of New Zealand universities was that the proposed appendix providing an international comparison of research output, would not constitute a fair and valid basis for comparison, particularly when considering the lower levels of government resourcing of New Zealand universities (see Figure 4.2). The Vice-chancellor of the University of Auckland at the time articulated the sectors' concerns as follows: "The sole purpose of our action is to prevent an invalid comparison being released that would do irreparable harm to New Zealand's image as an education destination for growing numbers of international students" (Hood 2004). The High Court injunction was successful, and the international comparison appendix was not published.

Notwithstanding the recent successes of export education in New Zealand's university sector, it is a high risk market that is both volatile and highly competitive. Material uncertainties in this market sector include factors like immigration policy, the New Zealand dollar exchange rate, international competition and global perception of the quality of the New Zealand higher education system. The international competition in export education is intensifying as illustrated by the following factors (MOE 2001):

- Many countries have embarked on strategies to support their export education initiatives. For example, Australia has invested $21 million in marketing education internationally and the United States of America has introduced of a range of packages to increase its proportion of international students;
- More than half of the estimated 2 million students studying abroad are subsidised through scholarships, placements, multilateral and bilateral agreements, whereas the New Zealand research universities are becoming increasingly reliant on full fee paying international students.
- Rapidly changing dynamics between the roles of host countries and supplier countries of international students. Countries that were traditionally major "suppliers" of international students are now also building their own market share of international students. Malaysia was traditionally a significant supplier of international students for Australia and New Zealand, however in 1999 the number of international students studying in Malaysia had increased to ten percent of the national student roll. Singapore, was previously a supplier of international students, and has now become an Asian hub for importing postgraduate international students.

Education New Zealand stress that "[a] responsive student immigration policy is the single most important key to restoring and building our international education business in the face of white hot competition and an increasingly discerning market" (Stevens cited in Education New Zealand 2006). The United States of America, has recently spearheaded a number of policy initiatives to assist the flow of international students to their country, while New Zealand is currently experiencing a downturn in international student numbers after eight years of continued growth (Education New Zealand 2006).

Published statistics on recent trends are not readily available given the time lag necessary for the Ministry to quantify EFTs figures at a national level. However the following figures released by Education New Zealand in December 2005, do provide evidence of the turnaround in the growth of international students studying in New Zealand.

Table 4.5 Cumulative numbers of foreign fee paying students (Jan 05 till August 05)

	2005	2004	Change
University	26 080	26 665	-2%
Polytechnic	10 755	11 027	-2%
PTE[1]	6445	6174	4%
English Language Schools[1]	24 628	34 005	-28%
Secondary Education	9 958	12 573	-21%
Total	77 866	90 444	-14%

Adapted from Education New Zealand (2005b)

1. In this dataset 'PTE' is an institution that has both domestic and international students, whereas the English Language Schools are providers that only have international students.
2. This dataset is based on a student headcount, as EFTS figures were not available at the time of publication.

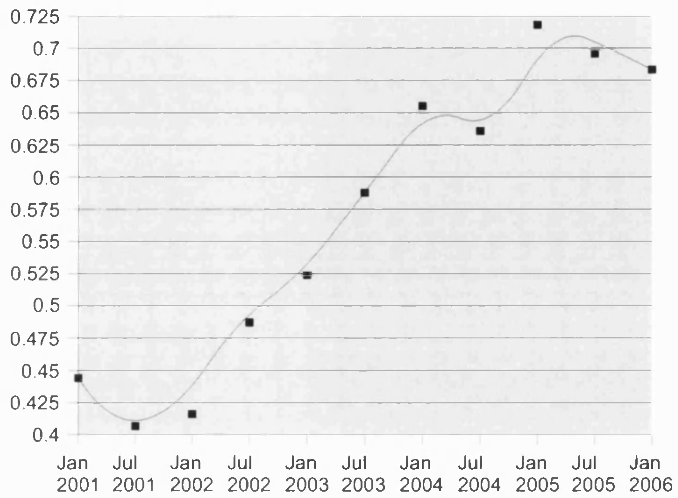
New Zealand's immigration requirements for foreign students studying in New Zealand, are more restrictive and onerous than those compared with Australia and more recently the announcement by the United States of America to assist the flow of international students (Education New Zealand 2004). Since 2001, the strengthening of the New Zealand dollar in relative terms to the American dollar has had a negative impact on the competitiveness of New Zealand's education product (see Figure 4.3).

While a devaluation of the New Zealand dollar in the short term is certainly plausible, the long term forecasts remain uncertain. What is clear, however, is the impact of the exchange rate on the competitiveness of export education for New Zealand. The turnaround in international student numbers corresponds with the peaking of the New Zealand dollar exchange rate.

A comparison of international student fees from Australia, Canada, New Zealand and the United Kingdom is useful, given that they have similar education systems and have reported the highest number of international students (Al-Rustom & Smith 2004: 10):

- The United Kingdom has the highest tuition fees. These range from an average of US$12,000 to US$16,000.
- Canada has the cheapest tuition fees ranging between an average of US$6 000 to US$14,000.
- Australia and New Zealand fees are similar falling between Canada and the United Kingdom. On average these range between US$8,000 and US$12,000.

Figure 4.3 New Zealand – US Dollar exchange rate



Source: http://www.oanda.com using the interbank rate

Consequently, improvements in the international competitiveness of New Zealand for international students would suggest the need to lower the costs of tuition.

In concluding this brief analysis of export education, the following categories will be used to distinguish between the forms of international education provision when building the scenarios:

- *Consumption abroad,* where the student moves to the country of the supplier for the duration of study. This is by far the major component of export education in New Zealand (MOE 2001: 11);
- *Offshore education,* which includes cross-border supply using distance education methods. This is not a major modality of delivery for the New Zealand research universities.
- *Physical presence* where the provider sets up a physical presence in the foreign country, for example an offshore campus, international alliance or where educators move to provide services where the students reside. This is not a major activity of the New Zealand research universities.

An analysis of the consumption abroad category, reveals that the financial impact of international students studying in New Zealand on the operational income of the research universities is material. Using the figures published for the 2004 financial year, 59 percent of the total operating income for the research university sample was generated from domestic students compared with 13 percent of the operational income being generated from international full-fee paying students. The income gearing ratio for international students is very high with every international student equating to the equivalent income of 1.2 domestic students using the operational income of the research-intensive universities in 2004 as the calculation base. In other words, a 10 percent decline in international students is the equivalent of a 22 percent reduction of the operating income for domestic students in 2004. New Zealand universities have the autonomy to determine the fee structure for international students, whereas fee increases for domestic students are regulated under the Fee Maxima legislation. However, international student fees are subject to free market principles in terms of international supply and demand.

Time-series analysis of New Zealand's offshore education using distance methods is not regularly published by the Ministry. However, a snapshot inventory for the 2001 calendar year was published (MOE 2006) estimated that there were 2200 offshore students in 63 programmes being delivered from New Zealand tertiary institutions. This constitutes approximately ten percent of the international student body in New Zealand, compared with thirty eight and thirty two percent for the United Kingdom and Australia respectively. While the absolute numbers are relatively low, they have grown exponentially since 1997 by 479 percent (MOE 2006).

4.2.3 A favourable policy environment for e-learning

New Zealand is positioning itself strategically to become a significant player in the global knowledge economy. There are a numerous strategic initiatives and policy interventions at the national level that are primarily aimed at facilitating the establishment of a knowledge society in New Zealand. With particular reference to the tertiary education sector, there are a number of interventions which collectively provide a favourable policy environment for the implementation of digital technologies in higher education.

The concept of e-learning is used here to refer to the provision of learning where digital technologies play and import role in the delivery, support, administration and assessment of learning (Jochems, Van Merriënboer & Koper 2004: 5). The concept of e-learning is not necessarily synonymous with distance education, as technology can be used to enhance or support face-to-face forms of provision. However, the delivery of online courses using the Internet would qualify as an example of distance education. Examples of policy related initiatives that provide fertile ground for leading e-learning futures in New Zealand are highlighted below:

- Government established the E-learning Advisory Group in July 2001, culminating in a report published in March 2002, entitled: *Highways and Pathways. Exploring New Zealand's e-learning opportunities (*ELAG 2002). A key recommendation of this report was the establishment of a Collaborative Development Fund for providers to develop their e-learning capability;
- The establishment of the e-Learning Collaborative Development Fund (eCDF) in 2003. The eCDF allocated $28 million over four years from 1 July 2003 to 30 June 2007. The fund is designed to enhance the system's capability through collaborative and strategic implementation of e-learning in tertiary education organisations.
- The establishment of the Innovation and Development Fund (IDF) in 2003. Currently $10 million is allocated annually to projects that foster new and innovative ideas to improve the operation of the tertiary education sector in alignment with the Tertiary Education Strategy and national goals.
- The institution of the Tertiary e-Learning Research Fund by the Ministry of Education. While in absolute monetary terms, this is not a large fund, its focus is forward-looking and is aimed at producing the conceptual building blocks required for a sector wide scenario planning exercise on e-learning futures in New Zealand (MOE: Undated, online).
- The development of an *Interim Tertiary e-Learning Framework* by the Ministry of Education (MOE 2004b). This is a stepping stone for developing a pan-sector e-learning strategy for New Zealand that will encompass the schools, early childhood and tertiary sectors. The framework outlines a vision, principles and action areas for e-learning in the New Zealand tertiary sector.
- The recent development of a New Zealand pan-sector Digital Strategy, corresponding with an increased funding allocation of $60 million through government's Growth and Innovation Framework to deliver specifically on strategic priorities. In monetary terms total government spending on digital strategy initiatives will total $400 million over the next five years (Cunliffe 2005). New Zealand's Digital Strategy is founded on three cornerstones:

- improving access to *content* that will enhance the lives of all New Zealanders;
- ensuring the national development of the skills to use ICTs with *confidence;* and
- *connectivity*, targeting ubiquitous access to and use of ICTs for all New Zealanders.

The examples listed above are all Government initiated projects, demonstrating a high-level strategic commitment to e-learning at the policy level. On their own, these initiatives do not signify a global leadership position. Other Governments have also made significant progress in this area, for example policy development work for e-learning in the United Kingdom. The differentiating feature for New Zealand becomes evident when this favourable policy environment for e-learning is considered in the context of: New Zealand's disposition for innovation; the ability to respond quickly to changing demographics because of its relatively small population; the high levels of dialogue between Government and the education sector; and a strong New Zealand identity. These factors are not easily replicated in larger industrial economies like Canada, the United Kingdom, or the United States.

4.2.4 The implementation of e-learning at New Zealand tertiary education institutions

Determining the magnitude, nature and extent of the online presence of courses and programmes at tertiary education institutions in New Zealand is a challenging task. First, there is a wide range of possibilities concerning how e-learning is implemented on campus, ranging from the provision of course administration details on the Web to full online delivery of a course. Second, there are very few studies that have attempted to quantify the adoption rates of e-learning on campus at New Zealand institutions. The Ministry of Education do request information on e-learning provision in their data returns, but this is unreliable given the classification difficulties associated with different ways in which technology is used to support teaching and learning. Nonetheless, drawing on international data and a few local studies, it is possible to generate a composite picture of the levels of e-learning implementation in New Zealand.

Technology is used in different ways to support teaching and learning on campus. The Weatherstation Project attempted to measure how e-learning has been adopted at twelve observation posts including six college campuses and six for-profit corporations over the period from 2001 to 2004 in the United States of America (Zemsky and Massy 2004: 19). This research project has identified four distinctive e-learning adoption cycles, each at a different stage of innovation within the higher education sector. With reference to Figure 4.4 below, Zemsky and Massy (2004: 10) have identified the following adoption cycles:

- Technology-enhanced face-to-face teaching which shows the highest uptake in the study. For example, e-mail, the Internet and off-the-shelf slideshow software (for example, Microsoft PowerPoint) to enhance classroom presentations.
- Adoption of learning management systems (LMSs), to support administrative tasks like grading, providing access to course resources and facilitating course based interaction. Zemsky and Massy estimate that this phase is moving rapidly towards the early majority of teachers using these systems.
- Importing learning objects into courses, although very few institutions are experimenting with learning content management systems at the enterprise level. However, online organisations are springing up to host and support the distribution of learning objects.

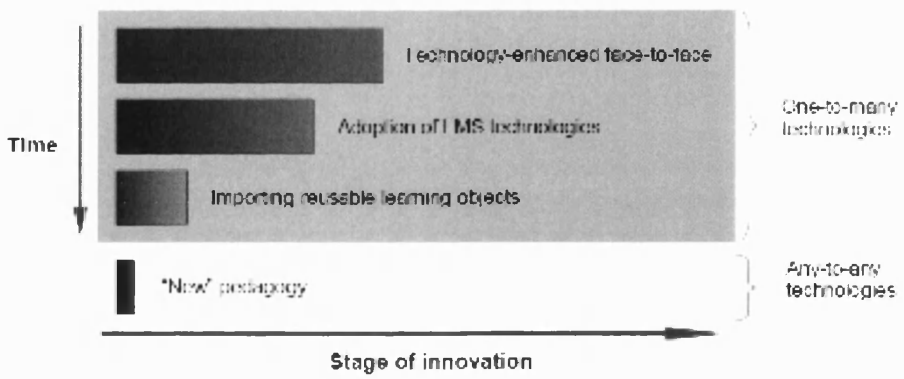
- Implementing "new" pedagogy, a concept used to differentiate new configurations of the teaching and learning processes where professors and learners adopt new roles taking full advantage of the new technologies and facilitating interaction in novel ways.

Figure 4.4 provides a snapshot of the adoption levels of the different categories over time. The first three categories rely on technologies where resources are delivered to many students from a single database and are classified as one-to-many technologies. However, the "new" pedagogy is emerging from socially driven peer-to-peer technologies which are one-to-one group communication and collaboration tools like instant messaging, file sharing and collaborative authoring projects using wiki technology like Wikipedia (Halm, Oliver, Farooq & Hoadley 2005: 203).

Zemsky and Massy's (2004) work is significant because it provides a research base establishing:

- the existence of different adoption cycles that are occurring in parallel with each other;
- the link between S-curve analysis and innovation in e-learning that was hypothesised in Chapter 3 (see Figure 3.5)
- different ways in which technology is implemented on campus, which do not necessarily qualify as distance education as described in Chapter 2, thus establishing that the implementation of technology informed by distance education processes is a distinct scenario alternative.

Figure 4.4 e-Learning adoption cycles in higher education



Adapted from Zemsky and Massy (2004 :11)

The adoption of different categories of e-learning implementation is corroborated by a recent OECD (2005) research study examining current practices. The following typology was used to assess the adoption levels of e-learning in this study (OECD 2005: 36):

- None or trivial online presence;
- Web supplemented where course outlines, lecture notes are made available with the use of email;
- Web dependent, where students are required to use the Internet for a component of their studies, for example online discussion forums or assessment without significant reduction in classroom teaching time;

- Mixed mode, where students are required to participate in online activities as part of their course work which replace part of the face-to-face teaching. However, campus attendance remains.
- Fully online.

Only the fully online and aspects of the mixed mode categories above would qualify in meeting the distinctive requirements of distance education described in Chapter 2. Taking into account the difficulties of quantifying the levels of activity in each of these categories, the following findings of the OECD study are relevant:

- All institutions participating in the study referred to plans to increase online delivery (OECD 2005: 36);
- With regards to fully online programmes, only two sample institutions had the majority of their provision in this mode, with the remainder reporting approximately ten percent of courses delivered fully online (OECD 2005: 38);
- Mixed mode delivery was somewhat higher at approximately 15 percent of courses for the majority of institutions (OECD 2005: 38).
- Using a weighted average composite for "online presence" the OECD (2005: 40) reports an average increase of 70 percent in the levels of e-learning activity since the Observatory baseline review conducted in 2000/01. (This calculation excludes the Virtual University of Tec de Monterray because of classification difficulties associated with their satellite delivery model as well as the Open University of Catalunya which has a distinctive online delivery model.)

The top six rationales that institutions report as the reasons for the adoption of e-learning on campus, in rank order are (OECD 2005: 88):

1. Enhancing on-campus delivery using technology;
2. Increasing flexibility of delivery alternatives for students;
3. Keeping up with the competition;
4. Widening access of provision;
5. Distance learning strategies;
6. Building new international markets.

The levels of adoption in New Zealand would appear to be similar to the international context.

The Institutes of Technology and Polytechnics of New Zealand (ITPNZ) commissioned the New Zealand Council for Educational Research (NZCER) to prepare a briefing paper on the critical success factors for e-learning, which contains estimates of the national utilisation of e-learning in the sector. Using data from the Ministry of education returns, the following summary is provided (Choat 2006 : 11; NZCER 2004):

- 49 Percent of New Zealand tertiary students have some level of web-based use in their courses;
- Courses which require web use for learning are mainly found in the university sector;
- Wānanga programmes do not have a significant web presence.

Each of the research-intensive universities selected for building the scenario context have implemented a learning management system, corresponding with the adoption of these systems elsewhere (see for example Zemsky and Massy 2004). These institutions either have approved e-learning strategies in place, or are in the processes of developing them. For example, the University of Auckland has a dedicated e-learning strategy, and the University of Otago is currently in the processes of developing such a strategy.

Zemsky and Massy (2004) have highlighted two significant challenges associated with the implementation of e-learning:

- *E-learning, on its own, is not a force that changes the way we teach.* Despite the potential of digital technologies to support and promote more constructivist processes of autonomous discovery learning, most academics still teach the way they were taught – that is transmitting the basic knowledge students need. Hence the proliferation of course management systems and PowerPoint packages that distribute content rather that teaching it. Zemsky and Massy suggest that : "e-Learning will become pervasive only when faculty change how they teach – not before" (2004: iii).
- *In e-learning we have not succeeded in connecting students meaningfully – that is, ways that promote and enhance their learning.* At most, learners experience e-learning as a convenience – an organisational mechanism that enhances organisational efficiency but not necessarily pedagogical effectiveness.

These findings were echoed in a detailed analysis of e-learning capability of nine tertiary education institutions in New Zealand. Marshall reports that: "While all institutions are making use of learning management systems, many are not placing the use of these systems within a framework of strategy and guidance to teaching staff that will transform learning" (2004: 8).

In building the scenario context, it is worthwhile to compare organisational approaches to e-learning and the central teaching and learning support staff at the research intensive universities. Direct comparisons are difficult because information technology cuts across the institution and it is difficult to assess the levels of support at the faculty level. Nonetheless, there are a range of organisational approaches to supporting the implementation of technology at these universities, for example:

- Providing a centralised support facility focusing on e-learning projects, as in the case of the Centre for Flexible and Distance learning at the University of Auckland;
- Incorporating e-learning advisory staff, and LMS professional staff within the professional development unit as in the case of the Teaching Development Centre at the Victoria University of Wellington;
- Splitting responsibility for e-elearning support between the professional development and the information technology services unit, as in the case of the University of Canterbury and University of Otago.
- Two of the research intensive universities have dedicated multimedia design and development units as in the case of the University of Auckland and University of Otago.

The dominant approach in New Zealand is to link e-learning specialists with the teaching and learning or professional development support centres. Recent research conducted in New Zealand suggests that e-learning capability "is not conditional on the use of a centralised support facility" (Marshall 2005: 11). Devolved models can work well with strong policies and management oversight, but have the inherent risk of developing pockets of excellence where skills and experience are not transferred throughout the organisation. Conversely the centralised model may result in over reliance on a small number of skilled professionals without building capability across the organisation (Marshall 2005: 11).

A provisional comparison of centrally funded, professional teaching and learning support staff among the research intensive universities provides a realistic baseline for establishing the number of full-time equivalent staff that can be used as a point of departure in the individual scenarios. It is difficult to assess the specific allocations of human resources to e-learning activities, but these will be manipulated as variables within the individual scenarios. The comparisons in Table 4.6 should be read with caution when attempting to make deductions about the resource allocations for dedicated e-learning staff. The comparison is provided as a rough indicator of the institutional investment in professional teaching and learning support staff. The scenarios will therefore explore the impact of different organisational alternatives for deploying professional support staff with regards to the implementation of DE technologies on campus.

Table 4.6 Professional teaching and learning support staff

		Number of Staff	EFTS-based weighted average
University of Auckland	Centre for Flexible and distance learning and Centre for Professional Development	23	15.2
University of Canterbury	Centre for Teaching and Learning plus LMS professional advisors for IT services	10	14.89
Victoria University of Wellington	Teaching Development Centre (which includes professional LMS advisors)	11	14.4
University of Otago	Higher Education Development Centre (excluding multimedia production unit and support staff connected with student support centre activities)	12	12.1

Assumptions

- Technical information technology support staff and help desk staff are excluded
- Staff connected with student learning centre activities are excluded
- The staff connected with dedicated multimedia production units are excluded (for example, University of Auckland and University of Otago), on the assumption that the other institutions are subcontracting these services.
- The University of Auckland uses its a home grown LMS, and consequently the development team staff are excluded to facilitate comparison with institutions that use a third party proprietary system under license.
- These figures do not take into account the teaching and learning innovation grants from central funds at the respective institutions. The comparative investment in the teaching innovation grant at the University of Otago is significantly higher than the other universities, thus explaining the lower EFTs-based average of 12.1. In this model a component of central funding for e-learning is devolved to the faculty level, through reallocations of the innovation grants.

Therefore in New Zealand, a research-intensive university with 15 000 EFTs would typically have 15 full-time equivalent staff funded from central budget for teaching and learning support services. How these resources are allocated among e-learning specific interventions will be explored in the respective scenarios.

4.2.5 Synthesis of the scenario planning context for the New Zealand research universities

The challenges derived from the preceding trend analysis for the research-intensive universities in New Zealand are summarised as follows:

- Demographic projections and trends associated with first-year enrolments indicate that there will be little or no growth in enrolment numbers over the next ten years for the tertiary education sector, unless there are substantive changes in the gross enrolment ratio for tertiary education across all ages. To sustain growth, the research-intensive universities will need to:
  - Attract more first-year students when compared with their competitors;
  - Expand enrolments from outside their traditional geographical feeder areas.

- Maintain or expand the international student base thus turning around the early decline reported in December 2005 (Education New Zealand 2005b). Success in this area will be contingent on:
  - The exchange rate;
  - Competitive pricing in the international market;
  - Maintaining and enhancing the perception associated with the quality and international standing of a New Zealand university degree;
  - Immigration policy
  - Increased offshore delivery using distance and e-learning methods.
- Increase enrolments of postgraduate student numbers thus turning around the negative trend in the proportion of postgraduate students over the last five years. There may be reasons outside the control of the university sector, for example preferences of young professionals to seek alternative forms of education other than a traditional research degree.
- Diversify and increase operational income, largely through contract research opportunities. Other than international student fees, there is little scope for substantive increases in income from domestic student grants or student fees.
- Reduce operational costs where possible, especially through the smart implementation of technology;
- Focus on ways in which to enhance the quality of teaching as a mechanism to improve retention and completion rates;
- Explore ways to leverage opportunities from the favourable e-learning policy environment in New Zealand.
- To explore opportunities for strategic collaboration in the sector as a mechanism to share risks associated with innovation and to leverage potential cost savings through shared infrastructure.

Individual institutions would prioritise different aspects of these challenges in their strategic plans, and the interplay among the selected priorities would impact on how the institutions will perform over the medium to long term. The scenarios will explore different alternatives.

4.3 Scenario blueprint and key scenario assumptions

The generation of a scenario blueprint and clarification of the key assumptions underpinning the scenarios delineate the discussion in this section. The dynamic complexity of the myriad of factors and variables discussed in this thesis must be structured into a manageable set of scenario themes that will facilitate comparison among the scenarios.

Each scenario will be presented as a storyline that depicts how the organisation gets from the present to a future point envisaged by the relevant uncertainty matrix. The scenario themes provide the framework for generating the different scenarios and will be the same for each scenario. The detailed storyline of each scenario will be generated in accordance with predetermined scenario constructs taking into account the differentiated dynamics associated with the three uncertainty matrixes.

In this section, it is also necessary to introduce the main "character" of the scenario storylines. In essence, the main character defines the institutional perspective from which the scenario is developed. In each scenario, the main "character" and high-level scenario themes will remain constant, while the variables associated with interaction between the two uncertainties will differ in each of the three scenario storylines. In this way the complexity of the dynamic interaction among all the variables is more manageable, without seriously compromising the ability of dealing with dynamic variables.

The scenarios are developed for a typical research-intensive university in New Zealand. Given the highly competitive nature of the tertiary education system in New Zealand and legal requirements of confidentiality, the scenarios are based on aggregated data from published reports. The University of New Zealand – a fictitious name used in the scenarios – is based on the research data analysed in the previous sections. The blueprint for the University of New Zealand that will be used as the baseline for the development of the scenarios is characterised as follows:

- A research-intensive, campus-based university located within a large city in New Zealand. Sample data is based on published results from the University of Auckland, University of Canterbury, University of Otago and Victoria University of Wellington;
- Student enrolment of 15 000 EFTS starting in the year 2000 with a proportional composition of (see Table 4.2):
  - 15 percent international EFTS
  - 85 percent domestic EFTS
- Composition of operating income (see Table 4.3):
  - Government grant – 41 percent
  - Domestic tuition fees – 18 percent
  - International tuition fees – 13 percent
  - Contract research income – 19 percent;
- Postgraduate enrolment comprises 8 percent of the total number of students;
- One year of full-time study equates to 1 200 student learning hours (typically 3 600 learning hours for an undergraduate degree). A undergraduate semester course is based on 150 student learning hours or 12.5 percent of EFTS study load (University of Auckland 2006: Online);
- The existence of a centrally funded professional development centre with 15 full-time equivalent staff;
- The adoption of a centrally funded learning management system on campus;
- Virtually no DE delivery in year 2000;
- The individual scenarios will initially allocate between 5 or 6 full-time equivalent staff in different ways to the leadership and support of e-learning operations on campus from year 2000;
- The environmental planning context is derived from the summary provided in Section 4.2.5.

The blueprint must be read in conjunction with the mechanics of cost and pedagogic quality of implementing e-learning technologies on campus (see Section 4.3.2 below). Finally the set of assumptions that are necessary in order to continue with generating the individual scenario storylines are stated.

4.3.2 The Mechanics of cost and pedagogic quality associated with e-learning interventions

The scenario storylines should reflect the distillation of the prior research reported in in the thesis covering the drivers of change, predetermined factors, rules of interaction and selected uncertainties (see Appendix 1). In other words, what is left after all the details have been removed to “highlight key moving forces in the stories” (Flowers 2003: 30).

The scenarios in this chapter will focus on resource allocation decisions. This is an accepted application of scenario planning in practice (Millet 2003: 19-20). The scenarios will consider resource allocation alternatives associated with e-learning operations that are facilitated through a centrally funded teaching and learning service unit within a campus based university in New Zealand.

The selection of a campus-based institution does not negate the experience of the single-mode DE providers, but is selected because the campus-based model is a dominant form of university-level delivery in New Zealand. The detailed analysis of the large-scale single-mode DE institutions was necessary because they represent the most mature institutional model of technology-mediated learning systems. These institutions are an important model for understanding DE futures. The scenarios are based on a foundational understanding of this experience, but nonetheless will develop the storylines from the perspective of the more traditional campus-based university model.

Boroush and Thomas (1992), drawing on their experiences of using scenarios to strengthen organisational planning and strategic management capability within organisations, recommend a clear focus on the planning question to be illuminated and the subsequent critical-focus variables that the planning question under consideration should address. In this regard the planning question for the scenarios is:

> *How should a research-intensive university in New Zealand, organise professional services for e-learning within a centrally funded teaching and learning unit comprising 15 EFTs weighted full-time equivalent staff members?*

Clearly there will be management and administration services required within such a unit, but there are a number of alternatives regarding the composition of roles and services, for example: professional development workshops, teaching consultations, technical support activities for the LMS, dedicated instructional design services for online courses, or research on the scholarship of teaching. Therefore, in an constrained financial environment, this resourcing decision concerns a trade-off between the continuation of traditional professional development activities compared with alternative configurations to support newer e-learning operations.

This decision cannot be divorced from the research and teaching activities of the university, and a framework is necessary to explore these dynamics. The *access*, *cost* and *quality* triangle introduced in Section 1.3.5 of Chapter 1 is a conceptual framework that can be used as a basis for analysis in the Scenarios. Conceptually the implementation of DE technologies on campus could potentially reduce costs, increase income through a rise in EFTS by new distance students or increase quality as reflected in by improvements in completion and retention rates. The dynamic balance of this triangle can therefore be expressed in the form of the following equation (Rumble 2002: 5):

$$[\text{NEW INCOME} - \text{NEW COSTS}] - [\text{OLD INCOME} - \text{OLD COSTS}] = < 0$$

A net gain in income would reflect successful implementation of DE technologies on campus. It is not possible within the constraints of the individual scenarios to provide a detailed costing analysis for the full range of provision at the respective research-intensive university. However, it is possible to demonstrate the interaction among key variables at a higher normative level. There are a number of published international benchmarks, reports and corresponding methodologies to estimate resource commitments in terms of professional time required for the development and delivery of asynchronous learning approaches. These are derived from the distance education literature in general and activity-based costing in particular, and will be used to explore the implications of resourcing alternatives in the individual scenarios (see for example: Bates 2000; Hülsmann 1999; Inglis 1999; Jewitt 1999; Rumble 1997, 2001 & 2002). The following points of reference and industry standards will be used in the scenarios:

- An undergraduate year of full-time study equates to 1 200 student learning hours or 120 points. A typical semester course at the undergraduate level is the equivalent of 150 student learning hours or 15 points, as determined by the Ministry of Education's Guide to Tertiary Education Funding (cited in University of Auckland 2006: Online).

This reflects the total time a student will spend on a semester course and could, for instance involve the following activities:

- reading the course textbook(s) and/or articles from the library database;
- working through web-based course texts;
- attending lectures and tutorials;
- answering and submitting written assignments;
- participating in asynchronous online discussion forums;
- preparing for tests and examinations;
- sitting formal tests and examinations.

- Activity based costing models in distance education use student learning hours as the basis for calculating the activities associated with course design, development and delivery. For example:
    - A full-time learning designer is capable of the design input required for 1 500 student learning hours or 10 courses;
    - The development time required for interactive, self-contained instructional materials is approximately 38 to 50 hours of academic time for each student learning hour (Rumble 2002). This compares with approximately 2 to 10 hours preparation time for a new one hour lecture (Rumble 2002). However, self-contained instructional texts for a fully online offering would consume approximately 25 to 30 percent of the notional learning hours in a course, with the remainder of student learning hours allocated to activities like other readings, participation in discussion forums preparation of assignments and examination related activities. Therefore, the development of an online course (depending on the specifics of the design adopted) would require the time of a dedicated academic for one to two semesters. The payback is that the resources would have an extended shelf life and could be used for a number of years.
    - Multimedia development, depending on the complexity could take between 75 and 300 hours of development time for 1 student learning hour.
    - The teaching activities for the delivery of courses are variable and increase in proportion to the number of students. These activities include the monitoring of online discussion forums, marking of assignments and examinations, and student administration.

- A semester is based on 15 weeks (12 teaching weeks and 3 weeks of study break and examinations). Most undergraduate courses timetable between 4 – 5 hours of face-to-face teaching per week.
- At a research-led university, academics allocate their available time between research, teaching and administrative activities. Consequently time spent on developing instructional materials for e-learning will reduce the time that can be spent on other activities. Conversely, reducing the number of contact teaching hours through the use of asynchronous learning methods would result in more time for other activities, like research. Unless the products associated with the design and development of e-learning resources can substitute for savings in academic time elsewhere, e-learning will remain a cost addition to the system if student numbers remain constant.
- Cost savings can be achieved through labour for labour substitution, for example using cheaper adjunct and graduate student labour instead of more expensive core academic staff for selected tasks.

In concluding this summary brief reference is made to the evolution of management accounting where traditional notions of fixed and variable costs “are being embedded in the much richer framework of committed and flexible costs” (Rumble 2002: 19). Committed costs are those costs that arise from management decisions to provide capacity, as in the case of a central teaching and learning services unit. This raises the critical distinction between the cost of the resources *supplied* and the corresponding costs of *how* the resources are used (Rumble 2002). This framework is used to explore alternatives in the scenarios.

4.3.3 Assumptions underpinning the scenario storylines

A noteworthy challenge for generating effective scenarios is to reduce the complexity into a manageable structure. This is achieved in three ways:

- The macro structure of the individual scenarios based on the valid intersections of the uncertainty variables. The scenario approach used in this study is based on a two-by-two uncertainty matrix, resulting in three valid scenario constructs. (see Appendix 1).
- The rules of interaction which define the behaviour of DE processes derived from the research and experiences of the large-scale, single-mode DE providers (refer to Appendix 1 and Chapter 2 for a detailed discussion)
- Defining the assumptions that underpin the development of the scenarios.

While the macro structure and rules of interaction assist in reducing the complexity into a manageable structure, they are conceptually different from what an assumption is in the context of the scenario-planning technique. For example, the unique requirements of DE systems are defined as a rule of interaction for the individual scenarios. This rule of interaction limits the range of alternatives to what has been tried and tested as successful best practice for asynchronous learning systems. An assumption, on the other hand, is a condition that is accepted to be "true" without extensive justification or validation within the range of the reported study. In order to proceed meaningfully with generating individual scenarios, it is thus necessary to clarify the assumptions and corresponding limitations underpinning the individual scenarios.

The following assumptions — still recognising the criterion of plausibility — underline each of the scenarios that will be generated in this chapter:

- The scenarios are developed within the broad acceptance of human capital theory, particularly at the level of personal decision-making for tertiary education. The acceptance of human capital theory as an assumption can be contested because it constrains opportunities for detailed problematisation from multiple perspectives (Wößmann 2003). Regrettably, the scope of the thesis does not allow for further critical analysis and this would need to be conducted in the context of even further analysis of the scenario outcomes and the generation of additional scenarios using alternative theoretical constructs.

  Human capital theory posits that an individual's socio-economic status, prospects of employment and career progression, and income earning potential, can be attributed to the investment in human capital accumulated through learning over time. Flowing from this is the assumption that continued growth and success of the evolving knowledge society is linked to the accumulation of human capital (see for example Schjoedt 2000). Human capital is the combined result of formal education, training and experience. The scenarios assume — through aggregation — that the total system is directed by the perceived rewards of increased human capital.

  Corresponding with the acceptance of this assumption is the unavoidable introduction of further limitations to the scenarios. Human capital theory is itself a problematic conjecture and can justifiably be deconstructed (see for example Bowles & Gintis 1975; Wößmann 2003). For example, human capital theory does not adequately account for the social injustice regarding the comparatively low earnings of highly skilled workers like nurses and social workers. Even within the university sector in many developed countries, situations exist where first-degree graduates can earn more than their lecturers (notwithstanding the string of postgraduate qualifications required as prerequisite condition of employment for university teaching). Supporters of human capital theory could argue that these anomalies are the outcome of normal demand-supply equilibrium. Yet this rebuttal does not explain the inadequacies of the theory. For example, the over supply of skilled nurses would drive the comparative equilibrium price of earnings down, assuming that the rebuttal holds true. However, when studying the shortage of nurses in many countries, corresponding analysis of wages would reveal that this under supply has not resulted in corresponding increases in the price for these skilled medical professionals. Furthermore, human capital theory must necessarily assume the existence of near perfect market behaviour. The problem for education is that it does not function as a perfect market in the economic sense, concerning the resultant interaction between supply, demand and price. Tertiary education is a public good that necessitates state intervention — in effect questioning the assumption of human capital theory.

- Closely linked with the first bullet is the assumption of a heterogeneous student group. The heterogeneity of the student group shows that diverse provision of education can be accommodated within the market in terms of: mode of delivery (contact, distance or hybrid); institutional form (public versus private and university, polytechnic or wānanga); and differences in hierarchical market positioning regarding cost leadership for the organisation (measured by quality, cost and access). Homogeneity of the student group is not a valid assumption because then a "one-size-fits-all" strategy could be accepted and it would mean delivery modality (for instance contact or distance) would make no difference regarding competitive advantage in the higher education market.

- It is assumed that student demand will aggregate in a way that demonstrates rational decision-making regarding choices in the tertiary education market space. Notwithstanding the difficult tensions between heterogeneity and aggregated rational behaviour (Simon 1978), it is necessary to make some assumptions about plausible market behaviour. Sadly, it is not possible to accommodate the levels of analysis and critical discourse within the scope of the thesis unless market behaviour is delimited to some extent. Therefore the elements of rational decision-making referred to above must be articulated in the form of a set of assumptions that aggregate market behaviour.

  It is assumed that individual students understand and accept the benefits of formal education, when deciding whether or not to invest in formal tertiary education. Furthermore, this assumption accepts that prospective students will attempt to optimise their decision based on what is considered "affordable" or "value-for-money" learning. The aggregated student market also assumes that it is becoming a more discerning market, especially in the case of international students. This means that students increasingly take the value-for-money dimension into account when deciding what, when and where to study across the tertiary education spectrum — ranging from pre-service undergraduate study through to professional lifelong learning alternatives. In other words, the market will not simply prefer the local campus-university alternative, at all costs, because of traditions associated with the provision of higher education.

- Notwithstanding the diminishing nation-state relationships of late modernity and the emerging information society, the scenarios continue to assume state participation in the funding of tertiary education. This is not to cancel out the trend of diminishing levels of state funding in real terms for the majority of publicly funded universities, but rather indicates that state-funded education will continue as a component within a differentiated tertiary sector, albeit at lower funding levels than in the past. Therefore, in a publicly funded education system, the scenarios assume that the dominant income stream is derived from state subsidies and contributions in the form of student fees. While contract research could generate substantial income for the University, the scenarios assume this category of income to be subordinate to the main funding stream above. Scenarios very different to the ones generated in this chapter would be necessary in the case where state funding of tertiary education were to discontinue completely. Nonetheless, the scenarios do assume participation from the for-profit online providers in the higher education market space.

- The scenarios accept the social good of the university as institution where knowledge, research and teaching have been combined within a single institution. This is the result of the Von Humboldt model of research-led education and Cardinal Newman's 'liberal-arts' model placing education at the heart of the university as institution (Claes 2002:5, Newman 1996). The scenarios assume that the university should be preserved as an organised societal structure, comprising an autonomous community of scholars that functions as a critical voice for ongoing development. In other words, the scenarios do not question the social value of organised critical scepticism commensurate with the functioning of a community of scholars.

  This assumption is an oversimplification of the essence of the university as an organ of society. It purposefully avoids tackling challenging questions: What constitutes a university? What are the values that underpin university practice? Are these the "right" values for the contemporary situation? What is the relationship between knowledge, society and the university? Can we still talk about the *uni*-versity or should we consider notions of a *multi*-versity or *di*-versity? (See for example Lenz 1997; Mccully 1973; Rustum 1990; Scott & El-Assal 1969.) Certainly, alternative scenarios could be generated to begin answering questions about the essence of the university and how its values may (or may not) change in relation to evolving components of society. However the focus of this chapter is to consider the impact of DE futures on a traditional campus-based university.

- The scenarios assume that competition within a differentiated tertiary education market will benefit the system as a whole. Consequently the "threat" of borderless education and internationalisation combined with increased private commercialisation of the tertiary sector could change the composition of the tertiary education market in fundamental ways.

  This assumption is also riddled with potential complexities: What are the social implications of elitism versus the fundamental rights of every adult to have access to tertiary education within a competitive university system? What are the ethical issues involved when private education institutions are allowed to compete in the tertiary education sector with public institutions that are indirectly funded by national taxpayers? More fundamentally, the assumption that competition will benefit a social or economic system is itself arguable.

- Flowing from the previous point, the scenarios assume that at a normative level, tertiary education markets will respond reasonably to the generic principles of competitive advantage (without disregarding the limitations of this assumption explained below). This means that each tertiary education institution is hierarchically related to other institutions in terms of its unique competitive advantage. A university's competitive advantage is determined by its relative position with regards to its competitors. Competitive advantage is assumed to be the collective result of the interaction between the quality and price of its respective goods and services. An above-average university — measured in terms of the quality-price differential — will gain market share, whereas a below average institution will lose market share. The mobility of students to enrol at the institution of choice increases significantly with distance modes of provision because students can virtually study at any university irrespective of its geographical location as long as they have an online connection.

It is important to emphasise that this assumption of the dynamic of competitive advantage in the tertiary sector is not an unqualified acceptance that tertiary education markets are perfect markets in the economic sense. The scenarios will take into account the complexities of price determination in the case of publicly-funded universities. In reality, most publicly-funded universities do not have much autonomy concerning the price they set for their education services. Price determination for tertiary education is largely a factor of the nature and extent of public funding (accepting that state intervention in the tertiary education market is necessary because education markets do not function as perfect markets). While some universities will have greater freedom to supplement income through student fees or contract research, others may be constrained by national legislative regimes. Universities, however, do have autonomy over the technology processes that are adopted to produce educational goods and services. Therefore, it is conceivable that a university will be able to incorporate more or better services for the same price through the smart application of technology. Also, it is assumed that the cost of university study is nearing the "affordability" threshold for the average family. Consequently, the assumption of competitive advantage — taking the price determination constraints into account — is a plausible assumption for the development of the scenarios.

- The scenarios are all developed from the assumption of promoting the continued survival and success of the university as institution. Therefore none of the scenarios will be developed from the perspective of generating an alternative organisational structure to replace the university as institution;

- Finally some elucidation is necessary on the implicit assumption that has been adopted regarding technology in this thesis. Classical economic theories treat technology as an exogenous variable, whereas more sophisticated analyses see that there is a recursive and dynamic relationship among technology, political, economic and social frameworks. For example, economic and social frameworks will influence how technology is adopted, but at the same time, technology enables what is economically and socially possible. With reference to this new socio-economic system, Castells (1998b) recognises that technology *per se* is not the cause of these changes but the same author goes on to affirm that "without new information and communication technologies none of what is changing our lives would be possible" (1998b: 3). When technology is viewed within such a dynamic system, the assumption adopted is that digital ICTs are simultaneously a cause and result of the changes analysed in the scenarios.

  Corresponding to this assumption, the scenario texts in this chapter are generated under the expressed limitation that the scope of the thesis does not permit the levels of sociological analyses to problematise recursive relationships. The thesis does not adopt a determinist view of technology yet within the individual scenarios the organisations will determine how technology is used — without detailed discourse and analysis of the broader political, economic, and social frameworks underpinning the decision.

  It is argued that this limitation is acceptable when measured against the overall purposes of the individual scenarios within the boundaries of this study. The focus of this study is definitive: to explore the impact of DE within the context

> of a campus-based university using three scenarios. The scenarios are not predictions of the future of higher education systems at the level of political, economic, and social frameworks — but it is obvious they operate within these contexts as part of a total dynamic system. The purpose of the individual scenarios is to raise questions about the fundamental structures and the interplay among these broader systemic frameworks. The scenarios are management tools to assist managers to begin dealing with some of the broader framework issues by attempting to answer the questions using the mental models engendered by the technique. Further research will be necessary to unpack and analyse the interactions of these meta-systems, but does not fall within the ambit of this study.

In conclusion, the scenario storylines that follow will attempt to tie together the threads among the myriad variables analysed and discussed in this thesis. The structure of each scenario is determined by the scenario themes identified in Section 4.3.1 above, and each storyline is narrated from the perspective of a research-intensive, campus-based University in New Zealand (see Section 4.2.1).

4.4 Scenarios for DE futures

In this section, three scenario storylines will be generated.

It is important to emphasise that the purpose of a scenario is to explore the underpinning the business models directing existing practice in higher education. The value of scenarios reside "in their implications for strategy and operations, not in the scenarios themselves" (Millet 2003: 23). Consequently, within the remit of individual scenario storylines, it is necessary to deviate from traditional academic conventions of justifying individual assertions within the scenarios by corresponding references and citations from the literature. However, where appropriate, clarification texts derived from relevant research and the calculation of key indicators based on the scenario constructs are provided. The reader is reminded that the criteria by which individual scenarios must be judged include the plausibility, differentiation, internal consistency, and decision-making utility of the scenario (and **not** the quantifiable probability of the future envisaged by individual scenarios). Scenarios are more about the dynamic interaction among complex variables rather than the specifics of the detail. Scenario-based planning is a tool used to explore alternative futures and should be used in this context.

The authoring framework for each scenario comprises the following elements:

1. A media release statement in the year 2015 introducing the senario;
2. Overview of the scenario;
3. Scenario constucts;
4. The storyline which is authored from a theoretical point in the future – in this case the year 2015. While the dates in the storyline proceed into the future, the storyline is discussed in the past tense reflecting on how the University got to this point in the future. Furthermore, in order to provide a historical context, each scenario begins in the year 2000 thus covering the tail period of the dotcom decline which triggered initial university investment in DE technologies;
5. Reflection on restructuring for technological change from the perspective of how a small number of full-time equivalent staff can be organised to support the implementation of e-learning technologies at a campus-based university.

4.4.1 Nipped in the bud: A revolution averted (Scenario 1)

Media Release: Times Higher World University Rankings, March 2015
New Zealand institution placed 39th in the world university rankings

Overview

The title of this scenario infers that the notions contesting the survival of the university as institution (predicated by fundamental changes in the economy and rapidly advancing technologies) do not materialise. Tried and tested pedagogy prevails with limited expansion into niche DE markets for the University of New Zealand. The University becomes more elitist but remains a popular institution for a tertiary education credential in New Zealand. DE practice evolves at a slow pace particularly since online modalities are managed as a cost-addition model. Technology adoption is incremental and changes are treated as sustaining technologies that improve efficiency and effectiveness of the campus-based delivery model. The pedagogic preferences of dialogue and interaction associated with the oral traditions of classroom teaching dominate design alternatives for technology-mediated learning. In other words, academic tradition underpins the organisational reluctance to trial new pedagogical modalities. University tradition takes precedence over managerial optimisation.

Scenario constructs

Macro scenario matrix	This scenario examines the intersection between a *low* level of *pedagogical systems innovation* (the implementation of digital knowledge granules) in conjunction with the *Fordist* characteristics of face-to-face delivery[1]
Leadership/ Management model	Collegial management model
Primary rationales for the implementation of e-learning on campus	• Keeping up with the competition • Enhancing on-campus delivery using technology • Increasing flexibility of delivery alternatives
University strategic priorities	• Advancing the international standing of the institution • Increased performance in research output • Diversification and expansion of the income base • 2 percent annual growth rate in EFTS • Excellence in teaching and learning
Trend assumptions	• Increases in the government grant for domestic students do not exceed the national inflation rate as regulated through the Fees Maxima legislation • The exchange rate stabilises over the long term at 68 cents to the United States dollar for the duration of the scenarios.

[1]The Fordist disposition required of this particular scenario is found in how the principles of industrialisation have impacted on face-to-face delivery models — for example, the shift from the tutorial learning experience to accommodate growing student numbers through discipline-based organisational design and teaching.

e-Learning design approach	Guilded and artisan-based course design approaches for technology-mediated learning resources are preferred where the academic takes responsibility for all the functions of the design and development process. In other words, implementation of e-learning is not based on DE processes and systems.
e-learning transformation disposition	Passive reactionary approach
Restructuring approach with regard to teaching-learning services	Incorporate new ways of doing business without restructuring of organisational processes for e-learning. • 5 Full-time equivalent staff with responsibilities for e-learning were incorporated into the existing professional development unit.

Storyline

In year 2000 the University of New Zealand purchased an enterprise licence for a commercial learning management system. "Keeping up with the competition" was a primary rationale driving the University's decision to increase web delivery alternatives. The perceived threat of borderless education and the prolific international growth in the number of tertiary institutions becoming involved with DE at the time was enough to sway the thinking of a number of skeptics questioning the decision. The adoption of a centralised learning management system, would enhance efficiencies by discontinuing the use of a variety of different systems taking hold at the departmental level and the the new enterprise version would link directly with the student administration system saving time in uploading student lists in separate systems. The Professional Academic Development Centre was assigned responsibility for the the training needs associated with the new learning management system.

By 2005, 70 percent of the University's courses had web supplemented resources where course outlines, lecture notes and slide shows are uploaded on the system for remote access by students in support of campus-based lectures. This has not had a major impact on academic time required for the preparation of lectures. The University has not made extensive use of the online interaction tools to support teaching and learning, other than course announcements posted on the learning management system. In the majority of courses, there is no compulsory requirement for Internet-based study activities and the learning management system is used predominantly to supplement campus-based lectures. Consequently these resources cannot be used for DE delivery because the functions of teaching are conducted in the classroom (and not mediated through the online resources).

With regards to online delivery, the University had converted approximately 8% of its courses for distance delivery. For example: the School of Business developed a new undergraduate degree in Information Management as well as a Postgraduate Diploma in Business Administration that both have a fully online alternative to the campus lectures; the Faculty of Arts developed a taught masters degree in Applied Linguistics aimed at attracting international students; and the Faculty of Medicine launched a few postgraduate courses in Nursing and professional development diplomas for New Zealand medical professionals.

The dominant pedagogical approach of these distance courses were based on electronic reading lists that are accessed from the library's digital databases supplemented by asynchronous discussion forums that were moderated by academic teaching staff. This model required relatively low levels of design and development input in advance of delivery, which facilitated rapid development of the courses. However, the teaching demands of these courses were such that a single academic or tutor was not able to support more than 20 online learners in addition to normal lecturing and research activities[2].

In the absence of a design-led approach for e-learning at the University of New Zealand, departments adopting online delivery experienced substantial increases in the academic workload of staff, thus placing pressure on other core activities in the respective departments.

From 2004 till 2008, the strong New Zealand dollar, combined with restrictive immigration requirements resulted in a 72 percent decrease in international EFTS compared with 2004 figures (see Table 4.7). Furthermore, intensified competition among all tertiary education institutions for first-year domestic enrolments, in part fuelled by the national decline in international students as well as changing demographic profiles for domestic students, the University was unable to meet its strategic growth target of 2 percent per annum. By 2008, total EFTs had remained relatively constant increasing by 1 percent when compared to 2004. Notwithstanding the small increase in total EFTS, student related income has dropped by 12 percent from $186 million to $163 million when expressed in terms of 2004 baseline figures. This is the result of the significant decline in international full-fee paying students since 2004.

Table 4.7 Income from government grant and tuition fees – 2004 to 2008

	2004	2005	2006	2007	2008
Domestic students (EFTS)	13 175	13 293	13 226	13 186	13 318
International students (EFTS)	2 509	1 595	1 058	873	693
Total (EFTS)	15 684	14 888	14 284	14 059	14 011
Percentage change - Domestic students		0.90%	(0.5%)	(0.3%)	1.00%
Percentage change - International students		(36%)	(33%)	(17%)	(21%)
Projected income (Grant and student fees)[1]	$186m	$175m	$167m	$164m	$163m

Note
1. Income projections are based on 2004 figures, assuming an EFTS income of $11 581 per domestic student and $13 477 per international full-fee paying student (as calculated below). Projected income is stated in millions of New Zealand dollars.

[2] **Impact of e-learning on teaching time**: Research shows that the implementation of e-learning delivery can either reduce or increase the teaching time required of the academics on a course. The labour requirements for e-learning are determined by the course design that is adopted, rather than the characteristics of e-learning technologies *per se*.

Bates (2000: 127) points out that in a well-designed e-learning course, students will spend the majority of their time interacting with the multimedia materials that are prepared in advance. In the case of an online course the teacher "needs to spend less time per student overall moderating discussion forums compared with the total time spent in classroom teaching" (Bates 2000: 127). Other researchers report that student-student support (peer support) in discussion forums can reduce the time demands placed on teachers (DiBiase 2000).

However, there are also numerous reports documenting that online teaching adds considerably to the traditional academic workload as a result of the the need to monitor and respond to online posts from students (Arvan, Ory, Bullock, Burnaska & Hanson 1998; Jewitt 1999; & Moonen 1997). Jewett (1999: 41) estimates that teachers may spend twice as much time teaching online when compared to the face-to-face situation. In many online course offerings in the United States of America, student numbers are deliberately kept down to approximately 20 students or less (Boettcher 1999).

	University of Canterbury $000	Victoria University of Wellington $000	University of Otago $000	Total[2] $000
Government grant	81 482	86 178	147 728	315 388
Domestic tuition fees	33 325	39 504	59 416	132 245
Total income domestic students	114807	125 682	207 144	447 633
International tuition fees	27 323	33 285	29 079	89 687
Domestic EFTS	10 584	12 604	15 464	38 652
Income per domestic EFTS	$10 847	$9 972	$13 395	$11 581
International EFTS	2 147	2 525	1 983	6 655
Income per international EFTS	$12 726	$13 182	$14 664	$13 477

Note:
2. University of Auckland figures are excluded because the Annual Report does not disclose the breakdown between domestic and international fees.

With only 8 percent of its courses in distance learning format and the inability to scale up delivery beyond a student-teacher ratio of 25:1 for the online courses, the University was not able to increase the number of EFTS enrolments as a strategy to increase income. A survey published by the Research Centre in the School of Education reported that the attrition rate for distance learning courses at the University was nearing 40 percent of initial registrations. Moreover, the pedagogical model adopted has not been able to reduce the costs of delivery. This resulted in a shift in emphasis in the rationale for the implementation of technology on campus from promoting competitive advantage to enhancing on-campus delivery. In 2008 the University executive took a decision that they would not prioritise the expansion of distance learning offerings.

The University invested in an e-lecture system, to record lectures digitally which students could access remotely using web streaming technologies. This technology proved popular with academic staff, because they did not have to adapt their teaching methodologies from the traditional lecture format. The majority of students still preferred to attend the live lectures, but found the e-lecture a useful substitute in situations where they could not attend a lecture. Approximately 30 percent of the students used the e-lecture system during the course of their studies (see for example, Albon 2004). Interestingly, student satisfaction ratings were lower in courses where the e-lecture was not available or the academic failed to upload their slide show presentation. The convenience of remote access of these resources was rated highly by the students.

From 2009, the University increased its domestic student fees to the maximum level permitted under the Fees Maxima legislation, and international student fees were increased at a rate of 2 percent per annum above the national inflation rate. This had a negative impact on overall EFTS growth, averaging a decline of 0.5 percent per annum. In 2015 there were 12 922 EFTs students and the resultant income from government grant and student fees of $150 million (using 2004 base year figures). These fee increases were able to contain the reduction in income from government grant and tuition fees to 8 percent from 2008 till 2015 (as opposed to a 12 percent reduction for the period from 2004 – 2008). In 2015, when compared to 2004, income from government grant and student fees had reduced by 19 percent in real terms.

In 2006, strategic analysis and forecasting techniques had predicted the decline in student-based funding. In response to this declining income base, the University prioritised the need for diversification of funding, with particular emphasis on research related activities. In 2006, total operating income was $242 million with $46 million (19%) generated through external research income (that is, revenue generated through research, consultancy and development contracts other than funding through Government tuition subsidies and tuition fees.) The following strategic objectives were specified in the University Strategic Plan (2006 – 2015) with regards to research performance:

- Doubling research income to $92 million per annum (approximately 40 percent of operating income);
- Improving research performance in the PBRF by promoting policies to recruit and reward research excellence on actual research performance combined with new professional development programmes aimed at improving research output;
- Targeting a postgraduate enrolment of 12 percent of the total number of students and doubling the postgraduate completions;
- Developing large-scale research institutes through selective university investment and systematically seeking new and profitable commercial research activities by making expertise in the commercialisation of intellectual property easily accessibly by University staff and postgraduate students.

Building on a strong research foundation as one of the top four research universities in New Zealand, significant progress was made on the achievement of these strategic objectives. The University's relative PBRF rankings improved, corresponding with an increase in their funding allocation from the PBRF. External research income was increased to $81 million dollars per annum by 2015 (35% of operating income). The targeted recruitment of leading international researchers has contributed to the success and sustainability of the University's research institutes and postgraduate enrolment targets of 11% of the student enrolments in 2015.

While the University of New Zealand had become more elitist, given the high costs of study, the University has improved its research performance and international rankings. The University achieved a ranking placement between 39th and 87th in the world. The *Times Higher World University Rankings 2015* listed the University at number 39 and the University of New Zealand has also improved is position from 215th in 2006, to 87th in the *Academic Ranking of World Universities* (ARWU) published by the Institute of Higher Education, Shanghai Jiao Tong University.

Restructuring for technological change in Scenario 1

The Professional Academic Development Centre at the University promotes a holistic approach for professional academic support in teaching and learning. This means that e-learning is not singled out as a discrete professional development activity but is managed within the context of improving the overall quality of teaching at the University.

In response to the University decision in 2000 for the Centre to support the training needs associated with the new learning management system, the following full-time equivalent staff allocations were assigned to e-learning related activities:

- 2 Training officers responsible for skills development in the use of the Learning Management System. This involved the presentation of short workshops in the computer laboratory on generic office software including word processing skills, designing and developing slide shows as well as skills development in the use of the learning management system. Skills development for the learning management system covered a range of topics, for example: uploading files; setting up and administering discussion forums; using chat forums; creating and administering online tests; uploading online assignments; and administering student grades. A series of online help documentation was also developed.
- 3 Academic Developers which were involved with incorporating the use of technology to make access to learning more flexible in the overall professional

development programme. Most of the professional development at the University was facilitated through workshops at the Centre. However, the Centre also provided one-on-one consultations with the School of Business and the Faculties of Arts and Medicine during the development of their online courses.

This organisational approach was efficient given that 70 percent of the University's courses had web supplemented resources by 2005. However, the workshop approach to promote implementation of e-learning had not succeeded in changing the way academics taught their courses, nor were significant savings in the cost of provision achieved[3]. The shift in strategic priorities to improve research performance from 2008 meant that the academic developers were required to spend more time on professional development associated with postgraduate research, for example: workshops on supervising postgraduate research students, writing successful grant applications, and assisting academics in publishing teaching innovations in peer reviewed publications on the scholarship of teaching in higher education.

In conclusion, the research stature of the University continues to attract high calibre students. Financial constraints should not be a limitation for the best New Zealand intellect to gain admission given the comparatively high University investment in a bursary scheme. However, places are limited and increases in student fees are nearing the affordability threshold. This has begun to restrict entrants from the poorer sectors of society. The University's research output and corresponding contract research income has supplemented the decline in student-based funding resulting from significant declines in the proportion of international students.

---

[3] **Impact of academic development on teaching behaviour.** The New Zealand Ministry of Education commissioned a review and synthesis of the research on the impact and efficacy of student support services and professional academic development on teaching quality (Prebble, Hargraves, Leach, Naidoo, Suddaby & Zepke 2004). The synthesis is based on the analysis of 150 research studies.

In Scenario 1, the organisational preference for centralised support and leadership of e-learning operations are located within the professional academic development unit. Relevant findings of this research synthesis that related to the Scenario storylines are considered:

- Short training courses are unlikely to lead to changes in teaching behaviour of academic staff. They are most effective for the dissemination of institutional administrative information and the development of discrete skills and techniques, for example basic software training (Prebble *et al,* 2004: 29);
- An academic's conceptions of teaching are the most important influence on how they teach;
- *In situ* training using an academic work group approach (for instance, working on teaching improvement and overall course design of real courses involving professional design staff) is most effective for developing complex knowledge attitudes and skills associated with teaching effectiveness (Prebble *et al,* 2004: 33);
- The professional consultation model providing feedback on a one-to-one basis can assist teachers to improve the quality of their teaching, but is an expensive professional development interevention (Prebble *et al,* 2004: 37)
- Extensive training programmes (extending over one or two semesters) or formal qualifications where there is a requirement to put training into practice can be effective in transforming teachers' beliefs about effective teaching (Prebble *et al,* 2004: 48).

4.4.2 Nothing succeeds like success (Scenario 2)

Media Release: Tertiary Education Commission of New Zealand, March 2015 *The Tertiary Education Commission rates the University of New Zealand as the best teaching university in the country*

Overview

The title of this scenario infers that the University is able to build on past successes by adopting a learn-by-doing and incremental strategy. The University has been able to withstand stiff competition from other providers and has been able to implement a cost-sustainable model of DE. Increased differentiation between research-led and teaching-led institutions occurs within the tertiary sector. At the University of New Zealand, this is represented by differentiated specialisation between teaching-focused and research-focused departments. Technology changes are treated as sustaining technologies that improve the efficiency and effectiveness of the existing business model. With specific reference to e-learning activities, managerial optimisation takes precedence over university tradition. The DE sector is characterised by a blurring between traditional single-mode providers, dual-mode and conventional campus-based universities.

Scenario constructs

Macro scenario matrix	This scenario examines the interaction between a *high* level of *pedagogical systems innovation* and mainstream implementation of digital knowledge granules in conjunction with a DE process model based on *mass-standardisation.*
Leadership/ Management model	Centralised managerialism building competitive advantage through cost-leadership.
Primary rationales for implementation of e-learning on campus	• Widening access of provision through distance education • Building new international markets • Improving quality of learning
University strategic priorities	• Responding effectively to external pressures resulting from radical advances in technology • Reducing cost and improving access and quality of provision
Trend assumptions	• Increases in the government grant for domestic students do not exceed the national inflation rate as regulated through the Fees Maxima legislation • The exchange rate stabilises over the long term at 68 cents to the United States dollar for the duration of the scenarios.

e-Learning design approach	A design and production approach derived from DE processes and systems is implemented. There is a strong focus on the organisation's processes for optimising the design and delivery of e-learning, aimed at reducing and optimising the production costs with corresponding increases in the quality of learning and student services. In other words, the University incorporates more product features or services without parallel increases in the total cost of production.
e-Learning transformation disposition	Proactive responsive approach
Restructuring approach with regard to teaching-learning services	Incorporate new ways of doing business with restructuring of organisational processes for e-learning, yet maintaining traditional academic structures. • A new e-learning centre was established starting with 5 full-time equivalent staff dedicated to the development of distance education courses.

Storyline

In this scenario, members of the University management were reluctant to invest significant people resources into e-learning operations, other than the provision of a centralised learning management system. In 2000, the University had refrained from instituting a mainstream e-learning strategy for a number of reasons:

- First, there was not enough evidence to justify the fact that e-learning strategies would reduce the costs of the University's campus-based model, and management was unwilling to commit resources to a delivery system that was a costly add-on to existing systems. A "keeping up with the competition" rationale was not enough to sway University thinking to invest in e-learning operations, particularly since the University of New Zealand had committed substantial resources to a new building for the Faculty of Engineering;
- Many academics questioned the quality of distance learning when compared to campus-based pedagogy and they were unwilling to embrace the "fads" of technology-enhanced learning, particularly when considering that the University was maintaining a steady intake of residential students each year;
- Management was of the opinion that it would be more prudent to wait and see how the e-learning market in higher education would evolve. Moreover, given the accelerated rate of technological change, it would be better to wait for next-generation technologies.

By 2006, developments in the technology of digital knowledge granules had progressed considerably. Digital knowledge granules had attained high-levels of interoperability and most of the commercial delivery platforms had implemented the interoperability specifications for content packages. This meant that a learning object that was developed in one system could be imported and delivered seamlessly into another learning management system. While students are working though an online learning sequence, the learning management system tracks progress and keeps detailed data, for instance: time spent on a particular concept, interactions with the learning content and assessment scores on various activities. Furthermore, the data relating to the tracking of student progress within one system was also transferable to other systems, thus recognising an individual student's progress in relation to successfully completed learning objects in another system. This facilitated easier transfer and student mobility between different providers as well as the interoperability of content produced by commercial publishers.

Increases in student fees and the rising levels of individual debt from the national student loan scheme in New Zealand meant that the cost of a university education was beginning to reach the affordability threshold for many families. The University of New Zealand achieved an average annual growth of 1.5 percent per annum, between 2000 and 2005 with 16 159 EFTs students registered for the 2005 academic year. However, international student numbers had dropped by 8 percent over the same period as a result of exchange rate pressures and immigration restrictions.

In 2005, the University of Phoenix announced plans to establish a physical campus in Auckland from 2006 as part of their strategy to expand their market share in the Asia and Pacific regions.

Singapore was considered as a suitable base by the University of Phoenix[4] during the early planning phases, however the final decision to establish a physical presence in New Zealand was motivated by the following factors:

- The availability of internationally recognised scholars with academic salary levels comparatively lower than other Commonwealth countries;
- Significantly lower set up and operational costs when compared to Singapore;
- A relative exchange advantage when compared to the United States, Australia and Singapore;
- Competitive advantage considerations when taking into account the number of foreign universities establishing an international presence in Singapore;
- The Auckland campus of the University of Phoenix aimed to achieve an online ratio of 60 percent of total student enrolments. With a significantly lower cost structure, the University of Phoenix was confident that it could compete with other international providers based in Singapore. Moreover, a small campus-based operation was deemed sustainable within New Zealand given the international brand of the University of Phoenix. Campus students studying in carefully selected niche markets would help to cover the operational costs of a physical presence in Auckland. This campus was also used as an administrative support base for New Zealand academics in the part-time employ of the University.

The University of Phoenix adopted an aggressive marketing campaign focusing on high-demand curricula. With 62 existing degree programmes for online delivery, the University of Phoenix achieved a reasonably high growth rate of 5 percent per annum for students residing in New Zealand. The University of Phoenix alternative was particularly attractive for many school leavers and residential postgraduate students. The online delivery alternative combined with a highly competitive fee structure enabled the University of Phoenix to attract students from both the North and South Islands. Many school leavers preferred the flexibility of the online delivery model, being able to work part time to assist with paying for the rising cost of tertiary education. A recent survey of

---

[4] **Fact sheet for the University of Phoenix**. The University is a private, for-profit higher education institution committed to providing high quality education to working adult students.

Number of campuses: Virtual online campus plus 170 physical campuses spread across the United States, Canada and two locations in Mexico.
Number of students: 230 000 (48% campus-based and 52% Online)
Number of staff: 19 000 (including 1 500 core staff and 9 600 Online faculty)
Postgraduate ratio: 34% of student enrollment
Online degree programmes: 62 full degree programmes available online in 2005
Cost comparison: Cost of producing 1 hour of online material $237, (Compared with $487 at Arizona State University)

Sources: University of Phoenix Fact Book, 2005 and website (http://www.phoenix.edu) first year students reported that approximately half of the students held part time positions requiring more than 10 hours work per week.

The immediacy of this competition forced the University of New Zealand to review its decision not to invest in mainstream e-learning activities. This was necessitated because of declining student numbers, largely due to the impact of the University of Phoenix in the domestic student market. In 2006, the University of New Zealand reported a decline of 3.6 percent in student numbers with a large percentage of international students opting for the University of Phoenix alternative (see Table 4.8). In 2007, a decline of 6.5 percent was recorded. This negative trend continued until 2009, representing a decline of 11 percent in student numbers since 2005. 2009 was a turning point for the University because it was able to increase enrolments through the expansion of its own online courses (see Table 4.9).

Table 4.8 Income from government grant and tuition fees – 2005 to 2009

	2005	2006	2007	2008	2009
Domestic students (EFTS)	14 058	14 046	13 877	13 710	13 998
International students (EFTS)	2 101	1 531	680	627	1 059
Total (EFTS)	16 159	15 577	14 557	14 337	15 057[2]
Percentage change - Total		-3.60%	-6.50%	-1.50%	5.02%
Percentage change - Domestic students		-0.08%	-1.20%	-1.20%	2.10%
Percentage change - International students		-27.00%	-56.00%	-7.80%	-69.00%
Projected income (Grant and student fees)[1]	$186m	$184m	$170m	$167m	$176m

Note

1. Income projections are based on 2004 figures, assuming an EFTS income of $11 581 per domestic student and $13 477 per international full-fee paying student (see Table 4.7). Projected income is stated in millions of New Zealand dollars.
2. The net increase in EFTs was achieved by student enrolments in the new online programmes developed during the preceding three years.

Projections done in 2005, forecast that that student-based income would decrease to $158 million in 2010 (in the absence of increased enrolment figures), thus representing an overall decline of 15 percent in this income stream for the period of review.

Therefore, in 2005 the University of New Zealand commenced with a 5 year strategic plan to reduce the costs of teaching and to increase enrolment through the implementation of e-learning and DE technologies. A new Centre for Technology-Mediated Learning was established at the University. An international DE specialist was recruited as the founding director for the new Centre, which was set up as part of the Vice Chancellor's office. The Centre for Technology-Mediated Learning was charged with leading and managing the University's e-learning initiative, and was funded through the reallocation of six full-time equivalent staff from the Professional Development Centre.

The selection, and design of courses by the Centre for Technology-Mediated Learning were directed using a predictive budgeting tool to inform decision-making on the cost effective implementation of e-learning interventions. A cost analysis was completed before committing any resources for development. The Centre focused its design efforts in two major areas:

- the total redesign of large undergraduate courses so as to leverage the multiplier effect given that 25 percent of the courses offered at the University accounted for 76 percent of the total students;

- the development of high demand degree courses for online delivery.

The Centre had a strong operational research focus aimed at maximising pedagogical productivity in the University through smart implementation of technology. The ability to collect systematic data on the costs of e-learning operations, combined with the expertise of a team of learning designers, enabled the University to improve its system through repeated plan-do-reflect cycles, resulting in a range of incremental improvements resulting in significant savings in the cost of provision[5].

The University was able to leverage considerable advantage with its e-learning initiatives through its strategy of continuous improvement. Given the high level of interoperability of digital knowledge granules, the University had to become an efficient producer of high quality digital knowledge granules in a competitive education market. The pedagogical quality of the digital knowledge granules achieved by the University of New Zealand were commensurate with the respected status of its brand and contributed towards the growth of its e-learning operation. The Centre for Technology-Mediated Learning was responsible for implementing a number of processes and systems that promoted the success of e-learning operations at the University:

- Based on the experience of designing and developing learning objects and using techniques of workflow analysis and productivity research, the University introduced a number of specialised positions for improving the efficiency and quality of its learning resources: learning designers specialising in particular subject domains; digital animation experts; virtual reality developers and project managers specialising in the dynamic cost behaviours of e-learning development and delivery. The additional positions were instituted from 2009 and financed

---

[5] **Saving cost and improving quality through e-learning**: The Pew Grant Program in Course Redesign involved thirty institutions including research universities, comprehensive universities, private colleges, and community colleges from all regions in the United States (Twigg 2003: 30). This project has demonstrated that the total redesign of a course in conjunction with the implementation of online learning technologies can result in significant savings with corresponding increases in the quality of learning. Twigg reports that:

"*results show improved student learning in twenty of the thirty projects, with the remaining ten showing no significant difference... Preliminary results show that all thirty institutions reduced costs by about 40 percent on average, with a range of 20 percent to 84 percent. Other outcomes include increased course-completion rates, improved retention, better student attitudes toward the subject matter, and increased student satisfaction with the mode of instruction. Collectively, the thirty redesigned courses affect more than 50,000 students nationwide and produce a savings of $3.6 million each year* (Twigg 2003: 30).

Focusing on large enrolment courses, the project implements a whole course redesign rather than a single class. Sharing the responsibility for design with the entire teaching team, savings are generated, for example by: eliminating duplication of effort; promoting economies of scale through collective design effort; reducing teaching time in the classroom by substituting lectures with interactive online learning resources and where appropriate replacing expensive labour costs with more cost effective substitutes.

This research project has highlighted and disproved a number of commonly held assumptions in the academy, that disguise and constrain the potential for successful implementation of technology on campus (Twigg 1999). For example:

- *improving quality is usually associated with increased costs* – however the project has demonstrated that it is possible to simultaneously improve quality and reduce costs;
- *the implementation of technology typically adds cost to the equation* – yet whole course redesign using smart implementation of technology can reduce the costs of provision;
- *the reduction in face-to-face contact will reduce quality of learning* – however, research findings show that technology-based courses are at least as good as their face-to-face counterparts.

through realised cost savings and increased student income from the online programmes;
- The reusability advantages of digital knowledge granules spurred the University to engage an external consultant specialising in dynamic simulation modelling to identify the extent that digital knowledge granules could be reused across a range of disciplines, including innovative ways to adapt existing objects in a cost-effective way for a range of different applications. Systematic analysis of the dynamic cost behaviours, when using reusable digital knowledge granules, steadily improved the University's cost leadership in the market, when compared to other competitors in the market;
- Adopting a predictive costing model enabled the University to decide on the optimal selection of carrier and delivery technologies by taking variables like the shelf-life, number of expected enrolments and different pedagogical models into account, prior to committing resources for the development of individual courses.

By 2010 the University of New Zealand had developed a sustainable DE operation and had achieved significant savings in a number of large undergradudate courses. The University was also successful with implementing a strategy of continuous improvement, based on the smart implementation of the technology of digital knowledge granules.

At the same time the University of Phoenix, was beginning to build a respectable brand in the employment market, particularly in curriculum-driven postgraduate programmes, professional postgraduate certificates and the lifelong learning domain. This was achieved through of a combination of factors:

- employing respected and reputable adjunct faculty members from New Zealand and abroad who could engage in asynchronous discussion forums and asynchronous video-mail postings;
- a high profile and targeted marketing campaign;
- an open registration system that was difficult to match with the fixed academic year of the campus-based cohort model;
- a professional course development model that relied on a range of specialisations and sophisticated project management systems that were difficult to replicate in the collegial managerial model of a traditional university; and
- the ability to respond rapidly to changing market dynamics.

The most powerful cost-leadership advantage of this private university was rooted in the fact that the institution did not carry any basic research responsibilities. This cost advantage enabled the private university to incorporate higher levels of customisation in their product offerings than was sustainable at the University of New Zealand. This was achieved by a low student-tutor ratio, where individual tutors could customise the learning experience in ways that were not possible with the University of New Zealand e-learning model. Furthermore, high levels of cosmetic customisation were achieved at the private University through smart implementation of digital knowledge granules.

The sophistication of the private university delivery model, supported by a professional design and development process, and strategic alliances with publishers marketing digital knowledge granules enabled the University of Phoenix to offer qualifications at tuition fees that were considerably lower than those for New Zealand nationals at other competing institutions, despite the fact that they received no government funding support for their programmes.

In 2010 the University of Phoenix announced a 15 percent reduction in their student fees, in response to the growing competition from the online alternatives delivered by local New Zealand universities. The University of New Zealand, was not able to scale-up its operation to comparable levels of customisation in a sustainable way. Within the tertiary education sector, the differentiation between research-led and teaching-led institutions was beginning to grow. Internationally, the powerful respected universities, continued with a strong research-led focus. In the wake of the successes of the private universities like the University of Phoenix, many of the smaller traditional research-led universities were forced to shift emphasis to teaching in order to free-up expensive research costs to support the sustainability of a highly competitive teaching model.

Consequently, in 2010, the University of New Zealand was faced with a difficult decision of reducing its research costs to remain competitive with its teaching. Funding from contract research had declined in the last two years given shifting preferences of the commercial sector to use its own in-house expertise for basic research combined with the wide access to new knowledge made available as open content on the Internet. Given the University's experience and success with the continuous improvement strategy, which it adopted for its DE initiative, combined with its systematic analysis of cost behaviours, the University of New Zealand was in a better position to fund and retain some of its research activities when compared to its counterparts that had accepted technology-mediated learning as a cost addition to the system. However, notwithstanding this success, it was unable to continue funding research at the same levels as in the past. Rather than adopt an "either /or solution", the University decided to differentiate between research-led teaching and pure teaching departments within the University. Nonetheless, the University of New Zealand was able to retain some of its high profile research, largely because of cost savings generated through its DE design approach and small increases in funding from contract research. The rigour of the design approach adopted at the University of New Zealand, has resulted in high quality teaching with noticeable improvements in the retention rates of students enrolled at the institution. In 2015, the Tertiary Education Commission ranked the University of New Zealand as the best institution on the teaching quality dimensions using the Performance Based Teaching Review processes that was first instituted in 2010.

Restructuring for technological change in Scenario 2

The Centre for Technology-Mediated learning adopted a professional course team approach for the design and development of the asynchronous learning resources, based on the knowledge and experience from distance education development processes. Each development was managed as a project, involving a team of professionals consisting of a learning designer, academic authors and multimedia developer. The predictive budgeting tool was used to assist with the development of a design blueprint to ensure cost-effective implementation of e-learning technologies. Prior to the commencement of the development of an online course, a break even analysis was conducted to determine the minimum number of EFTs enrolments required over the shelf-life of the course. Completed courses were evaluated according to the criteria specified in the design blueprint.

The Centre for Technology-Mediated Learning appointed three full-time equivalent learning designers and two multimedia web developers in 2005. Typically the lead time for completing the design and development of a full online course required a calendar year's worth of development. The specified criteria for the University's contestable Teaching Improvement Grant fund of $150,000 were adapted to meet the requirements of the strategic development priorities of the Centre. This funding was used as an incentive to compensate academics for the authoring of learning resources, recognising the additional workload. Each learning designer had the capacity to manage the design of 1500 student learning hours worth of resources. The University has specified a 4-year shelf-life for the majority of online resources, and the design time capacity was divided according to a 3:2 ratio between online courses and course redesign projects aimed at substituting lecture time with interactive online learning resources. Table 4.9 illustrates the total output achieved in the design of learning resources expressed in terms of the equivalent student learning hours of the resources concerned. This table demonstrates how the University of New Zealand was able to increase its income from off-campus students and reduce the cost of some face-to-face courses through substitution of lecturing time with e-learning materials. The total design capacity of 4500 hours of learning materials (3 designers multiplied by 1 500 hours) was allocated between online courses and resources to substitute lecturing time. During the period 2006 – 2009, 72 online courses were developed which could extend reach to off-campus students and 144 face-to-face courses were redesigned to substitute lecturing time resulting in 7 200 hours per annum which could be used by academic staff for other purposes, for example research or further course development.

Table 4.9 Outputs of online learning resources based on learning design capacity

	2006	2007	2008	2009	Total
Total student learning hours	4 500	4 500	4 500	4 500	18 000
Student learning hours for online courses	2 700	2 700	2 700	2 700	10 800
Student learning hours for resources to substitute lecture time	1 800	1 800	1 800	1 800	7 200
Number of online courses developed (150 Learning hours)[1]	18	18	18	18	72
Number of face-to-face courses redesigned	36	36	36	36	144

Notes

1. On average, the course redesign resulted in one third of face-to-face lecture time substituted with interactive online teaching resrouces.

The increased capabilities of interactive communication associated with the technology of digital learning objects contributed to increased blurring between traditional face-to-face and distance education modalities. Face-to-face teaching time was reduced, and replaced by a growing percentage of technology-mediated learning materials. Advances in digital ICTs also resulted in significantly increased opportunities for dialogue-driven interaction. The interoperability of digital knowledge granules facilitated easy migration of learning resources between campus-based delivery and asynchronous DE systems.

The University of New Zealand discovered that conventional face-to-face pedagogy was not well suited to the new modes of delivery. Asynchronous multi-media delivery required a different pedagogy from what the residential academics were accustomed to. Rather than institute specialised training initiatives for academic staff, the University created new areas of specialisation within the organisation through division of labour and built its development process on the course team approach pioneered by the British Open University. As a result, decision-making for instructional design and project planning for distance education projects were centralised within the Centre for Technology-Mediated Learning.

The proportion of courses using the distributed classroom model decreased considerably, given the difficulties of cost-effective scalability. However, desktop video conferencing is a popular communication technology for individual student-tutor consultations. The use of these synchronous technologies is one of the main reasons for the blurring between face-to-face and DE delivery systems. The interoperability standards of digital knowledge granules enabled tutors or students to find relevant objects for remote application sharing in real time. This means that a particular digital knowledge granule could be retrieved in real time from the content repository and viewed simultaneously during the desktop conferencing session. The socialisation dimensions, plus the high levels of individual customisation that could be achieved with these sessions, produced high-levels of learner and tutor satisfaction with the delivery system.

While substantive changes were necessary concerning the pedagogical design approach, the resultant improvements in the quality of the learning experience were perceived to be worth the effort and difficulties associated with changing to the use of digital knowledge granules, to improve the quality of delivery.

The systematic analysis during the design phase of individual courses, combined with the advantages associated with the convergence of technology, helped the University to increase its traditional market base because it could extend its delivery to new markets. For example, students residing outside the geographical area of the University and offshore provision using distance education methods.

The increase of 720 EFTS in 2009 (see Table 4.9), was largely attributable to the new online degree courses. In 2009, the University of New Zealand had developed 72 online courses (the equivalent of three full degree programmes), which were designed for 75 enrolments per course. This resulted in approximately 5 400 course registrations (675 EFTS). An average saving of 45 percent was realised with the redesign of large undergraduate courses. These savings were used to finance the appointment of 44 full-time equivalent staff to support the online teaching initiative. A further two learning designers and two multimedia developers were appointed in 2009 to expand capacity for the development of online resources.

From 2010, the University could not continue with the same levels of design output because the first courses developed in 2005 had come up for revision. On average, the redesign of an existing course required 60% of the initial design effort when compared to a new course, taking into account the necessary curriculum updates. The two new learning designers were allocated to work full-time on the development of online courses, whereas the existing designers continued to work according to the 3:2 ratio between online courses and course redesign of face-to-face projects. The existing investment in online resources that were developed to substitute lectures in the large undergraduate courses (approximately one third of the lecturing hours) was extended to convert these courses into full online format.

In 2010, taking these considerations into account, the University of New Zealand forecast that they would only be able to have 211[6] full online courses (approximately nine full degree courses) by 2015. Given that the majority of academic staff were actively involved in research, the University could not scale up the authoring load of academics for the development and maintenance of new courses (compared with the 70 full online degree programmes offered by the University of Phoenix.) Clearly, in order to compete with the range of courses offered online by the University of Phoenix, the University of New Zealand would need to reduce the time spent on research in order to generate the academic authoring hours required to increase the number of online degree courses to sustain current enrolment levels. In 2010, the University of New Zealand reconfigured the roles of approximately 30% of the academic staff to focus full time on the design, development and teaching of online courses. Through the optimisation of reusable content objects, alliances with selected Universities for content sharing and focused development of online resources the University of New Zealand was able to achieve a sustainable level of 32 online degree programmes, in addition to the campus-based offerings. This was adequate to stabilise student enrolments at 15 200 EFTs in 2015.

[6] Calculated on the design capacity of the two new learning designers working full-time on online courses for the period 2010 till 2015, taking into account the reduced capacity of the remaining design team required to work on the revision cycle of courses four years and older.

In summary, this scenario is best described as leveraging the potential of a production-oriented philosophy through the smart implementation of technology. Codifying organisational experience with the design and development process is a key determinant of its success. The success of this model at the University of New Zealand was based on the systematic analysis of the "production" process aimed at optimising the quality and costs of providing distance learning. The systematic analysis of cost and technology, combined with the flexibility, reusability and interoperability possible with digital knowledge granules, enabled the University of New Zealand to steadily increase its market share in online learning. However, corresponding with these increased levels of flexibility, the complexity of the system increased beyond the levels that organisation could realistically manage. With growing pressure from the market to customise standardised offerings, the cost of variability increased beyond the levels that the University was able to sustain without considerable re-engineering of the University's structures and processes. In the absence of further efficiency gains — that could only be achieved through radical restructuring — the University opted to reduce the high staff costs of research in a number of disciplines. This reduction of research allowed the University to continue competing with its online teaching operations and a changing tertiary education sector.

4.4.3 No pain, no gain (Scenario 3)

Media Release: OpenCourseWare Consortium, March 2015 *The University of New Zealand is honoured with the Global Innovator's Award in Higher Education*

Overview

In this scenario the University of New Zealand develops a pedagogical delivery model incorporating rich digital media that is highly customisable according to individual student requirements. Notwithstanding the popularity among learners for this new delivery model, the development costs of the early prototypes were exorbitantly high. This necessitated a substantive revision of the organisational structures and technology processes in the University. The University of New Zealand builds its future competitive advantage on differentiation through innovation and pre-competitive collaboration in the tertiary education sector. The University is able to generate momentum for next generation pedagogy in a sustainable way. A differentiating feature of this scenario is that collaboration is a precondition for competitive advantage. Technology changes are managed as disruptive technologies that result in new pedagogy, in other words, a market proposition that — pedagogically speaking — is structurally different from that which has gone before. Restructuring business processes has enabled the University to achieve significant levels of unique customisation of learning materials and services for distance students without corresponding increases in the costs of production.

Scenario constructs

Macro scenario matrix	This scenario examines the interaction between a *high* level of systems *innovation* and mainstream implementation of digital knowledge granules in conjunction with a DE business model of *mass-customisation*.

Leadership/ Management model	Leadership through differentiation building generative advantage for "new" pedagogy
Primary rationales for implementation of e-learning on campus	• Finding new ways of implementing technology to enhance pedagogical effectiveness • Successful implementation of creative solutions in a sustainable way
University strategic priorities	• Expanding access to new educational "markets" • Pre-competitive collaboration to spread the risks of innovation
Trend assumptions	• Increases in the government grant for domestic students do not exceed the national inflation rate as regulated through the Fees Maxima legislation • The exchange rate stabilises over the long term at 68 cents to the United States dollar for the duration of the scenarios.
e-Learning design approach	A design and production approach based on a networked organisational design model of mass-customisation. There is no centre or hierarchy regulating the system and the network self-organises through a web of connected individuals and organisations. In other words, the University capitalises on the benefits of disruptive technologies.
e-Learning transformation disposition	Strategic innovation
Restructuring approach with regard to teaching-learning services	Process driven restructuring based on a "fit-for-purpose" approach in achieving a new pedagogical model. • Pedagogical Innovation Research Centre was established with 5 full-time equivalent staff.

Storyline

The University of New Zealand in this scenario did not engage in mainstream e-learning delivery for the sake of technology alone. The University remained focused on enhancing the quality of its campus pedagogy through the sustainable implementation of new innovations. Since 2000, the University of New Zealand has used an open source software[7], learning management system.

Over the years, the University of New Zealand has earned a reputation for research excellence and innovation. The University places a high strategic emphasis on its research-led teaching philosophy. In response to rapid advances in the technology of digital knowledge granules, the University established a Pedagogical Innovation Research Institute in 2003.

The original purpose for establishing the Pedagogical Innovation Research Institute was to promote interdisciplinary postgraduate research and innovation in technology applications for e-learning. The Pedagogical Innovation Research Institute provided a conceptual and physical space for postgraduate research students to work together in multidisciplinary teams to promote basic research and innovation involving technology-mediated learning applications. It was the expressed intention that innovative discoveries that could be scaled-up in a cost-effective way would be rolled out into the University delivery system. The inclusion of administrative departments (like the Information Technology Services Department), helped to ensure that the operational

[7] **Open source learning management systems**: Open source software refers to computer software where the source code is available for modification and adaptation. The software is released free without restriction under an open source license (for example, the GNU General Public License[a]). There are a number of widely used open source learning management systems in the university sector, for example:

- ATutor developed by the Adaptive Technology Resource Centre at the University of Toronto (http://www.atutor.ca/)
- Moodle (http://moodle.org), managed and developed by Moodle (Pty) Ltd in Perth. Recently the British Open University announced an initiative worth nearly £5 million to build on the Moodle open source learning environment resulting in one of the largest installations of the Moodle software (Open University: 2005).
- Sakai (http://sakaiproject.org), a community source project involving partner universities who contribute financially to the development of the project. There are approximately 90 Universities signed up as partner institutions, including for example Australian National University, Harvard University, Massachusetts Institute of Technology, Standford University, University of California Berkeley, and University of Cambridge, CARET

While there is a direct savings in terms of licensing costs, the implementation of open source systems still requires investment in support and development services. A recent study on the total cost of ownership for open source systems ranges between 56 percent and 76 percent of the cost of maintaining a proprietary equivalent (BECTA 2005: 22). This study confirms the potential for sustainable savings with the use of open source software solutions on campus.

Note:
a. Originally written by Richard Stallman for the GNU project and provides users of the software the following legal rights or *freedoms*:

- the freedom to run the program, for any purpose.
- the freedom to study how the program works, and modify it. (Access to the source code is a precondition for this)
- the freedom to redistribute copies.
- the freedom to improve the program, and release the improvements to the public. (Access to the source code is a precondition for this)

realities of enterprise-wide technology applications could be factored into the research work. At the same time postgraduate students were able to gain practical experience with functional research in a real organisational context. In this way the University of Zealand was able to replicate the conditions of Mode 2 knowledge production[8].

The early champions responsible for establishing the Institute had begun experimenting with the new digital communication technologies in teaching-learning situations. They realised early in the process that they were dealing with a kind of learning behaviour that was considerably different from the learning behaviours they had become accustomed to under the expository teaching and the receptive learning model associated with classroom-based lectures. In virtual learning spaces, students are able to initiate a wide range of learning activities that are not directly regulated by the instructor, such as:

- student-controlled sequencing and navigation of non-linear texts like hypertext (thus enabling learners to determine their own unique path through a variety of materials);
- self-directed discovery of third party content (in other words content that was not authored by the teaching organisation concerned nor necessarily intended for the student to consider for the purposes of the course) as in the case of browsing the web and searching other accessible databases for supporting learning materials; and
- extensive opportunities for a range of communicative interaction within and outside the student cohort (for example asynchronous discussion forums, Listserve groups, e-mail, video-mail, web conferencing) all independent of the student's geographical location.

Virtual learning spaces were unexplored territories (from a pedagogical research perspective) and the establishment of this innovation unit was a conscious decision to begin finding answers to challenging academic and organisational questions.

The list of research projects conducted under the auspices of the Pedagogical Innovation Research Institute included, for example, work on: the pedagogical applications of desktop virtual reality; intelligent ontology systems for learner driven navigation of knowledge objects; Human Computer Interaction (HCI) research with particular emphasis on portable access devices and broadband multi-media communication; neurological research on learning retention from multi-mode, multi-media stimuli; enterprise modelling and organisational design optimisation for professional networked organisations; intelligent software automation and systems design, building on the technology of rapid application design; modelling languages for educational applications; and the psychology of virtual communities.

In 2005, the University of New Zealand won a competitive bid from the Government's eLearning Collaborative Development Fund to build an authoring tool that would enable academics to design and publish their own interoperable learning objects, without the need to become proficient in hypertext mark up. An amount of $1.2 million was awarded for the development of the eLearning XHTML Editor (eXe), an open source software project. In comparative terms, this grant equalled the total operational costs of the Professional Academic Development Centre. Eight full-time equivalent staff were appointed including six developers and two learning designers. As of 2004, the Pedagogical Research Institute had 13 full-time staff and 6 postgraduate interns working on their respective research projects.

An amount of $100 000 was set aside to compensate academic authors for the content development in the Facluty e-Learning Pilot project. (see below). The remainder of the eLearning Collaborative Development funding was used to hold a series of user group meetings with representatives from the tertiary education sector in New Zealand and

[8] See discussion on differences between Mode 1 and Mode 2 knowledge production covered in the exposition of the knowledge society in Section 1.3.1 of Chapter 1.

"bounty" projects for the development of discrete components of code required in the project where other Universities in New Zealand were contracted assist with these projects. In this way the University of New Zealand was able collaborate with other institutions to spread the risks and costs of strategic development in the future, given the open source philosophy of working together on technology infrastructure. The skills acquired by other institutions through these commissioned code development projects would contribute to the long term sustainability of the eXe project.

The architecture of the eXe project was based on the philosophy of separating *content* and *form* in the way digital information is stored, by using the structural components of eXtensible Markup Language (XML) in conjunction with a human-computer interface that is easy for non-technical users to use[9]. In this way the project established the potential for the technology to generate unique learning situations dynamically based on the interaction between *what* to teach (content) and *how* to teach it (form). The innovation of this instructional system was instrumental in establishing the technical foundations for intelligent automation of learning design to generate pedagogically sound instructional strategies appropriate for autonomous self-directed learning. Thus the eXe project would be capable of implementing a DE model based on mass-customisation.

After eighteen month's development on the eXe project, there were 70 000 users of the software from 121 different countries. The software had also been translated into 13 different languages by volunteers from different parts of the world. Following the international success of the project, in 2006 the eXe project received a further grant from the eLearning Collaborative Development Fund of $700 000 for an additional year's development. This enabled the project to set up a second development node at another tertiary education institution in New Zealand.

In 2006 the Pedagogical Innovation Research Institute proposed the Faculty e-Learning Pilot project whereby a single course from each of the seven faculties in the University would be developed as a pilot project to be delivered in parallel mode (that is face-to-face and asynchronously) using the eXe instructional authoring system. The University of New Zealand also secured a Government contract — largely the result of the expertise and reputation of the University's Business School — to develop and deliver a course for small business entrepreneurs. This course aimed to provide leadership training for the difficult transition phase between the entrepreneurship phase of a small start-up enterprise, and sustainable operational development of a successful business[10]. However, the requirement for this government funded training contract was that the course had to be delivered asynchronously to cater for remote students using a variety of technologies. The University of New Zealand was well-positioned to take on this project because of its work with the eXe project. In 2007 the University of New Zealand conducted a review to evaluate the experience gained from these pilot projects. Key aspects of the review are listed below:

- Focus group interviews with students revealed that the rich multi-media presentation of concepts utilising simultaneous visual (for example, text, static and dynamic graphics, animations, video) and auditory (for example, voice, music, and authentic sound tracks) modalities promoted understanding, learning retention and also reduced the time required for assimilating difficult concepts. These findings were corroborated by the analysis of assessment data. The power of immersive learning environments combined with learner-generated

[9] Refer to discussions in Section 3.4.1 detailing the technology of digital knowledge granules.
[10] In New Zealand, the start-up ratio for new small businesses was considerably higher when compared to international benchmarks, however the failure rate of these start-ups was unacceptably high when compared to international standards.

simulations of content was now developing into an important area of pedagogical research for the University;

- The ability for learners to control the pace of their own learning — according to: individual levels of understanding; personal commitments; and their own learning environments. This was considered an important factor contributing to the high levels of understanding in the different student groups. Students rated the independence and flexibility[11] of this way of learning very highly when compared to the lecturer-controlled pacing of expository learning associated with conventional lectures. For example, a learner struggling with at particular concept had the flexibility to spend more time on mastering the concept concerned, without being forced into keeping up with the cohort enrolled for a traditional face-to-face course;
- The entrepreneurship course was not offered within the constraints of existing academic semesters and students could enrol at any time during the year. Students enrolled for the entrepreneurship course rated the freedom to choose, when to register and when they were ready to sit for the final evaluation as a strong feature of the course. They were thus able to adapt their learning programme according to the specific cycles of activity in their respective businesses;
- Students on the entrepreneurship course welcomed the flexibility to incorporate their own practical experience into the course, integrated with independent research and information obtained from searching the Internet for relevant course material;
- Each student experienced the teaching as a highly individualised and personal learning experience. Students were able to link-up remotely with their respective tutors in a synchronous, one-to-one desktop video conference or alternatively to communicate asynchronously using video-mail to discuss individual learning problems. The added advantage of talking to a "real" person incorporating non-verbal communication such as body language and facial expressions enhanced the levels of personal satisfaction;
- These interactive communication technologies also promoted both formal and informal socialisation within the respective student groups;
- Students were impressed with the levels of content customisation. For example, embedded learning activities and assignments were customised according to selected areas of interest or professional career. This was made possible by the design capabilities of the eXe project because activities could be intelligently customised according to the individual learner profiles supplied by the students on registration;
- Students were also impressed with the capabilities of the eXe instructional tool to customise delivery for different delivery technologies just-in-time. For example, one business manager enrolled for the entrepreneurship course indicated a preference for online delivery of the course. During the course, this business manager unexpectedly was required to undertake a business trip where access to the Internet was problematic. The eXe authoring tool was able to reconfigure and export a text-based version of the learning content for her two-week period of absence. A a customised set of materials, taking into account the learner's level of progress within the curriculum was produced, without corresponding increases to the unit cost of production;
- Individual learners were able to progress through the curriculum using different learning tracks, depending on their own unique prior knowledge and experience.

[11] Asynchronous learning systems provide greater flexibility for learners to progress at their own pace because this is not time-bound by the time-place constraints of the lecture schedule.

Learners with detailed knowledge of a specific area of the curriculum were able to progress quickly through the relevant sections whereas other students, without this prior knowledge were automatically provided with the additional resources and activities to support their own individualised learning.

Notwithstanding the achievements above, the University of Zealand also identified a number of critical problems of a systemic nature with this emerging delivery system:

- The actual costs incurred with the development of the learning materials for the two projects far exceeded the allocated budgets. The internal development costs for achieving the sophisticated levels of component customisation described above had escalated exponentially, despite using organisational design processes that were derived from global best practice of course development for distance learning materials[12];
- Experience gained with designing, developing and delivering the Entrepreneurship course indicated that the University of New Zealand's processes were not ideally structured in order to deal with the short response times for an open enrolment system. For instance, students expected the University to incorporate relevant changes in business-related legislation into the course as they changed in the corporate world;
- The assessment of the entrepreneurship course generated problems that were not anticipated during the design phase of the course. Given the diversity of resources that were consulted by individual students, it was not possible to set a final challenge exam based on a fixed curriculum. This problem was overcome by asking each student to compile a portfolio providing documentary evidence and personal written reflections on their own learning experiences. Clearly, conventional assessment practices were not appropriate for this highly customised learning environment;
- The University of New Zealand had grossly underestimated the time requirements for both the design and development of multi-mode, multi-media resources, as well as the time commitments that were demanded from the levels of technology mediated student-tutor interaction during the delivery phase. Clearly, under the current organisational model, this delivery system would not be scalable. Furthermore, the pilot study demonstrated that decision-making for effective design in this environment was not intuitive, particularly when the organisation's tacit knowledge was founded on campus-based traditions of teaching and learning. For example, the University's administration systems could not deal with the open registration model without a high-level of manual intervention which would become extremely costly in the event that this model were to be extended to a larger number of enrolments. Also, the complexity of matching design decisions with available staff capacity under a mixed-mode delivery model had increased when compared to the single-mode face-to-face model — for instance matching the availability of tutor's time for on-demand video-conferencing when they were also responsible for research work, class lectures and the actual time required for the academic content development of the multi-mode, multi-media, learning materials used in the pilot experiment;

Thus in 2007, the e-learning initiative at the University of New Zealand had reached a critical path decision. The University had acquired first-hand experience of the noteworthy potential of this new emerging pedagogy, particularly with regards to the University establishing a leadership position through differentiation in the tertiary education market space. Operating under existing structures and processes, the

[12] In effect, the cost sustainable levels that are realisable with less sophisticated forms of customisation had been exceeded in the absence of the necessary organisational process transformation. See discussion on the basic approaches of mass-customisation under Section 3.4.2 of Chapter 3, in particular the cost behaviours of mass-customisation depicted in Figure 3.9 and Figure 3.10.

University could not afford to carry the escalating costs of component customisation. Also, the centralised decision-making processes of the University were too slow to respond adequately to the demands of this new teaching environment. For example, the approval process for changes in the curriculum starting from the academic course team and moving through a range of committees (including the Departmental Curriculum Committee, the Faculty Board, and Senate) was too protracted to keep up with the needs of a dynamic market. Furthermore, there was considerable resistance from the majority of faculty members for this new way of teaching.

At the same time, there was increased pressure from a large number of students to extend this new teaching model to other courses (particularly from the students who enrolled for the experimental courses and had had direct experience of these new learning environments). By this time, portable access devices capable of broadband wireless connectivity were affordable and becoming ubiquitous accessories for the majority of students.

Sustainable delivery of this emerging delivery model would be dependant on the University overcoming the following challenges:

- Significantly reducing the cost of the academic time required for the authoring of e-content by adapting and modifying content freely available from the growing number of open content projects ;
- Decentralising the decision-making process associated with the curriculum and learning design of courses to the course-team level so as to improve the response time to external changes;

By 2007, the uptake of social software applications in the educational sector was growing rapidly. Social software refers to the range of software tools that enable people to connect through the Internet and work collaboratively on common projects. Social software allows people to meet and interact together on the Internet in both synchronous and asynchronous situations. Wiki technology was showing the most potential for collaborative authoring of e-content. Wiki software simplifies the process of creating web pages because authors no longer need to develop the skills associated with HTML mark up. Moreover, users from around the world can work on the same document to modify and refine the content. Wiki software keeps track of all changes and has the ability to revert back to any of the previous edits[13].

[13] **Wikipedia the free encyclopaedia**: Wikipedia (http://en.wikipedia.org) is a project dedicated to developing a free content encyclopedia. Wikipedia is an offshoot of Nupedia (http://nupedia.8media.org/) – an earlier but similar initiative to develop a free encyclopedia. Unlike Wikipedia, the Nupedia project had an extensive system of peer review and relied on qualified contributors for articles. The rate of contributions was frustratingly slow, and Jimmy Wales, the founder of Nupedia began exploring ways of starting a complimentary project using a more open approach for contributing and maintaining articles. On 15 January 2001, Wikipedia was launched, using wiki technology for the collaborative development of articles. The project is driven by a compelling vision: "*Imagine a world in which every single person is given free access to the sum of all human knowledge. That's what we're doing. And we need your help*".
In May 2005, Wikipedia recorded more visits than the New York times website and in March 2006, was ranked as the seventeenth most visited website in the world, with more than a million encyclopaedia articles in English.

Corresponding with the implementation of social software in education, a number of Universities began experimenting with open education resource initiatives[14]. This resulted in a growing collection of digital educational resources that were published under open licenses enabling unrestricted use and rights to modify of the materials. For example, the OpenCourseWare Consortium, committed to the free and open digital publication of high quality educational materials, organized as courses had attracted membership from more than 100 Universities from around the world. In 2006, the Commonwealth of Learning set up wiki called "WikiEducator" to support collaborative authoring of open education resources for the Virtual University for Small States of the Commonwealth Initiative. The Virtual University for Small States of the Commonwealth was conceived by the Commonwealth Education Ministers in 2000 and is a consortium of institutions working together in practical ways, enabled by appropriate ICTs to develop the content and the subsequent delivery of teaching (COL 2004).

In 2007, the University of New Zealand took a strategic decision that all content for e-learning delivery at the University, would be developed collaboratively as open education resources. The University of New Zealand opted to utilise the free service provided by Wikieducator.org for collaborative authoring of open content, together with a wide number of open content repositories for reconfiguration of existing content.

Approximately 85 percent of the development cost required for the production of e-learning resources is attributed to the academic time for authoring of the content (Rumble 2002). Using the open content model, the time for authoring was reduced to between 10 and 15 percent of the time when compared to the development of closed content resources. These savings in development time are achieved by reusing and

[14] **Open Education Resources (OERs)**: The concept of Open Education Resources (OERs) was coined by a Unesco forum in 2002 referring to the open provision of education resources that can be used and adapted freely without restriction (Wiley 2006). They include a wide range of resources for example individual learning objects, lecture notes, curriculum outlines and full courses.

Licensing: Typically OERs are assigned one of the "copyleft" licenses which in effect uses copyright law to ensure that every person who receives a copy or derivative work of the resource is legally entitled to use, adapt and redistribute the resource. In practice the original copyright holder ensures future freedom of the resource by assigning a copyleft license to the work and its derivative products. Most OER initiatives are using one of the Creative Commons licenses (http://creativecommons.org) or the GNU Free Documentation license (http://www.gnu.org/licenses/fdl.html).

Universtiy OER projects: There are a growing number of OER initiatives (Wiley 2006). Consider for example:

- The China Open Resources for Education project involving more than 150 universities with more than 450 courses online (http://www.core.org.cn/cn/jpkc/index_en.html)
- ParisTech OCW project involves 11 French universities offering more than 130 courses (http://graduateschool.paristech.org)
- The Japan OCW Alliance incorporates six of Japan's top universities and the project offers over 140 courses
- In the United States of America, there are seven universities with OER projects offering more than 1400 courses, see for example: Massachusetts Institute of Technology (http://ocw.mit.edu); Rice University (http://cnx.rice.edu); Johns Hopkins University (http://ocw.jhsph.edu), Tufts University (http://ocw.tufts.edu); Carnegie Mellon (http://www.cmu.edu/oli); and Utah State University (http://ocw.usu.edu)
- British Open University announces a £5.65 million project to make selected University courses freely available under the Open Content Initiative(http://oci.open.ac.uk/).

Wiley reports that "[a]ltogether there are over 2000 freely available university courses currently online. And more OER projects are emerging at universities in Australia, Brazil, Canada, Hungary, India, Iran, Ireland, the Netherlands, Portugal, Russia, South Africa, Spain, Thailand, the UK, the US, and Vietnam" (2006: Online).

reconfiguring existing open education resources that are developed collaboratively around the world combined with the high levels of automation now possible with the using the eXe instructional authoring system.. Utilising open education resources the savings in development time increased from 60% in 2007 to 85% in 2009 (see Table 4.10).

This enabled the University of New Zealand to expand the number of fully online elearning courses to 258 in 2009, without significant increases in the time required for design and development (See Table 4.10). By 2015, all courses at the University were available in both conventional face-to-face and e-Learning modalities. Approximately 60% of the student roll were studying using the new multi-modal, multimedia delivery alternative, interacting with their teachers and peers using a variety of digital communication technologies.

The University of New Zealand has maintained annual growth rate of 1.7% over the period of review. The new delivery model has resulted in an overall growth of 6% in the total number of international students since 2000 thus maintaining a healthy income statement.

Table 4.10 Outputs of open education resources used for online learning

	2006	2007	2008	2009	Total
Total student learning hours	1 200	7 500	10 000	20 000	18 000
Number of online courses developed (150 Learning hours)	8	50	67	133	258
Savings in design and development time by using open education resources[1]	Nil	60%	70%	85%	

Notes

1. By 2009, the growing inventory of open education resources combined with advances in technology has enabled the University of New Zealand to bring down the time required for course design and development of online materials to 15% of the time required for developing an online course using closed content.

In 2012 an American foundation supporting the development of open source software for education awarded a grant of $2.8 million to the University of New Zealand for further code development of eXe and Mediawiki (the open source software used for Wikieducator.org site) to develop a seamless import-export facility between the wiki and eXe. The practical outcome of this development was to establish the technical capability for local institutions to recontextualise open content for local institutions in a cost-effective way, thus widening access to the the tools for mass-customistation in e-learning.

In March 2015, the OpenCourseWare Consortium honoured the University of New Zealand with the Global Innovators Award in Higher Education. This was in recognition for the pioneering work done by the University of New Zealand in establishing a new technology-enhanced delivery model now being adopted by a growing number of Universities around the world.

Restructuring for technological change in Scenario 3

The Pedagogical Innovation Research Institute was set up from a reallocation of 5 full-time equivalent staff from the Professional Academic Development Centre. The institute was constituted as a joint interdisciplinary initiative involving a number of academic departments, as well as involvement from key administrative departments. An representative advisory board was formed from the founding academic departments including the School of Education, the Department of Psychology, the Computer Science Department, the School of Medicine and the Business School. In addition, the Information Technology Services Department, the Directorate of Postgraduate Studies, the Professional Academic Development Centre were founding members of this initiative. Following the successful grant from the eLearning Collaborative Development Fund, the staff compliment had increased to 13 full-time staff in 2005.

By 2008, ubiquitous access to broadband connectivity was almost universal. The majority of students owned affordable, portable access devices capable of high resolution, multimedia playback using wireless connections to the global digital communications infrastructure. The majority of universities — including the University of New Zealand— had not succeeded in designing and developing enough multi-mode, multimedia learning content to take advantage of the demand for these forms of rich interactive resources now emerging because of students' access to portable playback devices. Traditional universities continued with the tried-and-tested pedagogy of the expository lecture, discussion class, and seminar with the inclusion of multimedia materials only as supporting teaching aids to expository pedagogy.

The relative short supply of multi-mode, multimedia, learning content combined with the increasing student demand for these kinds of materials resulted in a gap in the market that was quickly taken up by the commercial publishing sector.

Commercial production and marketing of multi-mode, multi-media learning objects by the publishing industry for use in the university sector was increasing rapidly. These materials were marketed to university students as a component of the commercially produced text books. The closed digital formats and copyright restrictions left very little room for academics to reconfigure the materials for local use. The publishing industry was extremely successful in moving into this market space. The high costs of producing media rich content resulted in less flexibility regarding individual opportunities for faculty members of the University of New Zealand to author their own learning objects for an entire course. In the past, the lower costs of publishing text books allowed more scope for individual faculty members to author, publish and prescribe customised texts for their own courses. However, the high production costs of these media rich materials meant that locally authored learning objects could not be justified for the relatively small "production" runs of individual universities. Universities were forced to find ways of overcoming the "not-authored-here" syndrome. Notwithstanding these concerns, the commercially-produced learning objects provided greater flexibility to mix and match subcomponents of the curriculum, using a wide variety of learning objects developed with the assistance of academics from all over the world.

The University of New Zealand could not compete with the production costs of the mass-produced digital content. Moreover, the costs of component-based customisation could not be sustained with the University's existing technology processes and organisation structure. This is why the University decided to redesign its technology processes and organisational structures in an attempt to build a new tertiary education market for customisable learning, driven by a research-led curriculum.

Results from the Faculty e-Learning Pilot project had demonstrated the potential of the authoring approach using the *eXe Instructional Authoring System*. In order to sustain the project, the University of New Zealand was forced to collaborate on the development of these technologies and the development of the digital content for this approach of mass-customisation of learning objects. This collaborative strategy was simultaneously a defensive and offensive strategy (Gibbons 1998: 25). It was a defensive strategy because this was a way in which the risks and costs of innovating new pedagogy systems could be shared. It was an offensive strategy because the University purposefully aimed to establish a new market proposition in the tertiary education market that did not exist before. The collaborative ventures resulted in the University of New Zealand acquiring specialised knowledge within the organisation that was difficult for competitors to imitate in the medium term.

By virtue of the Information Technology Department's involvement in the research work initiated by the Pedagogical Innovation Research Centre — combined with the software development associated with the *eXe Instructional Authoring System* — the University of New Zealand had built up organisational competence in the area of innovative software development. In particular the small development team had developed highly specialised skills. This in-house capability in the area of software development promoted flexibility for the University's emerging technology strategy because they were able to adapt to alternative paths of development with relative ease. Also, the University's ICT development philosophy was driven by pedagogical needs, rather than by technology-push behaviours normally associated with commercial ICT application's development in education.

The critical success factors of the University of Zealand's technology strategy are summarised below:

- The technology strategy for e-learning was founded on getting the soft-processes of flexible design for multi-mode, multimedia pedagogy right, recognising that the hard technologies would continue to change and evolve at a rapid pace;
- Collaborating on pre-competitive infrastructure that is not core business of the university, recognising that successful competition would be derived from specialised knowledge required of implementation;
- Building a technology strategy recognising that the future processes of DE design, development and delivery will now be based on a design model as opposed to a production model[15].

Early in the history of the Pedagogical Innovation Research Institute, it became clear that the project was working towards establishing a new delivery methods and not simply using modern technologies to replicate existing pedagogical modalities. The new pedagogy was capable of providing:

- learner driven multi-sensory learning materials in ways that were previously not possible;
- quantitative and qualitative improvements in opportunities for individualised forms of interaction;
- increased possibilities for intelligent, automated generation of a variety of pedagogical methods just-in-time according to learner driven preferences; and
- automated tracking of a wealth of learning research information that could be fed back into the delivery as part of a dynamic system.

The research team observed notable differences in this new way of learning: for example unique learning paths through resources that were generated by the learners and not the instructors; the inclusion of a wide range of content through browsing and researching the Internet that was not planned as part of the original course; the opportunities for increased synchronous and asynchronous interaction irrespective of time and place (via e-mail, web cam and video mail) — previously asynchronous communication (e-mail, letter, facsimile) over a distance could not carry non-verbal communication effectively.

[15] The previous mass production paradigm entailed the *production* of uniform parts for a uniform product, whereas customisation for mass provision focuses on the *assembly* of reusable parts into a unique, individual product (see Chattel 1995:57).

The resultant pedagogy was structurally and qualitatively different from conventional expository teaching and receptive learning. The new pedagogy became the cornerstone of the redesign and reconfiguration of processes at the University of New Zealand.

The organisational approach adopted by the University of New Zealand for content development and reconfiguration is best described as a networked model. Decisions on specific changes and modifications to the open content materials were taken by individual academics who use the resources in their courses. The transparency provided by resources developed collaboratively on the Internet has resulted in a networked system of peer review where academics from around the world continue to contribute to the ongoing refinement of the materials. There is no predefined hierarchy or centre for decision-making, yet this complex system self organises development priorities and the quality of the resources through a networked community of scholars.

The combined effect of these approaches has transformed the University of New Zeland into a post-Fordist institution as measured by:

- the high levels of product innovation;
- the significant potential for varying development processes according to the specific needs of individual projects; and
- the high levels of labour responsibility at the project development level[16];

4.5 Conclusion and reflections

This chapter concludes with a summary of the key decisions and trade-offs associated with the three scenarios. This will be used as a conceptual framework for the concluding chapter, which will examine the benefits and limitations of scenarios as a tool for enriching strategic management of university futures. In this section a number of reflective observations will be highlighted. Finally, a summary of the answers to the original research questions is considered in the light of the outcomes of the scenario storylines.

First, it is necessary to point out that the scenarios have been developed from the perspective of an individual organisation operating within an increasingly differentiating market space. This means that individual decision-making at the institutional level interacts with the consequences of the aggregated decision-making of the other institutions in the same market space. As a result, the generic principles of competitive advantage operating within a heterogeneous market apply.

The diversity of the demand for tertiary education will support a wide range of delivery alternatives and institutional arrangements, including for instance the financial influence and reputation of the powerful universities like Harvard, MIT and Oxford; the smaller universities who may (or may not) decide to consider mergers or other partnerships; institutions that focus on teaching as opposed to research; the market split between publicly-funded and for-profit universities; and a variety of new institutional forms resulting from partnerships and agreements between the forms already listed[17]. Moreover, the ways in which e-learning strategies evolve in each institution are likely to be different. For example, the way digital technology strategies and asynchronous systems will evolve at traditional campus-based institutions is likely to be very different from how these technology strategies will evolve at single mode DE institutions. Peters

---

[16] Refer to the discussion on post-Fordism in Section 2.3.2 of Chapter 2 and Table 2.5 in the same section.

[17] See also the discussion on the changing dynamics of competitive advantage in the DE sector in Section 3.3.1 of Chapter 3.

states that "[w]hen a conventional university and a distance teaching university transform into a virtual university the result can never be the same" (2002: 143). This reiterates that differentiation in the sector will continue, but more importantly that the single mode DE universities already have a tradition of supporting individual students in asynchronous learning systems and that this can assist campus-based institutions in understanding the demands of evolving pedagogy. Also, knowledge is mobile; therefore, it is possible for traditional universities to benefit from the experience of single-mode DE providers.

It is improbable that e-learning — or the so-called virtual university — will replace conventional campus-based institutions. Rather, alternative forms of existing and future provision will operate in parallel to the existing campus-based pedagogy. At the meta level, the changes that are likely to be observed with regards to e-learning will be the changing proportions of learners choosing to study among the dominant delivery forms: 1) technology-enhanced campus pedagogy including opportunities for asynchronous learning; 2) technology-enhanced distance education (referring to the adoption of digital technology within the single-mode DE delivery model); and 3) multi-mode, multimedia delivery systems envisaged as a new pedagogical modality (that could be adopted by existing institutions or new emerging institutions). These three modalities of technology application in learning were introduced as independent value networks when discussing the difference between sustainable and disruptive technologies in DE (see Figure 3.5 in Section 3.3.2 of Chapter 3).

The point is that when operating within differentiated markets, managers must recognise that strategic decisions will involve trade-offs. These are the trade-offs that university leaders must consider when taking strategic decisions about the future of e-learning within individual organisations, as well as the potential impact of these decisions on competitive advantage within a differentiated market.

For example, integrating technology-enhanced options of delivery within a campus-based delivery system, without changing anything else in the system, would result in technology becoming a significant cost addition to the system. The anticipated benefits would arguably be greater flexibility for campus students, as well as quality enhancements of the face-to-face learning experience. Consequently, the trade-off of this decision is having less money with which to do other things in the university system. Viewing online learning as a costly add-on to an existing system is not an unusual approach. For instance, a recent survey on online learning within universities of the Commonwealth found that only 20 percent of the universities in this study had purposefully adopted online learning strategies aimed at reducing the cost of provision over the long term (The Observatory on Borderless Higher Education: 2002). It appears that many universities have adopted online learning strategies as a rationale driven by "keeping up with the competition" (see The Observatory on Borderless Higher Education: 2002) — notwithstanding the added cost of provision. It is disconcerting to note that after weighing up the evidence of current practice that the additional cost of e-learning at most institutions has not resulted in qualitative transformations in the way academics teach (Zemsky & Massy 2004). It appears that e-learning at most campuses is limited to the convenience factor of online access to classroom resources like lecture notes and slideshow presentations (Zemsky & Massy 2004). Consequently, if the cost of e-learning has not resulted in significant quality gains — what are the tradeoffs that universities have made?

It is insightful to carry out a trade-off analysis of the three scenarios depicted in this chapter. There are a number of trade-off perspectives that could be analysed, but for the purposes of this conclusion, I will consider the managerial approach that was adopted in each scenario with reference to DE futures and its corresponding trade-offs for the university functions of teaching and research.

Nipped in the bud: A revolution averted (Scenario 1)

The dominant managerial approach of this scenario was to maintain the tried and tested collegial managerial model associated with the academy. The strategy was to continue carrying out basic research for public good derived from the University's research-led teaching philosophy. Online learning strategies were taken on board as a response to keep up with competition, to improve quality, and to enhance flexibility of delivery. The market trade-off for this particular scenario is that the University of New Zealand was forced to become more elitist because the more cost-effective forms of online delivery associated with competency-based curricula were taken up by other providers. Thus the University was not able to establish competitive advantage for its e-learning attempts neither in terms of quality nor price. The University was, however, able to retain its leadership in research as well as the organisational structures associated with a traditional collegial managerial model.

Nothing succeeds like success (Scenario 2)

The dominant managerial approach of this scenario was to achieve cost leadership in terms of the quality-price differential, through a highly centralised planning model with regards to e-learning. The University achieved considerable success with expanding its access to quality teaching and was able to establish competitive advantage regarding its e-teaching. But the trade-off was a reduction in the resources available for basic research, necessitating differentiation between pure teaching and research-led teaching departments. In addition, the University was forced to adopt a more competency-based curriculum particularly with regards to the rapidly growing lifelong learning market.

No pain, no gain (Scenario 3)

The dominant managerial approach of this third scenario was to achieve leadership through differentiation, culminating in the development of new pedagogy — a market proposition that did not exist before. The university was able to retain its basic research operations and adopt a more collegial managerial model through decentralisation. But the trade-offs were represented by a redesign of University structures and technology processes, combined with a total redesign of the pedagogical model from an expository model to one which facilitated autonomous self-directed learning.

Such a trade-off analysis is a useful approach to identify the key differences among the three scenarios and will be used as the conceptual framework for the concluding chapter. At the same time, it also illustrates the necessity to view scenarios within the workings of a dynamic system. It is dangerous to view these high-level summaries when they are divorced from the detail of the individual scenarios. While each of these managerial approaches may seem to be plausible alternatives for individual universities, they represent the complex interplay between the situational dynamics of the individual uncertainty matrix. For example, the management of a typical campus-based university with a strong history of conducting basic research is less likely to change its approach to one of centralised managerialism. However, if the same university were faced with the challenges of a high level adoption of digital knowledge granules and mass-customisation within the tertiary education market, the rational for the choice of centralised managerialism becomes more apparent.

The point is that, while it is tempting to compare the different scenarios at face value, analysts must remember that each scenario is the result of the interplay among a unique set of variables. The predetermineds are the same for each scenario, but the **uncertainty matrix** for each individual scenario is **different**. Each scenario is the outcome of the recursive interplay between managerial decisions and the unique contextual factors of each uncertainty matrix. Herein lies the power of the technique because it can use the potential of conceptual modelling within the context of a dynamic situation while mere forecasting techniques are unable to do this.

This section concludes with a reflection on an important historical parallel. Perhaps it is providential that the first move towards multi-mode, multimedia, learning objects will be led by the commercial for-profit sector including a number of new innovative alliances. Interestingly, the evolution of single-mode DE shows a similar history. The commercial correspondence schools led the establishment of distance teaching in the mid-nineteenth century (see for example Peters 1998: 110). The genesis of formally organised distance teaching was created for the aim of realising profit. Education was not the primary driving force. The growing demand for new skills from "industrial man" to progress within the industrial economy fuelled the early successes of the correspondence schools (not to mention the abuse of some unscrupulous providers). It was not until 1946 that the university sector was prepared to set up a single mode DE institution. Weighing up the evidence, it seems plausible that history might repeat itself in that the commercial sector will lead the transformation to the next generation of pedagogy, with the university only coming on board some years in the future. In this new era of the global knowledge society, the question that remains unanswered is whether or not the university will be able to regain is market share in the tertiary sector after the initial turbulence. Will society continue to value the benefits associated with: the interaction with a community of scholars, a passion for autonomous generation of new knowledges, combined with the integration thereof into a culture of learning? At the same time, will society continue to pay for an education underpinned by the traditional benefits associated with a university education?

In contrast, there is a unique opportunity for the university sector to lead the generation of a new pedagogy. Hopefully, then, this will be driven not by profit motives, but by the compelling question of how to maintain the demonstrated benefits of a university education in a sustainable way within a complex and rapidly changing environment. This naturally assumes that the functions of the university are essentially good for society. Perhaps the leaders of the academy will need to consider whether or not it's appropriate to rethink the value propositions underpinning the university of the future. The responsibility of contemporary university leadership and management necessitates the requirement of understanding the functions of a university when comparing strategic alternatives. Scenario planning is a technique whereby mental models can be used to promote understanding, regarding the relationship between these functions and future outcomes of strategic choices within a complex dynamic system. Establishing pedagogical leadership should be a conscious management commitment to make the future of the university happen within manageable levels of risk, rather than by committing the institution's future to speculation and conjecture.

4.5.1 Concluding reflections on the original research questions

The objective of this study was to apply contemporary management thinking connected with the concept of "knowledge innovation" as a strategic leadership intervention to develop foresight into probable futures of university DE teaching systems. The research project has applied the technique of scenario planning and is a conceptual study guided by the following broad-spectrum questions introduced in Chapter 1:

- *Why* is transformation in the tertiary sector looming with particular regards to ODL provision?
- *Where* should thinking about the future begin? — In other words, what can we learn from relevant experience as a starting point for building scenarios on the future of DE provision?
- *What* are the major uncertainties that are likely to have the most significant impact on the future of DE delivery systems at university-level?
- *What* plausible alternatives can be generated for the future of ODL provision?
- *What is* the value of the scenario planning technique as a tool to assist with leading university futures with the adoption of DE technologies*?*

The research reported in this study has sought to answer more detailed aspects of these guiding questions, and a summary of the major findings is provided here. In this concluding reflection it is now possible to draw on the insights derived from the individual scenarios. However, the final question concerning the value of scenario planning will be discussed in Chapter 5.

Question 1

What are the fundamental driving forces that are likely to influence the transformation of higher DE provision in the future and how significant are these drivers of change likely to be?

The study departed from the premise that there are forces at work that are likely to reshape the futures of higher education in general and DE in particular (Turnoff 1997). A dynamic systems approach was adopted to analyse these forces. The research methodology employed in this study recognised the existence of a recursive and dynamic interplay among the key forces themselves but also a recursive relationship concerning: first, how this forces are likely to influence higher education; and second, how higher education systems are likely to influence the forces at play. Three dominant forces where interrogated and problematised with particular emphasis on how they might have an effect on the eternal triangle of reducing the costs of university provision, while simultaneously increasing the quality of, and access to university-level education.

Global knowledge society

The global knowledge society represents a shift towards a "technological paradigm" (Castells 1996: 91) where the economy is both global and informational in that the economic and social processes of production, consumption and circulation (including the components of capital, labour, raw materials, management, information, communication, technology and markets) are now organised on a global scale (see Castells 1996: 66). The thesis accepts the assumption of discontinuity (with corresponding justification) thus viewing the global knowledge society as a distinctive new economy (with due acceptance that this is a contestable point of departure). The thesis has argued the existence of multiple knowledges (for instance, explanatory knowledge, instrumental knowledge and technological knowledge) and has noted the dynamic of evolving epistemology as suggested in the shift from Mode 1 to Mode 2 knowledge production (Gibbons *et al* 1994). While the global knowledge society is considered to be a distinctive new economy, it is not seen to replace the industrial paradigm but rather subsumes it in growing proportions.

In each of the scenarios the threat of borderless education was perceived as a "crisis" providing impetus — a catalyst for change — for the University of New Zealand to respond. Yet the nation-state bond between public universities and society has been sufficiently strong for the period under review constraining radical changes in the local market dynamic with particular reference to borderless education. Furthermore, it would appear that the capital divide between wealthy and developing nations will continue to mitigate against explosive growth of borderless education for institutions intending to expand delivery into developing societies, simply on the grounds that students from developing societies cannot afford the international tuition fees of universities operating from highly developed countries.

The actual performance of the early online providers targeting the online education market appears to confirm this observation. For example: the slow rate at which degree courses are being developed for U21 Global; the relatively low student numbers participating in the Western Governors University project (Morrison & Mendenhall 2001); the imminent restructuring plans for the United Kingdom's eUniversity (HEFCE 2004; Schmoller 2004); the closure of many of the for-profit online ventures at a number of universities including New York University, Temple University, the University of Maryland University College and the shutting down of Fathom by Columbia University (Carlson 2003). It is too early to speculate about the demise of the vision (or national threat) connected with borderless education because it is highly probable from a technological point of view. The current lull may represent the chasm between early adopters and the early majority. Furthermore new technologies like digital knowledge granules may radically alter the feasibility concerning a sustainable business model for borderless education. Time will tell.

The contemporary nature of information itself as the new economy's dominant resource is the main characteristic of the global informational economy that has propelled change in each of the scenarios. Wulf sums up the challenge for universities as follows:

> *Knowledge — its creation, storage, and communication — is part of the essence of a university. The ability to process information, the "raw stuff" of knowledge, thus sits at the heart of what a university is and does. A technology that alters that ability by orders of magnitude cannot avoid having an impact on at least how the university fulfils its mission — and possibly on the mission itself.* (2003: 15).

Unlike the traditional factors of production, information expands as it is used (Cleveland 2000: 56). Moreover, digital information can travel at the speed of light, is therefore highly mobile, it cannot be owned (only its delivery service is proprietary) and finally the "spread of knowledge empowers the many by eroding the influence that once empowered the few who where in the know" (Cleveland 2000: 56). Noticeably societal relationships concerning the university's traditional custodianship of knowledge production and dissemination thereof are changing. This combined with newfound institutional arrangements and digital communications technology; it is becoming increasingly easier for new providers to enter the higher education market.

While these developments may be disconcerting for some, others see huge opportunity like John Chambers, CEO of Cisco Systems, who for instance says: "The next big killer application for the Internet is going to be education. Education over the Internet is going to be so big it is going to make e-mail usage look like a rounding error" (Chambers, cited by Irvine 2001: 1).

Massification of higher education

This driver of change is not limited to an account of the continued exponential expansion of global tertiary education provision since the Second World War, but more importantly signifies a philosophical shift away from elitism. Gourley sums up the ethical imperative associated with the massification of higher education when she asserts that we "have failed the greatest moral challenge of our time if we cannot make Open Distance Learning (ODL) happen, for all the peoples of the world wherever they may be" (2002: 2).

UNESCO's "Education for All" (2000d) objectives now incorporate a strong higher education focus in recognition of the growing need for specialised skills in the knowledge economy combined with the disappointingly low tertiary education participation rates in many parts of the world. Expanding access to pre-service tertiary education and lifelong learning constitutes a major driving force for each of the scenarios in this thesis. In particular, DE is seen as an important strategy by each of the scenarios to expand access beyond local geographical boundaries and given the pressures to do more with less, reaping the gains from potential cost-efficiencies of e-learning has also urged the scenarios to search for ways to effectively integrate distance learning into their existing delivery systems.

Advances and convergence associated with digital ICTs.

The unparalleled velocity of technological change combined with phenomenal cost reductions in digital ICTs has enabled many traditional campus-based universities to incorporate DE into their delivery systems. "A year ago, there was no chancellor or president in the country who didn't say that universities should be seriously thinking about online courses" (Carr 2001: 43) — a situation very different from the beginning of the 1990s where very few campus-based universities would admit to strategic plans for mainstream distance education delivery.

The most significant characteristic concerning the potential for change in education is the convergence among telecommunications, computing and recent developments in the cognitive sciences. In short, the convergence of technology "will change the ways in which we can impart knowledge and skills" (Dhanarajan 2000: 13). This represents a quantitative and qualitative advance "that will change universities" (Daniel 1999e 13).

Significance of these drivers

The thesis has conducted a detailed analysis of the findings from a wide range of researchers who contend that the university is on the verge of deep-seated, pedagogical transformation resulting from the interplay among the drivers of change summarised above (see for example: Dhanarajan 2000; Drucker 1997a; Duderstadt 1999; Gibbons 1998; Peters 2002; Readings 1996; and Taylor & Eustis 1999). While the assertion of fundamental pedagogical transformation can be contested from a variety of different perspectives — most notably the absence of empirically verifiable models of mainstream institutionalisation of the "new" pedagogy — there is sufficient acceptable evidence to verify the plausibility that such futures may exist, and consequently this meets the minimum acceptable criterion for building scenarios in accordance with the technique of scenario planning (see Van der Heijden 1996 & Schoemaker 1998). Scenarios are **not** predictions of the future, but are rather strategic planning tools to examine assumptions about existing and future business models (Wilson 1998: 81). For example, if the unique interplay among the factors in Scenario 3 were to materialise, how would your University respond?

Each scenario storyline depicts a course of action that is significantly different from the usual business model associated with traditional campus-based universities. In this regard the factors identified under Question 1 above, suggest that these drivers of change are likely to be significant for university futures. At least, the scenarios have proved that it is possible to generate plausible and conceivable university futures that are different from the traditional delivery model, and for this reason these drivers of change require ongoing, careful and rigorous analysis.

Question 2

What can we learn from the history of DE and large-scale ODL provision with particular reference to its defining characteristics and does this provide insight for building future scenarios of this form of education provision?

Single-mode distance learning universities offer the most mature experience of institutionalised technology-mediated teaching at university level. Consequently a study aimed at generating foresight into probable futures of university DE teaching systems, must carefully consider what we can learn from the history of existing examples of technology-mediated teaching because the future of e-learning is also a form of technology-mediated teaching and learning.

This analysis has revealed that providing DE at scale has specialised pedagogical, systemic and organisational requirements that differ from those associated with traditional campus-based learning.

Primary analysis reveals that distance education is a unique form of provision when compared to traditional face-to-face provision. A more detailed analysis of DE — drawing extensively on the work of Otto Peters — has demonstrated that it is the "most industrialised form of teaching and learning" (Peters 1989: 7). As such, DE is structurally different from face-to-face teaching, not only systemically but also — more importantly — that DE is pedagogically distinct. This raises a fundamental question for the research reported in this thesis: Assuming the theory of discontinuity, if DE is analogous to the "second wave" social order of industrialisation, will the new knowledge economy give rise to a "new" pedagogy that is structurally different from what has preceded it? In preparing to answer this question, further analysis of the Fordist and post-Fordist organisational models with particular reference to DE was necessary. The summarised conclusion to this basic question, as derived from the scenario storylines, is provided under the heading of the fourth research question below.

Of particular interest is the fact that the evolution of the open universities was underpinned by a humanist philosophy to expand access to tertiary education driven by the fundamental right of every adult to have access to education. To realise this vision, teaching and learning had to be separated in time and space. Therefore, the evolution of the open universities was guided by an educational vision and technology was the enabler (not the driver).

In today's world the relationship between vision and technology is recursive. The vision for universal access to higher education through ODL is arguably receiving higher prominence today than before. It is therefore a powerful driving force for ICT enabled expansion. Consider for instance UNESCO's *World Declaration on Higher Education for the Twenty-first Century* which stresses the importance of utilising the potential of digital ICTs to achieve the ideals of universal enrolment in higher education (see UNESCO 2002: 88). In unison with this vision, technology is simultaneously a driver and enabler because exploring new modes of learning (next generation pedagogy) is enabled by the inherent capabilities of the convergence of digital and cognitive technologies themselves but is simultaneously driven by the inertia of deploying DE technologies in education.

Question 3

What uncertainties or factors could have a significant impact on future DE delivery systems and innovation, particularly with reference to those factors where the outcome is unknown?

In researching the answer to this question, it was necessary to analyse the competitive advantage of DE within the higher education sector. DE was found to be one of the largest growth segments in the tertiary education market — a market characterised by unprecedented volatility. This analysis found Christensen's (2000) distinction between sustaining and disruptive technologies to provide a useful explanatory framework to distinguish how DE futures might evolve in the future at different types of institutions. Pre-scenario analysis using this framework suggests that:

- DE futures at campus-based universities would evolve differently from DE futures at the large-scale single-mode ODL universities, where the dominant influence for change is driven by sustaining technologies;
- The potential for the emergence of a new pedagogy, that is structurally different from that which preceded it, is plausible in the event that the dominant influence for change is driven by disruptive technologies;

A holistic view of technology was adopted, namely that technology is the application of codified and tacit knowledge to practical situations incorporating the confluence of ideas, people, processes and techniques and is therefore not limited to computer hardware (see Daniel 1999a: 10). As a result it is not possible to identify a categorised list of hard technologies as either sustainable or disruptive. In accordance with the scenario planning technique, two uncertainty factors were identified based on the understanding that they must meet the following criteria:

- First, they must have the inherent potential for radical change to the existing business model; and
- Second, the future outcome of these factors must be unknown;

Pedagogical systems innovation resulting from advances in the technology of digital knowledge granules (learning objects) was identified as the first uncertainty and the dominant business model as represented by Fordist and post-Fordist orientations was identified as the second high-level uncertainty. The unique interplay among these uncertainties within the total system including: the drivers of change (Research Question 1); and the rules of interaction derived from the unique nature of DE systems (Research Question 2) would determine whether emerging DE technologies are sustaining or disruptive.

Given that the future outcome of the uncertainties is unknown, a detailed analysis of two clear-cut states of each uncertainty was carried out:

- *Pedagogical systems innovation* represented by minor versus radical change in the technology of digital knowledge granules; and
- *The dominant ODL business model* represented by a Fordist approach of mass-standardisation versus a post-Fordist approach of mass-customisation.

The resultant two-by-two matrix identified three valid scenario quadrants. These scenario quadrants provided the structural framework for each scenario.

Question 4

What innovation alternatives (scenarios) can be derived or generated from the conceptual building blocks analysed in the thesis and what are the implications of these scenarios for evolving DE pedagogy and those who are likely to benefit from alternative scenarios?

Three scenarios were developed as part of a complex dynamic system concerning the interrelationship among: the drivers of change, basic trends, rules of interaction and the uncertainty matrix. The respective uncertainty matrix of each scenario is summarised below:

- *Nipped in the bud: A revolution averted* (Scenario 1) assumes minor change in existing technology of digital learning objects under a Fordist organisational model of mass-standardisation[18];
- *Nothing succeeds like success* (Scenario 2) is developed from the starting point of radical change in the technology of digital knowledge granules in conjunction with a Fordist organisational model of mass-standardisation.
- *No pain no gain* (Scenario 3) supposes radical progression in the technology of digital knowledge granules combined with a post-Fordist organisational model of mass-customisation.

Observing the practice of technology adoption in higher education it would appear that on the one hand, as affordable opportunities for asynchronous delivery increase corresponding with advances in technology, face-to-face institutions would expand their levels of distance learning provision. On the other hand, as affordable opportunities for synchronous interaction increase through advances in digital ICTs, single-mode DE institutions will continue to incorporate escalating levels of synchronous dialogue and interaction into the distance learning experience. This may appear to suggest that there is a convergence or blending between traditional face-to-face and DE organisational forms. However, as evidenced in Chapter 2, the organisational structures, processes and corresponding pedagogies of the two forms of provision differ considerably, and in the absence of structural changes the blended learning observation does not hold true.

Hence the way technology enhanced DE develops at face-to-face universities will differ from how it is likely to evolve at large-scale single mode DE institutions when technology is adopted within the organisation as a sustaining technology (see for example Figure 3.5 in Section 3.3.2 of Chapter 3). This is an important qualification because the scenarios have been developed from the perspective of a traditional face-to-face university, and have not considered the impact on single-mode DE providers. This distinction can be traced to the different roles that technical media play in face-to-face and DE forms of provision. In the case of campus-based teaching media is traditionally an adjunct used to support face-to-face pedagogy, whereas in DE technical media actually carry the functions of teaching. This is a structural difference because the specific roles media adopt in the teaching-learning situation change the pedagogical function and corresponding structures (Peters 2003: 87). Similarly, if the capabilities of future digital media change in fundamental ways — then it is plausible to contemplate further changes in pedagogical structure. Already digital media and the Internet have resulted in foundational changes. First, the Web can simultaneously provide something to talk about and the means to hold the conversation and as such is the first universal communication technology with this capability (see Brown & Duguid 1995: 16 and the

[18] This scenario matrix should not be misread as a status quo scenario for traditional campus–based universities, because the attempted levels of DE provision in the scenario far exceed the norm for a traditional face-to-face university and the scenario introduces systemic structural challenges into the organisational design of a traditional university. These structural challenges place pressure on the collegial organisational model and agrarian-like pedagogy.

discussion on the origins, description and characteristic feature of digital learning objects in Section 3.4.1 of Chapter 3). Second, the new digital media are multi-modal which means that they employ more than one sensory channel and simultaneously create opportunities for interactivity.

Thus, in education we must consider the possibility of disruptive technologies resulting in a "new" mode of delivery for the future, which will look completely different to a conventional face-to-face university, but also completely different to the traditional single-mode DE university model. These distinctions are evidenced in the differences between the first two Scenarios and Scenario 3:

- *Nipped in the bud: A revolution averted* (Scenario 1) implemented DE technologies without significant changes to its processes or structures. The adoption of DE technologies without substantive changes elsewhere in the system generated difficulties with regard to sustaining the economics of the system. This necessitated increases in student fees and cutting back on the levels of DE delivery in order to maintain existing levels of research output. Very few pedagogical changes were implemented other than asynchronous delivery of media used in the face-to-face situation. However, there were efficiency gains for students when considering the convenience factor of remote access to classroom resources and the ability to carry out administrative procedures online. Scenario 1 is an example of DE technology being deployed as a sustaining technology (Christensen 2000).
- *Nothing succeeds like success* (Scenario 2) adopted a system of continuous improvement when implementing DE technologies. In short, the University of New Zealand replicated the processes and structures required of technology-mediated learning thus recognising the structural differences between face-to-face and DE pedagogy. Nonetheless, the pedagogy featured in this scenario was still largely based on a transmission model. Scenario 2 is structurally different from Scenario 1 because of the radical advances in the technology of digital knowledge granules. These deep-seated, technological changes were the catalyst for change, and in many respects, the university's response was a survival strategy. Scenario 2 is an example of implementing DE technologies as a Type 2 disruptive technology (Christensen, Aaron & Clark 2003). A Type 2 disruptive technology builds competitive advantage through the smart implementation of technology by serving less demanding customers[19].
- *No pain, no gain* (Scenario 3) depicts the story of the University's attempts to generate a "new" mode of delivery. This was enabled by radical advances in the technology of digital knowledge granules but also reflects fundamental transformation of the organisation to a post-Fordist business approach. The pedagogy is characterised by a new model of autonomous, self-directed learning building on the capabilities of multi-media for multi-modal representation. Scenario 3 is an example of implementing DE technologies as a Type 1 disruptive technology (Christensen, Aaron & Clark 2003). A Type 1 disruptive technology establishes a new market that did not exist before[36].

With regard to technological discontinuity, organisational leaders should consider what we have learned from industry concerning the dynamics of innovation. In particular, the track record pertaining to whether or not the discontinuity relates to a product or process. Also, whether or not the discontinuity results in the substitution of an existing product or service, or results in a broadened market. Utterback & Kim (1986) have analysed these relationships in industry. Utterback (2004: 46-47) applies these findings to higher education when analysing innovations in technology and the new learning media and highlights the following:

---

[19] The distinction between Type 1 and Type 2 disruptive technologies will be discussed in more detail in the concluding chapter. See: *Restructuring for technological change in the university* (Section 5.2.1 in Chapter 5).

- Discontinuous innovations in *products* usually come form outside the industry concerned; whereas discontinuous innovations in *processes* come from "inside the industry as frequently as from outside" (Utterback 2004: 46).

  This suggests that new product innovation is more difficult to achieve from within existing industry practice because few organisations are willing risk new innovations at the expense of the sustainable economics of tried-and-tested markets. Therefore, in the realm of higher education, we would expect to find that most of the innovations coming from within the community would be associated with innovations in *process*. Scenario 2 provides an example of a process innovation at the university that was triggered from within the education "industry".

  Scenario 3 is an interesting case, because it is both a process and product innovation. Research suggests that this kind of innovation usually comes from outside the industry. However, Scenario 3 demonstrates the plausibility for a university to undertake discontinuous *product* innovation — thus taking command of its own destiny. It is equally plausible (drawing on innovation research) that this kind of product innovation could be lead by the commercial for-profit providers in the market and is a discernable risk that university leaders will need to consider. In fact, the innovation of correspondence education was previously led by the commercial sector and not by the education sector.

- Discontinuous innovations that substitute for existing products and services usually come from within the industry. Scenario 1 is an example of how DE technology is used to substitute aspects of the face-to-face pedagogy through technology. In many respects, Scenario 2 is also a substitution model, regarding the way a campus-based institution provides substitute education services traditionally offered by the single-mode DE providers.

  On the other hand, discontinuous innovations that expand markets, by allowing new firms to enter and survive with new products and services, most often come from outside the industry. Utterback reminds us that in the case of innovations that expand markets "established firms are more likely to fail than succeed" (2004: 47).

  Therefore, in the case of a "new" emergent pedagogy, industry research would suggest that the risks of failure in the market by traditional universities would increase. Moreover, Utterback & Kim's (1986) research would suggest that this kind of market expansion would usually come from outside the traditional university "industry". However, Scenario 3 justifies that this kind of innovation can conceivably come from within the university sector, albeit with leadership that is prepared to take risks to maintain the core university functions of teaching and research.

In this way the three scenarios provide university leaders with strategic alternatives to consider the dynamics of innovation and corresponding risks associated with the adoption of DE technologies on campus.

Turning to pedagogical considerations, Scenario 3 reveals that a "new" mode of delivery would result in an organisation that looks different from a conventional face-to-face institution. Peters corroborates this assertion and suggests that the university of the future will be "an institution that looks completely different to a traditional university" (2002: 167). Peters founds his contention on a recent pedagogical analysis revealing that virtual learning spaces are structurally different from real-learning spaces and that digital learning environments offer a variety of new opportunities (Peters 1999: 14). It would appear that virtual learning spaces facilitate self-directed learning in ways that were previously not possible. Self-directed learning, combined with communicative interaction that digital ICTs now facilitate (Garrison 2003) could become the vehicle to realise the constructivist ideals purported by contemporary theorists in the field of teaching and learning.

The structural changes envisaged with a pedagogical migration from real learning spaces to virtual learning spaces was not necessarily planned by educationalists, nonetheless these new environments offer great opportunities to further the ideals of learning autonomy originally expressed by Wedemeyer (1961). The new opportunities certainly exceed those associated with the advent of moveable type and universal postal services that were responsible for the first DE revolution. In this regard, Peters considers the pedagogical shifts to virtual learning spaces as "the most fundamental didactic event of the present, and one which is of great cultural and historical significance" (1999: 14).

In a global, informational and networked economy it is becoming increasingly difficult to sustain the past yet the pedagogical potential for the future beckons to be uncovered. It is still an open question concerning how DE technologies will impact on the future of the university, however scenario planning provides a framework to explore the interaction of these uncertain futures in a systematic way.

Chapter 5

The value of scenario planning for leading DE technology futures

5.1 Introduction

The purpose of this chapter is to reflect critically on the outcomes of the research reported in the thesis. This concluding analysis will interrogate the value of scenario work as a planning tool for university leaders — especially when faced with the advent of new DE technologies and systems.

The scenarios developed in this thesis are **not** predications of the future. To be more precise, they are strategic tools used to generate well-founded insight into the emerging discontinuities associated the adoption of DE technology in the university. By applying the documented techniques of scenario planning, the storylines have succeeded in highlighting the assumptions and the corresponding dynamic underpinning alternatives and trade-offs which can be used as a test bed for examining strategic plans. This chapter will explore these business assumptions drawing on a framework derived from the trade-off analysis introduced in the concluding section of Chapter 4, thus demonstrating the value of the technique.

Technology-precipitated change is the nucleus of this framework. The role of technology can be viewed as a force that determines responses, alternatively as an enabler that facilitates new ways of practice. If advances in technology are dictates for institutional responses, then the degrees of institutional freedom are constrained and strategic planning for technology is nothing more than a reactive approach to changing environments. On the other hand, if technology is an enabler, then strategic planning is a vehicle that empowers institutional autonomy. However, in an informational economy, the relationship between technology and strategy is more dynamic. This will necessitate a better understanding of the reflexive relationship between technology as a force for change and simultaneously as an enabler for a new pedagogy. This is where scenario planning comes to the fore because it allows analysis of several different approaches in the context of uncertain futures. The major themes derived from the scenarios that require further analysis in this chapter are:

- The challenges of leading and managing internal change in the university environment;
- The functions of research and teaching when measured against the dangers of the commodification of knowledge associated with expanding educational markets through DE technology; and

- Society's expectations concerning the university as organisation.

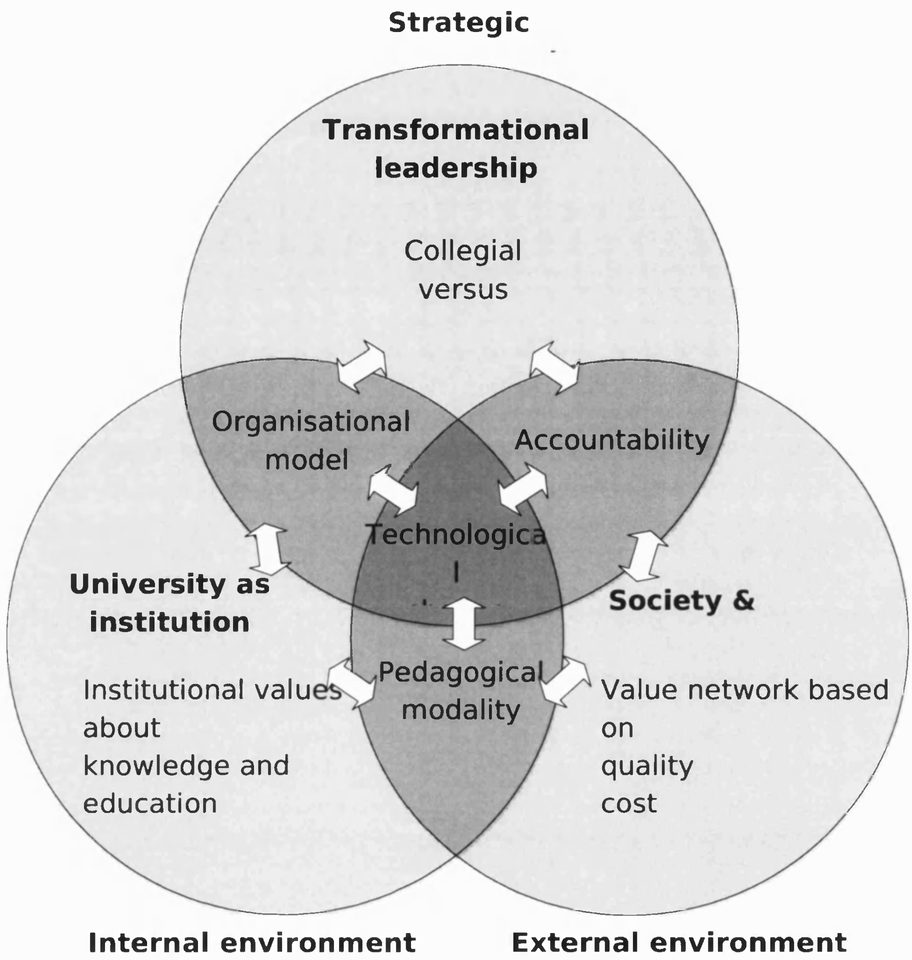
These themes relate to three perspectives: transformational leadership within the context of strategic management; the individual university as an organisational structure of society; and the emerging informational economy and society which the university serves, but also from which the university attracts its students (see Figure 5.1).

As indicated earlier, technology-precipitated change is a recurring theme in the thesis. This is why it is illustrated as the nucleus of the analytical framework in Figure 5.1. Historically, changes in technology have brought about fundamental changes in the provision of education. Chapter 2 demonstrated that distance education as technology is a product of modernity. Distance education was enabled by the advent technological change — that is, universal postal services and moveable type. In this regard the experience of the distance teaching universities is extremely valuable because the teaching-learning interaction is mediated by technology. Similarly the "new technologies and the way they have been deployed by business, government, and other institutions have yielded significant, and sometimes fundamental, changes to the way work and society operates" (Evans & Nation 2003: 785). Online learning or e-learning — which is fuelling unprecedented growth in DE provision in the university sector — is also a form of education where the acts of teaching and learning are mediated by technology, thus establishing a meaningful relationship between conventional distance education and the newer forms of online learning. However, there are strong grounds to suggest that the way e-learning evolves at conventional campus-based universities and DE institutions is likely to be different because "traditional and distance universities start from different pedagogical preconditions" (Peters 2003: 87). The three scenarios have taken these relationships into account and can now be used to gain a better understanding of the ways DE technology might impact on change in the University.

The high-level, trade-off analysis of the three scenarios — presented in the concluding reflection of Chapter 4 — compared the dominant managerial approach adopted in each scenario as a response to technological change in the university. The respective trade-offs compared the impact on the functions of research and teaching, and the competitive advantage of the respective institution within the higher education sector. This trade-off analysis provides a useful framework for debriefing the scenarios as well as a conceptual vehicle to come to grips with the fundamentals underpinning technological change in the university. In essence the trade-off analysis examines the relationships among strategic management, the internal environment and the external environment as depicted by the Venn diagram in Figure 5.1.

Each of the scenarios is driven by the core theme of *technological change* represented by the overlapping area of the three circles in Figure 5.1. In each scenario, the University of New Zealand institutes *transformational leadership* strategies in response to the technology-precipitated change. These change management strategies reflect the dynamic interplay between a traditional collegial management model associated with the academy and a top-down managerial model where change is directed by the executive management of the institution. The internal environment refers to a specific *university as an institution* (in this case of the University of New Zealand) representing a traditional campus-based university. The University of New Zealand aims to maintain its operations associated with knowledge and education. The strategies adopted by the University of New Zealand are in response to, but simultaneously contribute to the ongoing development of *society and the economy.* Students' decisions to study at the University of New Zealand are influenced by societys' perceptions of the value network concerning the quality, cost and access to an education at the University when compared to other tertiary education offerings in the market space.

Figure 5.1 Conceptual framework for analysing the scenario trade-offs



In addition, there are distinctive areas of interaction between adjacent circles:

- The transformational leadership decisions of the University of New Zealand result in a definitive *organisational model* characterised by the Fordist versus post-Fordist distinction;
- The strategic decisions adopted by the University of New Zealand will result in a dominant *pedagogical modality* distinguished by an organisational preference for flexible learning, technology-enhanced distance education, or a "new" multi-mode, multi-media pedagogy inferred in Section 3.3.2 of Chapter 3 (see also Figure 3.5); and
- The *accountability* of the transformational leadership strategies of the University of New Zealand are represented by the token value that society and the economy place on the credential offered by the University.

This provides a useful framework to analyse the fundamental assumptions of the individual storylines of the three scenarios. This Chapter is structured according to the main dimensions represented by the three circles in the Venn diagram in Figure 5.1. The debriefing of the individual scenario storylines will also reflect on the contemporary literature concerning change management in general, and managing technological change in the University in particular. In conclusion, the limitations derived from the experience of this study are summarised with the intention of identifying areas for future research.

5.2 Leading the university for technological change

An analysis of the composition of the tertiary education market reveals that fundamental changes are taking place. Over the last 20 years in the United States, tuition fees at four-year colleges and universities have increased at an approximate rate of 8 percent per annum — more than double the inflation rate (see Christensen, Aaron & Clark 2003: 45). Respectively, enrolment in traditional face-to-face programs has only grown at a rate of 0.5 percent for the past decade, while enrolment in distance learning is growing at three times the rate of face-to-face programmes (see Christensen, Aaron & Clark 2003: 45). In addition, the number of corporate universities has grown exponentially from approximately 400 at the beginning of the 1990s to the current situation where it is reported that 2000 corporate universities are operating in the United States (see Christensen, Aaron & Clark 2003: 45). The structure of the higher education market is changing in fundamental ways. Thus, tertiary education leaders in the digital era are faced with difficult decisions stemming from the DE precipitated groundswell to move forward into confusing and uncertain futures:

> *Most colleges and universities feel pressure to do something about online learning and to do it soon. But most are finding it very difficult to know what to do or how to do it within their resources and while fulfilling their missions.* (Sjogren and Fay 2002: 52)

Moreover, tackling these uncertain futures may result in changes in university processes, functions, structures, and possibly pedagogical foundations as well. Bates (1997b: 1) concludes that widespread introduction of technology-mediated teaching will require fundamental changes to the institution, arguing that it is necessary to restructure the university for technological change.

Managing technological change and innovation in the university — particularly where restructuring may be required — necessitates careful and insightful reflection. University leaders will need to take on the complexities of managing structural change. In addition there is a requirement to promote systemic innovation within an institution that prides itself on tradition and reflective scepticism — qualities that have rightfully ensured the university's survival as institution since the Middle Ages. This section will demonstrate how the scenario planning method can assist university planners to take into account a range of factors when developing sound strategic plans to lead the university through this period of change. Also, this section will analyse the trade-offs among the individual scenarios thus demonstrating the value of the technique when preferring one scenario over another.

5.2.1 Transformational leadership strategies

The imperative for change in higher education is usually driven by three conditions: outside pressure, a major crisis, or visionary leadership (Rowley, Lujan & Dolence 1997: 9). Each of these conditions for change can be identified in the respective scenarios:

- *Nipped in the bud, a revolution averted* (Scenario 1) is predicated by the outside pressures of having to incorporate online delivery alternatives in an attempt to keep up with the competition in the tertiary education sector. Although management took the initiative of instituting reactive steps in response to these outside pressures, university tradition took precedence above managerial rationalisation and optimisation in this scenario. The University of New Zealand was able to maintain its research-led teaching approach and became more elitist;

- *Nothing succeeds like success* (Scenario 2) is driven by a major crisis resulting from radical advances in the technology of digital knowledge granules, combined with the threats of the rapid growth of a new private university entrant into the market. In this scenario, e-learning strategy is driven by a managerial approach aimed at enhancements to the existing Fordist business model rather than restructuring for a new post-Fordist approach;
- *No pain no gain* (Scenario 3) is underpinned by the vision of establishing new pedagogy through innovation research. In this scenario, management reconfigured its operations to a post-Fordist business model in anticipation of new pedagogical modes of delivery;

From a transformational leadership perspective "[w]hatever the cause, strategic change requires creative thinking" (Rowley, et al 1997: 9). Consequently, universities will need to become more skilled in the challenges associated with successful management of change, and it would appear that techniques based on conceptual modelling (like scenario planning) can assist university planners to take into account the range of factors required for sound strategic planning.

In each scenario, the University of New Zealand succeeds in dealing with the changes associated with the advances in digital technologies. However, different issues are prioritised in each scenario, resulting in various trade-offs concerning institutional values, managerial approach and positioning within an increasingly competitive market. The scenarios trigger a number of foundational questions relating to transformational leadership strategies that can now be answered in the light of a comparative analysis of the three storylines:

1. Is technology adoption in the university a driving force or enabler for change?
2. Should universities restructure for technological change?
3. Do the scenarios advocate a preferred managerial approach for universities to achieve success with technology futures?

Answers to these will be considered in the subsections which follow, demonstrating how scenario planning can be used to gain a better understanding of the assumptions underpinning the implementation of DE technology in traditional campus-based universities.

Technology as driver versus enabler for change

Is technology a driving force or enabler for change? In all probability, based on the analysis of the storylines in the scenarios, technology can be a driver but simultaneously also an enabler for change. When viewed as a driver of change, an analysis of the scenarios reveals that this driver is not because of technology *per se,* but is rather a function of the institutional autonomy exercised within a global networked society. From a leadership and managerial perspective, the adoption of technology within the university is a key aspect requiring critical thought when contemplating change management interventions. University leaders are confronted with strategic choices and these choices should be informed by this dynamic interplay between technology as a driving force for change versus technology adoption as an enabler for change.

First it is necessary to reiterate what is meant by the concept "DE technology" and its relationship with society in the context of the thesis.

Technology is defined as a "practical or industrial art" (Oxford English Dictionary 2004: Online) and refers to the application of science (The American Heritage Dictionary: 2000). Technology is not an independent science with its own doctrine, but encompasses the application of principles from various areas of academic interest (Webster's Revised Unabridged Dictionary 1998: Online). In this thesis, DE technology is described as the application of organised knowledge to the practical art associated with the people, possesses and objects required when implementing technology-mediated learning (see Section 3.3.2 in Chapter 3 & Daniel 1999a: 10). Thus the concept of technology is not limited to the popular notion of computer hardware and software. Nor is it limited to the databases, routers and telecommunications backbone that make up the network infrastructure of the Internet. DE technology is inclusive of the people and processes necessary for the design, development and teaching through this modality. It also requires a society that is willing and able to learn through this mediated process, but at the same time a society that awards value to the credential acquired through this mode of learning. In this regard, collectively the people, unique processes and communication technologies required of the distance teaching method constitute DE as a technology in its own right.

An analysis of the systems map in Figure 4.1 in Appendix 1 reveals that advances in digital technologies can function both as a predetermined driver of change as well as a specific scenario uncertainty (as in the case of a technology like digital knowledge granules). The generic drivers of technology-precipitated change remain the same for each scenario, for example the convergence associated with digital ICTs (see Section 1.3.3 in Chapter 1) or the global connectedness of the Internet (see Section 1.3.1 in Chapter 1). However, the influence of technology can also assume the role of an uncertainty, which represents a different state in each scenario. The outcome of an uncertainty is unknown, for example whether or not the technology of digital knowledge granules will succeed in transforming the pedagogy of learning (see Section 3.4.1 in Chapter 3). In the introduction of the thesis it was also established that no other technological discovery in history has demonstrated comparable degrees of growth in both communicative power and corresponding reductions in cost as in the case of digital ICTs (see Section 1.3.3 in Chapter 1). When considering that enrolment in distance learning is growing at three times the rate of face-to-face programmes (Christensen, Aaron & Clark 2003: 45), there is also a compelling argument to classify technology as a driver of change.

At the level of sociological analysis of information technology and globalisation, Castells points out: "Information technology is not the cause of the changes we are living through. But without new information and communication technologies none of what is changing our lives would be possible" (1998b: 3). Then again, Castells also reports that, in history, no major transformation has taken place in technology or the economy "without an inter-related organizational transformation" (1998b: 14).

This alludes to the institutional autonomy that a university chooses to exercise, or alternatively, constraints placed on the degrees of freedom by the external environment regarding the decision, whether or not to integrate DE technology into the existing delivery model. Complicating matters is the fact that the dominant organisational form in the global informational economy is that of networking — comprising a set of inter-connected nodes. The social and economic network plays a significant role with regards to institutional autonomy. Viewed from a competitive advantage perspective, if the majority of institutions in the university network opt to implement DE technology, the degrees of freedom for an individual university to decide against implementing DE technology are constrained. Viewed from the perspective of society, future students who have grown up "digital" will place increasing pressure on universities to provide digitally-mediated, learning opportunities for active and social participation in the creation of knowledge (Barone 2001: 42). Again, in this example the networked relationship between the university and its students, places limits on the degrees of freedom regarding decisions associated with DE technology. Conversely, institutions within the higher education network may proactively create new futures, nudging the network forward by using approaches of strategy- and knowledge-innovation as advocated by a number of managerial strategists (see Drucker 1995, Edvinsson 1997, Hamel 2000b & Prahalad 1998). In this instance, the institution commands high levels of institutional autonomy.

Referring to the organisational logic of the network Castells emphasises its strategic significance:

> *The most critical distinction in this organizational logic is to be or not to be — in the network. Be in the network, and you can share and, over time, increase your chances. Be out of the network, or become switched off, and your chances vanish since everything that counts is organized around a world wide web of interacting networks.* (1998b: 14)

While networks have always existed in society, the new digital ICTs have enabled social and economic networks — that operate on a global scale — to emerge and function in ways that were previously not possible. In each of the Scenarios, the University of New Zealand opted to be part of the network to a greater or lesser extent. Let's examine the degrees of institutional freedom exercised by the University of New Zealand within the higher education network under each scenario.

Nipped in the bud: A revolution averted (Scenario 1)

This Scenario was predicated by the global trend in higher education to cater for web-delivery of its courses. The decision to implement DE technology was driven by the perceived threat of borderless education and the expansion of the university's competitors into DE. The outside pressures to do something about online delivery limited the degrees of freedom associated with the decision to implement DE technology at University of New Zealand. The University did not opt to transform its managerial processes or dominant business model and support for e-learning operations was incorporated into the existing professional development unit. The leadership style in this scenario is collegial, with strong Fordist characteristics for example: how the principles of industrialisation have resulted in the university discarding a tutorial learning approach in order to manage large undergraduate courses; or the rationalisation of the university curriculum through a discipline-based organisational design. DE practice evolved at a slow pace since online activities were managed as a cost addition model. Staff morale diminished progressively because faculty members were unable to keep up with the added responsibilities of developing and teaching online courses, over and above their research and campus-based teaching responsibilities. A drop in student income resulting from a decline in international students necessitated an increase in domestic student fees. As a result, the University of New Zealand has become more elitist. However, the University was able to maintain its research-led teaching philosophy, combined with relative increases in external research income.

Nothing succeeds like success (Scenario 2)

Scenario 2 was also spurred on by outside pressures to do something about online learning, but had the added catalyst of a competitive advantage crisis because of a new for-profit university entrant into the local market. This scenario differs from the preceding scenario, because the uncertainty associated with digital knowledge granules assumes a high level of innovation and successful implementation of the technology in mainstream provision of higher education. Building on the successes associated with the implementation of digital knowledge granules, the new competitor was able to generate significant market share in the local higher education market. This required the University of New Zealand to adopt rigorous

> processes for the design and development of e-learning resources. Unlike Scenario 1, Scenario 2 transformed its managerial processes thus exercising higher levels of institutional autonomy to proactively manage its own futures. A cost-leadership strategy was implemented and using techniques of workflow analysis, productivity research and a successful learn-by-doing policy, the University was able to compete in this changing market. Here the business model is neo-Fordist, building on the capabilities of digital knowledge granules to implement a philosophy of flexible production (see Section 2.3.2. of Chapter 2). As many commentators will attest, neo-Fordism is essentially a Fordist business model because it involves an "extension and deepening of the exploitative relationship between the organisation and worker" (Campion 1996: 45). Thus, Scenario 2 is classified under a Fordist business model in the scenario matrix in Chapter 4. The trade-off for adopting a neo-Fordist business model is represented by differentiated specialisation between teaching-focused and research-focused departments. The DE sector is now characterised by a blurring between single-mode, dual-mode and conventional campus-based universities.
>
> *No pain, no gain* (Scenario 3)
>
> Establishing advantage through differentiation in the university market drives this scenario. By applying an approach of strategy innovation the University of New Zealand aims to establish a new pedagogy by building on the enabling capabilities of digital knowledge granules to achieve a sustainable model of mass-customisation in the sector. The University adopts a post-Fordist business model and institutes changes to organisational structures and technology processes. Consequently, this scenario represents the execution of a high level of institutional autonomy when compared to the preceding scenarios. The University recognised that it would not be able to achieve this level of innovation alone, and engaged in "pre-competitive" collaboration within the university network though open source software development and sharing of open content. Thus competitive advantage is achieved through the apparent paradox of collaboration. The University of New Zealand was able to continue with a research-led teaching approach thus demonstrating that this was not dependent on the specific delivery model.

In each of the scenarios, it becomes clear that advances in technology *per se* are not the primary cause for organisational change. Rather, change is the result of exercising different levels of autonomous decision-making in response to the enabling capacity of digital ICTs within society. However, the degrees of freedom with regard to decisions to implement DE technology are potentially constrained (or enhanced) by the institution's respective role and interaction within the wider economic and social network. The degrees of institutional autonomy manifest themselves in areas over which the organisation has direct control, namely organisational processes and choice of dominant business model. Scenario 1 gave preference to the collegial management model without changing the existing business model. Scenario 2 opted to implement a neo-Fordist business model and corresponding changes to its business processes based on managerial optimisation. Finally, Scenario 3 decided to transform its structures and processes to implement a post-Fordist business model. In each case these decisions had implications for trade-offs related the functions of research and teaching and this will be discussed in more detail in Section 5.2.2.

In conclusion the three scenarios have highlighted the dynamic between the internal and external context, particularly with regard to institutional responses to the global trend of providing web-based alternatives for the delivery of face-to-face courses. Consequently, the relationship between degrees of freedom for autonomous decision-making and technology as driver *versus* enabler must take into account how individual universities interact with the broader higher education market.

Sustained success of technology-mediated learning alternatives will be difficult to achieve when adopting technology for the sake of technology alone. Nonetheless, advances in technology will remain to be a powerful driving force for change as depicted in each of the three scenarios. Clearly there are many forces at work that could reshape the practice of DE, albeit limited to increased differentiation in the tertiary education market. Turnoff (1997) is correct in asserting that advances in technology provide opportunities to channel these forces of change. Organisational restructuring for technological change is a necessary consequence because this "channelling process is really that of administrative and management practices and policies that govern the utilization of educational technology and methods" (Turnoff 1997: 1). In this regard, university leaders would be well advised to understand the reasons why they are diffusing technology-mediated learning alternatives at their respective campuses as opposed to jumping on the technology bandwagon.

Having said this, the increased adoption of technology on campus is inevitable. Strategic decisions of individual organisations are not taken in isolation of the total economic, social and educational system. Building on institutional theory, Bloodgood and Morrow (2000: 210) remind us that as individual organisations embark on strategic change other organisations in their field will take notice. Bloodgood and Morrow (2000: 210) point out that these organisations will perceive strategic change as a sign that they should reconsider their own strategic position. Institutional theory posits that an institution's actions are the result of tussles for legitimacy among counterparts, resource-providing components of the system and socially constructed belief systems that are eventually institutionalised in organisations and their resultant structures. Therefore, while individual universities have the "freedom" to choose between individual strategies, their freedom is dynamically constrained and influenced by the strategic decisions of the other tertiary education players, the economy and society components of the total system.

Herein lies the difference between leaders and followers within a dynamic system. The three scenarios have depicted varying degrees of institutional autonomy ranging from:

- a passive-reactionary approach in Scenario 1 to do something about e-learning; to
- a proactive-response model in Scenario 2, that was dominated by a cost-leadership strategy requiring high-levels of managerial optimisation; to
- a strategy-innovation approach in Scenario 3 aimed at developing foresight for the future to remain competitive.

Each approach has had differing consequences for how the university has promoted or sacrificed aspects of its research-led teaching philosophy, advanced or constrained student access to the system and maintained or enhanced the quality of the education experience. The technique of scenario planning enables university leaders to gain an intellectual grip on the dynamic interplay among the functions of research and teaching when adopting technology on campus. These include how to: foster the traditions of knowledge creation and dissemination; promote the vision of education for all; and encourage meaningful learning experiences for its community. Fortunately, individual universities are not predestined to any particular scenario path and can exercise relative freedom to operate within a differentiated higher education system. This comes with the understanding that the adoption of technology on campus will have implications for how the functions of research and teaching are sustained, promoted or compromised.

Restructuring for technological change in the university

Sadly the history of change management in the university — particularly with regards to the imperatives associated with the adoption of digital ICTs — has not revealed impressive results. Gonick (2002: 8) candidly points out that the track record of technology-precipitated change in the university has not been a success story. Gonick alludes to a foundational reason for this failure:

> *Yes, some faculty members are resistant, some are stubborn, and some are counter-revolutionary. But the truth is that technology itself and those of us who represent the corporate and institutional agents of change in the teaching environment have thus far failed. Across the United States today, teaching-related technology investments on campuses are at risk, and many technology champions are in retreat. Until technology becomes a core part of the teaching environment, it will not be seen as truly strategic. Until technology solutions are internalized within the teaching practice, recurring investment in technology will be seen as less than necessary.* (2002: 8)

Clearly, in order for technology to be adopted successfully in the university there is a need for technology solutions to be internalised within teaching practice. In the overview of this section it was suggested that the widespread introduction of technology-mediated teaching in the university would necessitate restructuring of the institution for technological change (see Bates 1997b: 1). Therefore one of the assumptions for university leaders to consider is whether or not the traditional organisational design and processes associated with university should be transformed. The corresponding trade-offs and determinants associated with this assumption are related to the:

- distinct types of technological change, in particular sustaining *versus* disruptive technologies (see Christensen 2000; Christensen, Aaron and Clark 2003 & Section 3.3.2 in Chapter 3);
- perceptions and readiness of academic staff to adopt technology in their teaching (Butler and Sellbom 2002; Jost & Schneberger 1994; Moore 1991); and
- organisation's own strategic position within society and/or the market (Bloodgood and Morrow 2000; Oblinger & Kidwell 2000).

In this regard university leaders are faced with four strategic choices. The first choice is to continue conducting business as usual notwithstanding the external and internal forces of change. The *status quo* scenario alternative was not analysed in this thesis given the research objective to explore alternative futures for DE technology. However, given the exponential growth of DE globally (see Christensen, Aaron and Clark 2003 & Section 3.3.1 in Chapter 3) it is unlikely that advent of the Internet and growing opportunities for web delivery have left campus-based universities untouched. Therefore this analysis of strategic choices will be confined to those derived from the three scenarios.

Nipped in the bud: A revolution averted (Scenario 1)

Strategic choice: Incorporate new ways of doing business through the adoption of technology on campus without restructuring of the organisation or its processes.

Responding to external pressures to do something about e-learning, in this scenario the University of New Zealand adopts technology to enhance the effectiveness of the existing delivery model. The dominant driver for technology adoption is to maintain the university's strategic position within a changing higher education market. Without substantive changes to organisational processes for the design and development of e-learning resources, artisan-based pedagogy and design approaches prevail (where the academic faculty member takes responsibility for all the functions of the design and development process). With regard to academic perceptions, the pedagogic preferences of dialogue and interaction associated with the oral traditions of classroom teaching are preferred thus the adoption of technology is largely leveraged through opportunities for extending classroom pedagogy (for example, streaming lectures asynchronously). The University of New Zealand experiences spiralling operational costs to maintain this model, which it is forced to pass onto the students resulting in the organisation becoming increasingly elitist.

Nothing succeeds like success (Scenario 2)

Strategic choice: Incorporate new ways of doing business into the existing model corresponding with restructuring of the organisational process design, yet maintaining many aspects of the traditional academic structures.

In this scenario, the University of New Zealand identified the strategic potential for digital knowledge granules to generate growth in selected areas of the tertiary education market. Building on the experiences of the traditional single-mode DE providers, the University instituted structural changes to optimise development processes and reduce corresponding costs of development. The implementation of a sustainable e-learning operation was promoted by this rigorous cost-management and organisational process redesign. However, new private university entrants in the market focused on pedagogical innovation without having to carry the costs of research. This introduced a highly competitive alternative into the market, and necessitated the University of New Zealand to differentiate between teaching-focused and research-focused departments.

No pain, no gain (Scenario 3)

Strategic choice: Generating a new pedagogical model corresponding with a process-driven restructuring aimed at generating organisational design structures that are fit-for-purpose.

The University of New Zealand was able to develop a new delivery model drawing on the experiences of a successful experimental project. This project was able to deliver highly customised, multimedia learning experiences using an intelligent instructional system. This prototype instructional system capitalised on the technological capabilities of digital knowledge granules. The University adopted a strategy based on leadership through differentiation. It was able to leverage competitive advantage through collaboration on technological infrastructure and open education resources. This required a fundamental restructuring of the organisation and corresponding business model to respond more effectively to the requirements of a new pedagogy and dynamically changing market demands. The organisation was able to develop the soft-skills required for this new delivery model through its decentralised and networked organisational model. While the classical distinction between administrative and academic departments was diffused through the restructuring process, the culture of a community of scholars was maintained in order to authenticate the pedagogical quality of the learning materials.

Scholars of organisational change theory usually distinguish between first order change and second order change (see for instance, Newman 2000). First order change is incremental, maintains internal reliability and is usually limited to changes in structures, processes, or administration. Second order change, is transformational and alters the strategic priorities of the institution. Based on this classification framework both Scenario 2 and Scenario 3 would constitute change of the second order. Once a university has taken a decision for the widespread introduction of technology-mediated learning, second order change would necessitate changes in the structures and processes and they "should not be embarked upon lightly" (Bates 1997: 1).

Managing transformation meaningfully impinges to some extent on answering the question of whether or not change in the university is imminent. This thesis has demonstrated the plausibility of change in the university sector with reference to DE futures. The literature abounds with suppositions concerning deep-seated change in the university as a result of technological change. For instance, Peters likens the increasing use of digitised learning environments to a "pedagogical revolution" (2002: 20) and postulates that "the university of the future must be reorganised, restructured and rebuilt" (Peters 2002: 164). Oblinger and Kidwell, for example, remind university managers that emerging technologies will alter core processes in the university and suggest that this change is different from the past:

> *Fundamental technological change ultimately results in significant structural change, regardless of whether the affected participants choose to join or to resist the movement. The changes that universities have weathered over the centuries did not upend their basic technology. Information technology did and does* (2000: 39).

Clearly there is evidence for university leaders to begin thinking critically about transformation in the university. In response to this challenge, the research documented here has generated three alternative paths of transformation. While it is unlikely that individual scenarios will be exactly right, "the discipline of thinking about them will improve our ability to respond to what does actually happen" (Wulf 2003: 15). Conceivably strategic problems will arise were the leadership of the university to assume that nothing will change. Therefore universities will need to proactively plan for change as part of their technology adoption strategy. Herein lies the value of scenario planning, because the trade-offs concerning alternative strategies can be explored before committing the organisation to a predetermined path

The scenario vignettes summarised in this subsection also illustrate the distinct differences between two types of technological change: sustaining versus disruptive technology[1] (Christensen 2000). The strategic leadership challenge is that "opportunities exist to deploy online learning in both sustainable and disruptive ways" (Christensen, Aaron and Clark 2003: 54) and universities will need to decipher the difference.

Christensen, Aaron and Clark's (2003) research shows that the pace of technological innovation always outstrips the ability of consumers to absorb these innovations. In other words, the market will initially permit technological innovation "only if it is anticipated that they will not disrupt the existing value structure of the community" (Phillips 2000: 267). For example, in Scenario 1, the addition of online delivery alternatives — a technology precipitated innovation and an example of a sustaining technology — increased the potential for greater flexibility of learners to study irrespective of geographical location. However, further value addition over and above remote access to campus-based lecture notes was not sustainable. Further pedagogical innovation in this scenario would have outstripped the ability of "consumers" to absorb the innovations when taking into account the differential between increased student fees and the affordability threshold. Many online learning efforts struggle because they

[1] The differences between sustaining and disruptive technologies were discussed in Section 3.3.2 of Chapter 3 outlining the principles of the "innovators dilemma" and will not be repeated here.

attempt to replicate traditional classroom pedagogy in a non-traditional way resulting in unsustainable cost escalations.

Turning to disruptive technologies, Christensen, Aaron and Clark (2003) distinguish between two distinctive forms of the disruptive business model. Type 1 disruption establishes a completely new market that did not exist before and Type 2 disruption is a business model that serves less demanding customers (that market leaders don't mind losing) so that the institution competes and establishes leadership from the low end of the consumer spectrum.

Scenario 3 is an example of a Type 1 disruption market, because the post-Fordist approach of deploying advances in digital knowledge granules has resulted in the genesis of a "new" pedagogy that did not exist before. The new pedagogy is customisable, is multi-modal and incorporates multimedia delivery driven by user preferences at a price that is the same or lower than the conventional face-to-face delivery model.

Scenario 2 is an example of a Type 2 disruption market, because the Fordist approach of deploying advances in digital knowledge granules has resulted in establishing significant advantage in the lower-end of the university market. Scenario 2 was able to translate emerging technologies into a lower-cost business model when compared to their counterparts, corresponding with expanding their market into competency-oriented curricula that were previously not well served by the university sector. The online offerings of the University of Phoenix, are also an example of Type 2 disruption market. It is a no-frills, low-cost alternative to acquire a university degree through remote asynchronous study — not unlike the characteristics that ensured the success of the Open University model.

The scenarios generated in this thesis corroborate Christensen, Aaron and Clark's business-oriented analysis of online learning:

> *The key for those developing or managing online programs is to recognize that online learning itself is not inherently sustaining or disruptive in nature; rather, it is how and to whom this innovation is deployed that ultimately determines whether online learning will be sustaining or disruptive.* (2003: 54)

In conclusion, the three strategic alternatives associated with the scenarios are not necessarily discrete alternatives. University leaders cannot for instance, opt for following Scenario 1 (*Nipped in the Bud: A revolution averted*) or Scenario 2 (*Nothing succeeds like success*) because the technological prerequisites for the two scenarios differ. Scenario 1 assumes a low level of innovation regarding the technology of digital knowledge granules, while Scenario 2 and Scenario 3 assumes substantive change in technology innovation. In addition, the business models of Scenario 1 and Scenario 2 are essentially Fordist, whereas the business model of Scenario 3 is post-Fordist.

Consequently, assuming that progression in the technology of digital knowledge granules does occur, university leaders will be faced with the strategic choice of designing business models based on mass-standardisation versus mass-customisation. In other words, making a strategic choice between Scenario 2 and Scenario 3.

This differentiation, arguably demonstrates, one of the most powerful features of scenario planning, namely their ability to incorporate the effects of uncertainties — of which the outcome is unknown — into strategic planning models. Traditional strategic planning relies on forecasting techniques that analyse historical data trends, with little scope to incorporate the effects of plausible uncertainties that could have a material impact on the future of the organisation.

The alternatives detailed in Scenario 2 and Scenario 3 will necessitate considerable restructuring in organisational processes and organisational design. While a conventional face-to-face university displays many features of industrialisation (for instance, economies of scale associated with large undergraduate classes, rationalisation through discipline-based teaching and division of labour between academic and administrative functions) the campus-based university still retains many pre-industrial characteristics (most notably the pedagogical modes of oral discourse associated with professing knowledge have essentially remained unchanged since pre-industrial times).

Conventional universities opting for the mass-standardisation alternative associated with Scenario 2 will need to institute change management strategies to effectively manage the transition to become a neo-Fordist institution. (This does not presuppose that all university's will necessarily become neo-Fordist as outlined in the *Nothing succeeds like success* scenario but does suggest further differentiation of educational provision in the tertiary sector is probable. For example, some institutions would opt for a Scenario 1 alternative while others may prefer Scenario 2 or Scenario 3.)

Similarly, assuming the advent of substantive changes in the technology of digital knowledge granules, conventional universities may decide to opt for the mass-customisation alternative as outlined in the *No pain, no gain* scenario. This strategic alternative will also require the implementation of appropriate change management strategies because the pedagogy of multi-mode, multi media learning is structurally different from the pedagogical modalities described in the other two scenarios. Interestingly, the collegial management model and the highly decentralised organisation of a conventional university is well suited to the post-Fordist requirements of Scenario 3.

This subsection explored the imperatives for organisational restructuring resulting from the adoption of DE technology. The scenario storylines have highlighted that the degrees of organisational restructuring interact with: the interplay among the distinct types of technological change; how technological innovation is deployed in the higher education market; and the extent that academic and general staff in the university are able internalise technology solutions within the core business of research and teaching. The nature and extent of organisational restructuring is not predestined because evolving DE technology is not inherently sustaining or disruptive. Coming to grips with this dynamic interplay will provide university planners with a deepened understanding of strategic alternatives when implementing DE technology.

Preferred managerial approaches for managing technological change in the university

The preceding analysis raises the interesting question of whether or not there is a preferred managerial approach or business model for the future of DE technologies at campus-based institutions. These managerial approaches refer to the collegial, managerial or organic-network approach adopted by Scenario 1, Scenario 2 and Scenario 3 respectively.

The interaction matrix of the individual scenarios would suggest that it is not possible to recommend a preferred business model because this is the resultant interaction of two uncertainty variables. Thus the Fodist, neo-Fordist and post-Fordist business models are uncertainties in the scenarios and cannot be predicted or recommended as preferred business models. However, the scenario-planning methodology allows planners to investigate the implications of these different business models under diverse circumstances.

In the case of Scenario 1, the deployment of DE technologies was instituted using the traditional collegial model associated with the academy. This was well-received by academics because they were able to develop e-learning resources in the confines of their own offices without external interference in their core teaching functions. The disadvantage with this artisan approach was that individual academics were not well prepared or supported for the unique requirements associated with developing and delivering distance teaching. In Scenario 2, a robust managerial model was implemented with clear divisions of responsibility for different subcomponents of the DE design, development and delivery process. There were demonstrable advantages for improving the cost-effectiveness and quality of the pedagogy, however academics felt alienated because academic teaching decisions were directed by optimisation objectives as opposed to subjective preferences coupled with the academic traditions of the discipline. In Scenario 3, a networked organisational model was adopted where decentralised decision-making was delegated to the individual project teams. These project teams included academic, professional and administrative staff members from the University. Decisions were well aligned with the needs of individual projects, however the university was forced to concentrate on developing new communication and collaboration models because the traditional academic hierarchy and communication structures were ineffective in this new environment.

The preceding paragraph summarises three diverse organisational models associated with the implementation of DE technologies at a traditional campus-based university. Each approach has distinctive advantages and disadvantages, but these need to be considered in the context of the structural elements of each scenario. The scenarios have established that it would be inappropriate to put forward a preferred managerial approach concerning the adoption of DE technologies on campus. This is a decision that university leaders will need to consider as an integral component of the systems dynamic of each institution. This system dynamic is inclusive of the university value trade-offs concerning the traditions of knowledge creation and dissemination; access to and quality of educational provision and the individual University's place in the economy and society.

5.2.2 Technology and the university functions associated with knowledge and education

The implementation of DE technologies in higher education creates a wide range of institutional possibilities. While there is tremendous potential for technology to expand access to education — thus expressing the values of a democratic society — there is also a tangible risk that we may also destroy what is valuable about higher education (Agre 1998). The scenarios reveal that when individual universities take decisions on the implementation of technology, these will trigger the onset of a series of dynamic relationships that have potential consequences for the functions of research and the quality of the education experience. Ultimately these dynamic relationships interact with the economy and society — in particular the tensions among: the value that society awards a university credential; the corresponding freedom society attributes to the university to determine what it does and how it functions; and the extent that this educational experience contributes to meaningful engagement in the workforce and social life. In this subsection, the implementation of technology is analysed at the institutional level in terms of the functions that define university practice and the interactions between society and economy will be discussed in Section 5.2.3.

The purpose of this discussion is not to provide an exhaustive analysis of the multiple discourses associated with technology and the university. Rather it is a confirmation that "tremendous damage can result if we transform our institutions without understanding them" (Agre 1998: 7). The discussion will be limited to an illustration of how the scenario planning method can assist university planners to gain a more sophisticated understanding of the implementation of DE technologies at the institutional level and its implications for the idea of the university. The analysis will focus on the potential risks associated with the commodification of the values of the academy.

The idea of the university eludes precise definition and represents a multifaceted debate. Most discussions about the idea of the university involve the relative importance among autonomy, research and education as the raison d'étre of the institution. For many commentators, research is the nucleus of the meaning of the "university". In addition Oswald (Cited by Claes 2002) cautions that when words lose their exact meaning it can influence the role of and value of the objects to which they refer:

> *In other words, if we ruin the word university, then that may one day help ruin the physical university. Indeed, this is actually happening. Bit by bit, the strength of our universities is being reduced, and one of the reasons is a dilution of the intellectual standards required of an organization for it to be allowed to call itself a university. ... Real universities are research institutions. They are primarily places for discovering how our world really works. Real universities are not, repeat not, primarily places of teaching"* (Oswald, Cited in Claes 2002: 2).

Oswald does nonetheless concede that universities are vital for education because of their knowledge and ideas generated through research. Concerning the question of autonomy and the relationship of the institution with society Oakeshott believes that the "university, like everything else, has a place in the society to which it belongs, but that place is not the function of contributing to some other kind of activity in society but of being itself and not another thing" (1989: 103). Interestingly society has valued this autonomy and has continued to attach significant value to the credential provided by an institution striving to be itself. Oakeshott (1989) stresses that the primary role of the university is the pursuit of learning and when students only desire a qualification for earning a living then the university will cease to exist. The risks associated with the commodification of knowledge and corresponding university response (sometimes referred to as the "entrepreneurial university") has been the subject of a growing number of critical reflections in the literature (see for example Barnett 2000a & 2000b; Claes 2002; Readings 1996; Noble 1998a, 1998b &1998c).

Likewise, the implementation of DE technologies on campus at the University of New Zealand in the scenarios has forced the university to grapple with difficult trade-offs in an increasingly competitive and discerning higher education market. These trade-offs may have a significant impact on the meaning of the university. At an institutional level, in striving to maintain a research-led teaching philosophy the following trade-offs for the University of New Zealand became evident:

- *Nipped in the bud, a revolution averted* (Scenario 1): Escalating costs of implementing DE technology resulted in limiting access to those that could afford the increases in student fees. This trade-off must be read in conjunction with the University's desire to maintain existing academic structures. Thus restructuring the organisation to contain costs of provision was not a preferred alternative. In addition, there was also a concerted effort to avoid scaling down of research activities as a cost reduction alternative.
- *Nothing succeeds like success* (Scenario 2): With the advent of radical advances in the technology of digital knowledge granules, the University prioritised educational values by instituting processes to support and promote the pedagogical quality of its technology-mediated teaching. This necessitated restructuring of the organisation and its processes to contain costs and promote teaching quality. While the University of New Zealand was able to maintain a steady growth in student numbers from the lower end of the University market, it was nonetheless forced to reduce its research activities.

- *No pain, no gain* (Scenario 3): Adopting a research-based innovation model, the University generates a new pedagogical model of delivery. The far-reaching advances in the technology of digital knowledge granules enabled this innovation. Collaboration on the strategic development of technology within the sector was necessary in order to spread out the risk. In addition the University was required to restructure its operations to support a post-Fordist model. However, the university was able to sustain a strong research-led teaching approach.

At face value, the scenarios appear to represent three discrete choices with corresponding consequences for the functions of research and education. However, this is not the case because each scenario starts from a different point of departure concerning the resultant matrix of the two scenario uncertainties. Moreover, the implementation of DE technology at a traditional campus-based institution involves a complex set of institutional perceptions of individual academics concerning tradition and the emerging realities of the global information society. Herein lies the value of scenario planning because these alternatives can be explored from the perspective of an organisational context. They provide a test bed to explore contemporary discourses on the functions of the university in the light of the implementation of technology on campus.

In this regard, Noble presents a series of compelling arguments that the university is under the siege of digital technologies in three separate papers using variations of the title: *Digital Diploma Mills* (Noble 1998a; Noble 1998b & Noble 1998c). Noble's discourses were selected for this analysis because he presents a highly critical and dissenting voice against the automation of higher education. As such they provide a fitting perspective to explore the utility of the scenario storylines.

Noble's trilogy has evoked widespread debate and controversy (see for example De Long 1998; Noble, Schneiderman, Herman, Agre & Denning 1998; White 1999). In spite of this controversy, "Noble's voice is a necessary one" (Herman 1998: 6) because he alerts the academy to the many reasons why they should be cautious as higher education deploys DE technologies on campus. There are contestable claims in Noble's work when measured against the history of technology-mediated learning that should also be taken into account — regardless of the allure that many of Noble's assertions will hold for some traditionalists in the academy.

The central thrust of Noble's argument focuses on the risks for the academy concerning the automation of education through digital technology where digitised course materials are distributed online without the participation of professors who develop this material. The events at two large North American universities provide the context for Noble's critical reflections: the University of California Los Angeles (UCLA) and York University in Toronto — Canada's third largest campus where David Nobel was Professor of History of Technology. These institutions are examples where university administrators took unilateral decisions for the mandatory use of ICTs in the delivery of higher education.

In the case of UCLA, all of its 3800 science and arts courses were required to develop web sites by the start of the subsequent term (Nobel 1998a & Noble1998c). This was the first time a major university, had made mandatory the use of the Web in its teaching (Noble 1998a). Similarly, the administration at York University in Toronto, also enforced changes associated with the implementation of technology-enhanced teaching. This contributed to unprecedented action by academic faculty members and the longest university strike in English Canadian history (Noble 1998a). In addition, both UCLA and York University initiated corporate for-profit arms for the commercial development and exploitation of online education. There are strong similarities between Scenario 1 and the events at UCLA and York University. First, the University of New Zealand in

Scenaro 1, took a management decision to migrate 70% of its courses onto the Internet to ensure adequate returns on its investment in technology. Second, the University of New Zealand had targeted the increase of external research income as a strategic priority.

Noble argues that the automation of higher education in this way "is not a progressive trend towards a new era at all, but a regressive trend, towards the rather old era of mass-production, standardization and purely commercial interests" (Noble 1998a: 1). Noble asserts that universities are not simply undergoing a technological transformation but "[b]eneath that change, and camouflaged by it, lies another: the commercialization of higher education" (1998a: 3). He attributes this to a change in social perception that has resulted in the systemic conversion of the intellectual *activity* of the university into intellectual *capital.* Noble (1998a: 3) identifies two general phases of this transformation:

- First, the commoditisation of the research function where large corporate companies in their battle to maintain supremacy in the shift from an industrial to a knowledge-based economy are partnering universities thus transforming research into commercially viable, proprietary products that can be owned, bought and sold in the market. This is evidenced by the growing proportions of fee income from corporate contract research and the large number of university owned companies that sell university intellectual property in the open market;
- The second phase is represented by university efforts to turn the classroom activity of instruction into commercially viable, proprietary products in the form of digitised materials. Many universities have spawned their own for profit companies or have invested in corporate for-profit alliances to market their courses for profit. For example, NYUonline (New York University), OnlineLearning.net (including courses from the University of San Diego and UCLA Extension) and Fathom (including for example: The London School of Economics and Political Science; Columbia University, University of Chicago, Oxford University Press and a number of libraries and museums).

Technology can easily be used as an instrument of social control (White 1999: 2) and Noble contends that the smokescreen of technology is being used to commodify the university, resulting in digital diploma mills. Moreover it would appear that universities have not adequately considered the consequences of their actions. Noble paints the following future for the university:

> *Quality higher education will not disappear entirely, but it will soon become the exclusive preserve of the privileged, available to children of the rich and the powerful. For the rest of us a dismal new era of higher education has dawned. In ten years, we will look upon the wired remains of our once great democratic higher education system and wonder how we let it happen.* (Noble 1998a: 12).

Noble's emotive conclusion will undoubtedly strike a cord with those faculty members who have had their workloads increased beyond reasonable levels in the scurry to get courses online. Also, the outcomes of Scenario 1 have suggested that the risk of elitism corresponding with adoption of technology in the University is plausible.

However, the scenarios and research in this thesis document that the future of the university involves more than the mere adoption of technology under the guise of progress. Noble (1998a) has argued that the implementation of technology represents a regression to mass-production, standardisation and purely commercial interests. He argues that the commoditisation of education through technology is aimed at reducing the autonomy, independence and control of the academic at the hands of administrators. Noble suggests that the aim behind administrator's plans with technology is to discipline, de-skill and displace labour (Noble 1998a). The adoption of a neo-Fordist business model in Scenario 2, shows similarities with this managerial optimisation and the rationalisation coupled with mass standardisation. However, Noble's value judgement that this necessarily constitutes a regression is debatable, and will be discussed in the following paragraphs.

The mainstream campus-based institutions, insofar as classroom teaching is concerned, use a pre-industrial apprenticeship model. In essence the pedagogy is a dialogue model with little division of labour across the functions of teaching. In all material respects, the pedagogy of face-to-face teaching has essentially not changed since the inception of the university. Moreover, the majority of university teachers are trained in the skills of research and knowledge creation, with little formal training in the art of teaching —one of the core functions of the university. Teaching skills are largely the product of an apprenticeship approach, where they are acquired through observation while studying as a student. Formalised professional development for teaching is still on the periphery of most universities. There are, however, numerous examples how industrialisation has influenced the traditional university (see Section 2.3.2 in Chapter 2), yet the dominant mode of teaching is still in effect pre-industrial. The social evolutionary path typically follows a trend from pre-industrial, to industrial, to post-industrial. Consequently, Noble's argument that the implementation of technology on campus represents a regression back to mass-standardisation does not hold true, as very few campus-based universities have progressed beyond pre-industrial teaching practices.

However, Noble is right to suggest that the implementation of technology on campus could lead to approaches of mass-standardisation. This is clear from the storyline of Scenario 2 where the sustainability of technology adoption and efforts to ensure consistent quality of delivery were achieved through mass standardisation. In contrast, universities have other choices with regard to the implementation of technology on campus. Institutions can choose to maintain existing pre-industrial teaching practices (as in the case of Scenario 1); or opt to transform systems for a post-Fordist model aimed at achieving economies through diversity (as in the case of Scenario 3). The corollary of these choices is whether or not the university will be required to restructure for technological change. In the case of Scenario 1, university structures and processes remain essentially the same. Whereas in the case of Scenario 2 and Scenario 3, reorganisation and restructuring will be required — even though the nature of the restructuring in these two instances is different. This brief analysis demonstrates the benefits of the scenario planning method, because alternatives can be compared notwithstanding the difficulties of contemplating reorganisation in the academy.

Noble (1998a & 1998b) also makes a case that the reduction of academic autonomy through the division of labour associated with technology-mediated teaching will compromise the quality and integrity of higher education. This is a crucial issue challenging the meaning of the university in this new era of higher education, precipitated by the wide scale adoption of digital ICTs. Flowing from this, there are two related questions: First, does the expansion of education facilitated by the adoption of technology represent a regression in the mission of the university? Second, can a university retain its functions of research and teaching without compromising quality, notwithstanding the division of labour associated with technology-mediated teaching? The answers to these questions will need to draw on the history of the most mature organisational form in higher education associated with technology-mediated learning — the large-scale, single mode DE universities. Hence justifying the detailed analysis of these institutions in Chapter 2.

Increasing access versus the university functions of research and teaching

The separation of teaching and learning made possible through technology, enabled the single-mode DE universities to extend access to learners who, for whatever reason, were unable to access a university education by means of conventional face-to-face institutions. The division of labour was a prerequisite condition in order to achieve the economies-of-scale necessary for providing a high quality learning experience and to support increased access. An important point to bear in mind is that these universities were not set up as commercial entities. The success of the mega-universities was underpinned by a humanist vision associated with the philosophy of open learning (see Section 2.2.1 in Chapter 2). As a result, the primary goal of the single-mode DE universities is focused on the pursuit of learning and expanding access. This pursuit of learning does not compromise the meaning of the university (Oakeshott 1989) — rather, it substantiates the meaning of a university. Based on the experience of the single-mode DE universities, it is difficult to find reasons to suggest that the adoption of technology in teaching necessarily represents a regression in the mission of the university.

Retaining a research-led teaching approach in technology-mediated learning

There is a wide spread perception among many academics at campus-based institutions that technology-mediated learning in the absence of classroom dialogue, does not constitute an authentic learning experience. For example, Herman (1998: 5) maintains that "[t]here is too much to learning that can only be accomplished through traditional modes".

There is ample evidence to refute claims that asynchronous learning is inferior to its face-to-face counterpart, or that it cannot be regarded as an authentic modality of teaching. Peters's (1973) extensive didactic analysis of DE has confirmed that in all material and educational respects, this form of instruction was a complete method of teaching and learning (see Section 2.3.1 of Chapter 2). Moreover, the mega-universities have demonstrated that they are capable of providing quality pedagogy as attested by the teaching ratings of the British Open University run by the United Kingdom's state-run system for assessing the quality of teaching at all its universities (see Section 1.3.5 in Chapter 1). Consequently, the argument that the method of delivery determines whether or not an institution can justifiably be called a university does not hold up to systematic enquiry. However, there is a requirement for asynchronous learning systems to institute appropriate processes for the development of high quality study materials — like the course-team approach — which would necessitate division of labour (see Scenario 2). In addition, there is also a requirement for providing learner support, excellent logistics and administration in these systems (see Daniel 2001a & 2001b).

Clearly campus-based institutions and dedicated DE institutions require different systems, processes and organisational structures — and this has little to do with the organisation's status to be called a "university". As campus-based institutions incorporate DE technologies into the delivery of teaching, tensions between administrators and academics are foreseeable because of the different systemic requirements. White comments on these tensions:

> *In academic settings, computer technology is either a divisive issue between administration and faculty or has the potential to become one. In essence, a power struggle is erupting over how higher education will be conducted. Battles for power are hardly ever amicable affairs, and I can understand why faculty may be tempted to portray administrators as evil conspirators. ...Conflict is an inevitable and unavoidable part of organizational life. The resolution process is critical; if both parties are wise, they will negotiate win-win outcomes. Unfortunately, wisdom is often the first casualty of confrontation, especially when the stakes are high.* (1998: 2)

Scenario planning provides a vehicle for academics and administrators to explore these tensions on neutral ground, because scenarios are not predictions of the future, nor are they definitive commitments to any strategic path. The advantage lies in their ability to explore the implications for both academics and administrators under a diverse set of conditions, without losing sight of the larger consequences for the university as organisation.

An issue, which is of concern for the meaning of the university and the implementation of DE technologies, is how to maintain a research-led teaching approach. The history of successful DE universities reveals that employing faculty members who remain actively involved in research is a critical success factor (see Section 1.3.4 in Chapter 1). This is what differentiates the DE universities from commercial providers. The scenarios have also highlighted important trade-offs concerning the functions of research under different circumstances when implementing DE technology at campus-based universities. Any disregard for the importance of research, could lead to a situation where the meaning of the university is systematically diluted.

The perpetual challenge for all universities is to widen access, improve quality and reduce costs (Daniel 2001a). Managing this challenge is becoming increasingly difficult for the modern university grappling with the imperatives to implement DE technology on campus. The implementation of DE technologies will increase costs. Without corresponding reductions in the cost of delivery through, for example, substituting aspects of face-to-face delivery with cheaper alternatives or increasing income by extending access through DE delivery, the functions of research will come under increasing pressure to scale-down. It is not surprising that university administrators are attracted by opportunities to subsidise operations through the commercialisation of its activities.

The late 1990s and first few years of the new millennium witnessed unprecedented interest in the commodification of education through the virtual university. Online learning was seen by many universities as the "cash cow" to curtail the spiralling costs of DE technologies. The for-profit higher education market, has also predicted phenomenal growth estimated at a 33 percent compound growth rate for distance learning in the foreseeable future (Oblinger and Kidwell 2000). Fortunately, the university sector has been granted a temporary reprieve, as the promises of substantial revenue streams through the commodification of education have not yet materialised. Perhaps this is a sign that the traditions of the university do not blend well with naked commercialism.

For example, Columbia University, after investing $14.9 million in Fathom, have now withdrawn from the consortium after earning only $700 000 from fees from other institutions and course sales revenue (Carlson 2003). In another telling example, New York University has also closed down its for-profit distance learning venture, NYUonline in 2001. An inside source from NYUonline has revealed that the poor economy was only part of the problem and that the company experienced difficulties running like a business while being managed by a university (Carlson & Carnevale 2001).

This should not be read as an invitation for complacency as there is a strong possibility that the reprieve will not last indefinitely. While there are numerous examples of university failures regarding online learning there are also a growing number of success stories. For instance, the online initiative of the University of Phoenix (a private for-profit university) continues to grow, with currently 141 300 DE degree students (see http://www.uoponline.com/). Despite the fact that many virtual universities relied heavily on seed funding and state appropriations with their foundation, a recent national study on virtual universities in the United States reveals that "there is emerging evidence that some VCUs [virtual colleges/universities] are building sustainable revenue streams as reliance on direct and indirect allocations has decreased slightly and the role of tuition and service fees has increased slightly" (Epper & Garn 2004: 30).

While the scenarios provide a well-founded basis to examine the implementation of technology in the university, it is important to revisit the assumptions on which the scenarios were developed. The scenarios were developed on accepting the social good of the university as organ of society where an autonomous community of scholars could continue to function as a critical voice for society. Moreover, notwithstanding pressures of reduced funding, it was accepted that the university would continue to function as a publicly funded institution. Therefore the scenarios accept that the University of New Zealand would strive to maintain its core values of research-based teaching. Laurillard points out that while these assumptions may be true for the present, "governments have the ability to change that power if universities are not seen to provide something valued and something distinctive from the increasing offers of the private sector" (2002: 18). Therefore it is necessary to examine the outcomes of the scenarios in terms of the value of the university for society and the economy. This will be tackled in the following section.

These concluding thoughts present a sobering warning that maintaining a research-led approach, will have to be taken up as a responsibility by the university itself. Scenario planning is a tool that can be used to gain a better understanding of why universities should or shouldn't be implementing DE technologies on campus. They have succeeded in considering alternatives for responding to the imperative that "[w]ithout a change in approach, new technology will not serve universities in meeting the challenge of mass higher education and lifelong learning for the knowledge society" (Laurillard 2002: 25). The risk for the idea of the university is that the digital age might find its own ways of managing without the institution (Laurillard 2002).

5.2.3 Society and the economy

The university's relationship with society and the economy must be taken into account when implementing DE technologies on campus. As indicated earlier, this concerns the value that society attributes to a university credential, the freedom society affords the university to be a university and what a university qualification means in society and the employment market. The value of the university for society lies in a complex relationship among knowledge, society and credentials (Brown & Duguid 1995), as illustrated in the scenario storylines. In addition, the association concerning how society perceives and uses technology should also be taken into account.

In this regard, there is growing concern among university leaders that "institutional policy, practice, and culture have not adapted to changes wrought by the incorporation of information technology into the life and work of the modern student and citizen" (Barone 2001: 42). There is also a persuasive logic in the assertion that, until technology becomes a core part of the teaching environment, it is unlikely to succeed. There are substantive risks associated with blindly following a technology-push strategy in the academy. Conceivably, the collective wisdom of the academy rooted in years of experience in critical thinking, has also intuitively resisted a technology-push strategy because of the unknown risks concerning the potential erosion of the functions of the university that could conceivably result from the implementation of popular technology fads. This resistance is ingrained — not so much in the conventional "resistance to the change" phenomenon among faculty members, but rather derived from the tacit wisdom uniquely characteristic of the organisational culture of the university as institution.

Turning to impact of technology in society, Brown (2000: 28) points to the 1975 predictions in Business Week that envisaged a paperless office because of the switch to digital data storage. Twenty-five years later, despite phenomenal advances in digital ICTs since then, the use of paper has accelerated and the older technology of the printed word not only survives, but also prospers. Brown ascribes this apparent dilemma to the fact that books are so well socialised that people do not think of them as a technology. This is the social life of information. New digital technologies will need to be socialised into the fabric of society in ways that the technology becomes transparent. In other words, the university will need to find ways that e-learning is not thought of, or experienced as a technology *per se*. The critical question is: How will the old "technology" of the university engage with the new "technology" of the virtual university?

The ideals underpinning the notion of a paperless office presents a powerful image to illustrate how modern technologies are all too often inappropriately used without understanding the broader sociological and pedagogical foundations. That is, sometimes, technology is implemented in ways— both intentionally and unintentionally — that entrench the status quo under the smokescreen of technology-mediated efficiency gains. Video-taping lectures and making them available for streaming online is an example of using new technologies to replicate existing classroom pedagogy. A recent study examining the adoption of technology in American universities reveals that e-learning has not resulted in changes to the way academics teach (Zemsky & Massy 2004). Zemsky and Massy deduce that "e-learning will become pervasive only when faculty change how they teach — not before" (2004: iii).

The point is that digital ICTs have not replaced the older technology of the book. Similarly, we may argue that digital ICTs will not replace the older "technology" of traditional campus-based teaching. As discussed earlier in this section, online learning can be implemented in ways that are sustaining or disruptive (Scenario 1 *versus* Scenarios 2 and 3). However, the question of whether or not traditional campus-based pedagogy will be augmented or replaced is also a function of how well the technology of online learning is likely to be socialised into the fabric of society. Peters (1973) indicated that the success of the single mode DE providers was not only attributable to the capabilities of emerging industrial technologies, but was also made possible because of the socio-cultural and intellectual conditions of industrial society. Similarly the industrialisation of education did not result in the demise of the traditional campus-based university. Both single-mode DE providers and campus-based universities functioned within a differentiated education system serving the needs of society.

In Scenario 1, the University of New Zealand did not change the way teaching was organised or practiced within the University. Scenario 1 assumed that its students and society would continue to value a credential underpinned by the traditions of the university. In Scenario 2, the University of New Zealand adapted and optimised its processes to keep education affordable, notwithstanding the adoption of technology thus assuming a more egalitarian approach to expand access to education. Scenario 3 displays a commitment to finding new ways of teaching through the smart implementation of DE technologies yet striving to respond to society's changing needs.

Brown and Duguid have examined the compelling reasoning that information technology can push aside the more practical logic of humanity in their excellent work: *The social life of information* (2000). They argue that the obsession with the virtual university may result in the destruction of the most valuable features of the university. Protected by the façade of the university, these institutions carry out academic activities that are immensely valuable for society, but do not necessarily carry direct value in the employment market.

Arguing from the perspective of preserving the important social benefits derived from the core values of the university, Duguid (2002: 15) is of the opinion that digital technologies are transforming education in radical and irreversible ways. "We cannot, nor should we want to go back. The only significant question is how do we go forward" (Duguid 2002: 15). This calls for transformational leadership in the university based on a deep understanding of the assumptions that underpin preferred approaches for the future.

While each of the scenarios have explored the adoption of DE technologies in the university under different circumstances, it is clear that technology on its own will not transform the university for the future. The value of the university for society and the economy lies in the organisation's ability to provide students and society access to a community of scholars. It is this community of scholars that credentialises the learning experience. Fortunately, this is not a function of the delivery technology that is deployed but is more a function of providing meaningful ways in which students can interact with a community of scholars. While universities may be required to restructure the way they teach or reorganise the way processes are implemented in the academy, they will need to maintain and promote a culture of research. It is imperative for scholars to remain actively involved with research in order to sustain this community of scholarship. It is the scholarship and communicative interaction with this scholarship that ascribes meaning to a university degree for society.

Gehart Casper, previous president of Stanford University sums up the challenge facing the university rather well: "The university will remain attractive as a physical space to the extent that the quality of what we do exceeds what technology will make possible" (2000: 3). The possibilities for technology-mediated "new" pedagogy have increased by an order of magnitude, and as indicated above, may well constitute a disruptive technology. All is not lost, as universities continue to attract the crème of academic intellect. The extent of this knowledge resource should enable the university to reinvent itself in a meaningful way. In Casper's own words:

> *"The true university, however old, must draw together and reinvent itself every day. To put it differently and to exaggerate only slightly, even after 100 years — or, for that matter, 500 years — the days of the university are always first days"* (2000: 7).

5.3 Lessons learned and limitations of the study

Scenario planning is a powerful technique to reflect systematically on the future. In particular it enables decision makers to become reflexively aware of the assumptions that underpin alternatives for the future as established in the previous section. However, the experience of developing the scenarios documented in this thesis has also provided valuable insights into the challenges associated with applying this technique as a tool for strategic planning in higher education. In addition, the study has highlighted a number of shortcomings of the technique in general, and limitations of this research project in particular. This concluding section focuses on these limitations with the intention of recommending areas for future research.

The study was an ambitious project from its inception. Conceptual modelling of unknown futures, combined with a contemporary leadership disposition of purposefully generating new futures — as opposed to moving forward based on minor variations of the past — is a powerful philosophy riddled with the ambivalence. The ambivalence relates to the simultaneous opportunities and threats associated with perceived failure and success. The process is dynamic because failure can promote success —institutions can learn from their mistakes. In contrast, success can contribute to failure. As in the case of the innovator's dilemma, a compulsive obsession for success can blind us from seeing the early signs of fundamental changes in the higher education market and technology that could potentially contribute to our failure. The way this dynamic will play itself out in the future is unknown hence the adoption of scenario planning as the key research methodology for this study.

On the one hand, this study has pushed the conceptual envelope to the point of acquiring an improved understanding of the fundamentals that are driving the future of DE technologies in the university sector. Thus the objectives of the research have been achieved taking into account the constraints of the study as delineated by the stated assumptions of the study. The research has demonstrated the utility of scenario planning as a conceptual technique and generated three alternative futures for university leaders to consider. These scenarios are useful benchmarks to gage strategic plans and to obtain a clearer understanding of the dynamics at play in our evolving university futures. Yet on the other hand, this study has also identified a number of limitations of scenario planning as a technique that must be taken into account.

Unquestionably, the most significant limitation concerns the complexity of the technique, especially if we are striving to gain a better understanding of the foundations of university-level education when faced with the implementation of DE technologies in a changing world. Scenario planning has the advantage that it can accommodate the interaction among multiple variables. However, early in the study it became clear, that in order to meet the criterion of plausibility in the Scenario storylines, thorough analysis from multiple perspectives would be required.

The university is a multi-faceted and complex organ of society. This encouraged the theorising in this study to be conducted as a multi-disciplinary and inter-disciplinary study drawing from the multiple knowledges: of philosophy; sociology; economics; education; open distance learning; leadership and management theory; and the growing field of information and communications technology. I have purposefully refrained from labelling these areas of academic interest as disciplines because the boundaries are blurring. Wulf (2003: 18) remarks that "disciplines are complex idiosyncratic social structures that will not easily dissolve .....[yet] much of the most interesting work is already happening at the boundaries of traditional disciplines". Many of our most successful innovations in the world are generated from the grey areas between the boundaries of conventional disciplines. For example the potential innovations associated with digital knowledge granules are derived from the boundaries of software development, the convergence of telecommunications and what we are learning in the cognitive sciences. Working between traditional disciplines has enabled the research reported in this thesis to think outside the box. However, the downside of multi-disciplinary work is that it increases the complexity of analysis that is necessary to do justice to the arguments showing the interplay among these areas of academic interest. As indicated in the introduction, this thesis is not an empirical study but engages in the prior task of theorising about the factors that university managers will need to consider when building strategic plans.

At a practical level, it is unlikely that university leaders would find the time to wade through the deliberations and theorising reported in the thesis. Therefore a translation mechanism will need to be found to simplify access to understanding the dynamic among the multitude of variables. Most organisations — including universities — are grappling with the balance between sustainable economics and innovation (Wheeler 2004). The difficulty is that changes in technological approach will incur costs and one of the tried-and-tested techniques to avoid variations in existing cost behaviours is to limit changes that would alter the sustainable economics of the organisation hence constraining opportunities for innovation. Consequently leaders are rarely exposed to the range of changes that interact with each other in a total system. It would be possible to build a dynamic simulation model that explores the cost-revenue relationships taking into account models replicating the elasticity of demand for a university degree, cost and revenue streams associated with research, different cost behaviours associated with the way technology is deployed in teaching and learning and so on. The prior theorising in this thesis has identified the trade-offs and assumptions under different approaches thus providing a starting point for developing simulation models whereby decision-makers could explore the impact on the university system by manipulating different variables.

The second limitation relates to the "accuracy" of the value judgement of how far into the future universities should look when attaching significance to the drivers of change and uncertainties that are used as the conceptual building blocks for scenario planning. As a conceptual modelling exercise, the research walked a tight line between the risks of data-driven forecasting and idealistic speculation. Empirical studies have the advantage of maintaining focus as delimited by the data and the inherent strengths and weaknesses of the tools used to generate the data. Research associated with strategy innovation does not have the luxury of empirical data to delimit the study.

Conceivably you can determine where a study of the future should start for the purpose of defining boundaries, for example the present or starting from three or four years prior to the present date as in the case of this study. However, where does a theoretical point in the future cross the threshold into speculation? Or to what extent do you need to look into the past to help understand the future? These challenges were managed using the discipline associated with academic research, for example the conventions of determining objectives, establishing and refining research questions, selecting appropriate methodologies, testing conceptual hypothesis etcetera. The study was also structured according to the conventions of traditional research. At the same time conventional research paradigms were constraining. For example, methodologically speaking, how do you test a hypothesis for the future, when the future is not likely to happen before the study is completed? Consequently there is no data that can be used to test the hypothesis because the future has not happened yet. This study relied on the reported experience of scenario planners from the corporate world to inform this decision. Notwithstanding the limitation of the value judgement concerning where the threshold into speculation begins, it must be reiterated that scenarios are **not** predictions of the future. They are tools to help us understand the trade-offs we may need to consider under different views of the future.

The concluding limitation is a collective grouping that relates to the opportunity cost of forgoing scenario constructs by deciding on particular uncertainties at the expense of selecting others. Per definition, the outcome of uncertainties is unknown. Also, there is no guarantee that the "right" uncertainties were selected for building the scenarios and the assumptions underpinning the scenarios (see Section 4.3.3 in Chapter 4) are conditions that were accepted to be "true" without rigorous validation. The risks associated with prioritising selected uncertainties and accepting a set of assumptions should not be ignored when interpreting the results of the research. These inadequacies constitute fertile ground for further research into alternative scenarios. Although not intended to be an exhaustive list, examples of these limitations are listed for consideration:

- A definitive decision was taken to develop the scenarios from the perspective of a traditional campus-based institution. This represents a particular set of organisational and pedagogical preconditions. Scenarios developed from the perspective of the large-scale single-mode DE universities would evolve differently because they begin from a different set of preconditions. Similarly, scenarios developed from the perspective of the corporate university will also result in different outcomes. The development of these scenarios would provide a more composite picture of the market dynamic associated with DE futures and is therefore suggested as an area for further research.
- The scenarios assumed that the university as institution would continue with the provision of its core functions of research and teaching within the existing value chain model. Consequently, unbundling and outsourcing of components of the university's processes were not considered in the scenarios. For example, outsourcing the instructional design of online materials. Duguid (2002) warns that the unbundling of complex social systems is "not as simple as it might seem to those who advocate it". However, the unbundling of the value chain is certainly a strategy that many virtual universities operating for profit are experimenting with, through the provision of decentralised services (see Epper & Garn 2004). Notwithstanding the complexities of the unbundling debate, this is a limitation in the scenarios documented in this project. Again, this is a dimension worth exploring in future scenarios.
- A key requirement for developing scenarios that will have decision-making utility is to simplify the plethora of variables by not attempting to analyse more

than two key uncertainties (Schoemaker & Mavaddatt 2000: 212). This is a limitation of the technique that must be taken into account when using scenarios for decision-making purposes. There are a number of material uncertainties that could, for example, have a significant impact on the future of universities:

- A *local versus international locus of control* with regard to the phenomenon of globalisation. While there is a strong reciprocal relationship between local and global, where the dominant locus of control will ultimately reside is unclear. Education is culturally bounded and the positioning of this locus of control will have deep-rooted consequences for the economy, society and education.
- The *nation-state relationship* and its implications for education and the information economy. Much of the literature has argued that the breaking down of the nation-state relationship is a consequence of late modernity (for example, Gibbons 1990; Gibbons 1999b). It is assumed by many theorists that the information economy necessarily corresponds with a weakening nation-state relationship. However, recent studies have documented phenomenal successes of some welfare states in the evolving information economy, thus dispelling the notion that strong state involvement is a barrier to success in the knowledge economy (Castells & Himanen 2002). This uncertainty raises numerous questions with regard to optimal levels of state-control in the evolution of e-learning in the university sector.
- *Credentialised versus non-credentialised learning* as the preferred model for the future of higher education. The scenarios have assumed that society will continue to attach value to a university credential. It would certainly be worth exploring whether or not individuals will begin questioning the true benefit of a university degree when measured against its cost (Laurillard 2002). Are there alternative ways of gaining the qualities and skills traditionally obtained through a university education and would society value non-credentialised learning? Internationally the undergraduate student profile is changing. For example: a large proportion of undergraduate students today hold part-time positions thus changing the meaning of full-time university study. Priorities and reasons for university study among undergraduate students are changing when compared to those of their parents. Taking into account the capabilities of modern technologies and the youths' affinity with these digital technologies, this is an uncertainty worth exploring for the future of the university.
- *"Old" versus "new" knowledge* as a generic descriptor for changing epistemology and those organs of society that exert influence in this unfolding dynamic. The adoption of ICTs in higher education is not limited to the efficiency gains associated with automation of university processes, increased access to codified knowledge through e-journals and productivity tools like word processing in the production of research reports. These technologies, in conjunction with the evolution of society, are potentially changing the nature of knowledge, how it is produced, how we use knowledge and ultimately how we learn. What is unclear is how the sources of power and influence in relation to knowledge creation and dissemination will evolve. For example, will the established and centralised forms of knowledge production prevail or will we see emergent forms of self-organised and diffused knowledge produced and used in a decentralised way?
- *The survival of the university* as the preferred organisation for higher education. Scenarios must be relevant from the perspective of reflecting the key issues and central concerns of the organisation concerned. Therefore in this study, the scenarios were developed from the

perspective of preserving and promoting the idea of the university. Preferring one scenario above another makes them less effective as tools for decision-making (Kahane 2001). Consequently an uncertainty continuum exploring the potential demise of the university in the face of unrelenting pressure from alternative providers or different institutional configurations was not explored in detail. Nonetheless the competition axis and its impact on the conventional university have been explored by other scenario planners (see University of Michigan: 1996). This uncertainty should be investigated further in the light of more recent advances in technology compared with the poor track record of the early virtual universities that were conceived prior to the bursting of the dot-com bubble.

Scenario planning should not be misinterpreted as the panacea for strategic planning in the university. Unfortunately, as indicated in the introduction of this thesis, systematic thinking about the future "does not have a well defined methodological base" (Miller 2003: 3). Nonetheless, scenario planning is a widely used technique that can create opportunities for university leaders to think creatively about ways to shape the future for the better.

5.4 Conclusion

Universities are institutions that operate with relatively high levels of institutional autonomy, which have enabled them to foster and protect the functions of research and teaching as a self-regulated system. Thus, they are not predestined to follow any particular strategic path with regard to the adoption of DE technologies on campus. This suggests that individual universities could choose different strategic paths with the understanding that leaders will need to consider the relationship between autonomy and the functions of the university when preferring one strategy above another.

In the past, the autonomy of the university has been closely aligned with academic values. Though, with the adoption of more sophisticated digital technologies, increasingly institutional autonomy is being influenced by administrative components of the university system. As a result, there is a risk that core academic values could become diluted with the adoption of technology on campus. The challenge for universities is to strike the right balance between administrative and academic requirements associated with DE technologies. This is not a clear-cut relationship as organisational boundaries are beginning to blur with the implementation of e-learning technologies as illustrated below.

Historically, the institutional autonomy of the university was almost solely concerned with the academic issues of knowledge creation and dissemination — that is, what to research and what to teach. This institutional autonomy had very little to do with questions associated with mode of delivery at campus-based institutions (apart from a few quality related issues) because universities have assumed continuity of the face-to-face delivery model. However, the introduction of online teaching technologies on campus is challenging this tradition, but is also expanding the realm of influence and organisational responsibilities pertaining to institutional autonomy beyond academic departments. In most universities, administrative departments including the central information technology department and the university library, manage substantive components of e-learning technologies and the digital databases for storing knowledge. Given the size of the budgets that these technologies consume, combined with the specialised administrative and technical requirements of the technologies concerned, it is understandable why the management of enterprise-wide learning technologies are assigned to central administrative departments. Clearly the traditional administrative-academic boundaries are blurring as universities move forward with the implementation of e-learning technologies.

A dimension less thought of when assigning administrative management responsibilities to e-learning technologies are the academic values that may be forgone with such organisational design decisions. The crux of the matter is that the new learning technologies differ in a fundamental way from previous generation learning technologies (and other administrative technologies). The specific roles that the new learning technologies adopt in the teaching-learning situation actually alter the pedagogical structure (when compared to face-to-face teaching) because they carry the functions of teaching (see Peters 2003: 87). This is different from previous generation technologies that were used as adjuncts in support face-to-face pedagogy because they did not alter the pedagogical structure of classroom teaching. This is potentially a key academic responsibility that could be forgone with inappropriate organisational design solutions, yet sound scholarly reasoning would suggest that pedagogy should not be driven by the technology deployed or the departments that manage these technologies. Moreover, the research reported in this thesis demonstrates that the adoption of DE technologies is not simply limited to administrative issues, but has substantive implications for trade-offs in the core functions of the university. Therefore it is imperative that university leadership finds the right balance between administrative efficiency and academic autonomy with the implementation of DE technologies on campus.

In summarising the scenario research documented in this thesis, three strategic paths could be considered by universities with the adoption of DE technologies. They are not discrete alternatives because they are dependant on the nature and extent of the future evolution of technology combined with organisational design decisions that individual universities may take. What is clear, however, is that each alternative will impact on the functions of research, teaching quality and the university's relative position within society and the economy.

The first scenario suggests that with the implementation of e-learning technologies, campus-based universities should not expect radical changes in the quality of the learning experience for its students, other than gains in efficiency and convenience. Academics need to change the way they teach, as well as finding meaningful ways of connecting students with their academic endeavours and each other before we are likely to see qualitative advances resulting from the adoption of DE technologies on campus. The scenario illustrates that in the absence of a strategy to manage cost, quality and access of DE initiatives, trade-offs for research output or increases in student fees could result. From a systems perspective, the introduction of a new technology without substantive changes elsewhere in the system will necessarily contribute to imbalances requiring trade-offs. This is not to suggest that traditional campus-based universities should refrain from the adoption of e-learning technologies — it cannot be avoided given the universal uptake internationally. It does however require insightful management to ensure that maximum value is achieved without compromising the functions of the institution. This scenario assumes that current online technologies do not change much over the years to come, and managers should question the reasonableness of this assumption against contemporary advances in technology.

The second scenario achieves considerable success with expansion into DE markets following radical advances in digital technologies. In this scenario, the University is able to refine and adapt systems and processes pioneered by the single-mode DE providers for local campus conditions. Through managerial optimisation using a Fordist business model of mass-standardisation, the University is able to build on its successes using a philosophy of continuous improvement. Notwithstanding measurable improvements in the quality of its pedagogy, the trade-off is to forgo some of its research activity by differentiating between departments focusing on teaching and departments prioritising a research-led teaching philosophy. The University was prepared to institute significant changes to its organisational structures and processes. Targeting a slightly different market segment enhanced its successes. Nonetheless the university's credential was still respected within the general employment market.

The third scenario achieves success by applying a strategy innovation approach based on research. Faced with the challenges of radical advances in digital technologies, the University builds on its research capability to generate and establish a "new" pedagogy and corresponding new mode of delivery. As an early entrant into this new market, the University establishes a global leadership position. The University reconfigured its operations and structures for a post-Fordist business model based on mass-customisation, in order to grow this new mode of delivery in a sustainable way. The University was able to maintain its research-led teaching approach combined with sustaining high-quality teaching. However, the trade-off in this scenario was to forego traditional academic structures associated with the university in the transformation towards a post-Fordist business model.

In all likelihood, the provision of higher education is likely to become more differentiated in terms: of the target markets that individual institutions will serve; the preferred delivery models that educational organisations will support; and the choices concerning operational priorities that different universities will support. The value of the research reported in this thesis is that it provides a basis for university leaders to begin contemplating among differentiated and well-founded alternatives for the future.

Appendix 1

Macro systems architecture for building the scenarios

1. Introduction

A myriad of factors and variables associated with university-level DE futures have been analysed and discussed in the first three chapters of the thesis, but until now these factors have not been conceived in relation to each other. Senge offers the following advice when dealing with a complex set of factors that may play out over a considerable period of time — such as those discussed in this thesis:

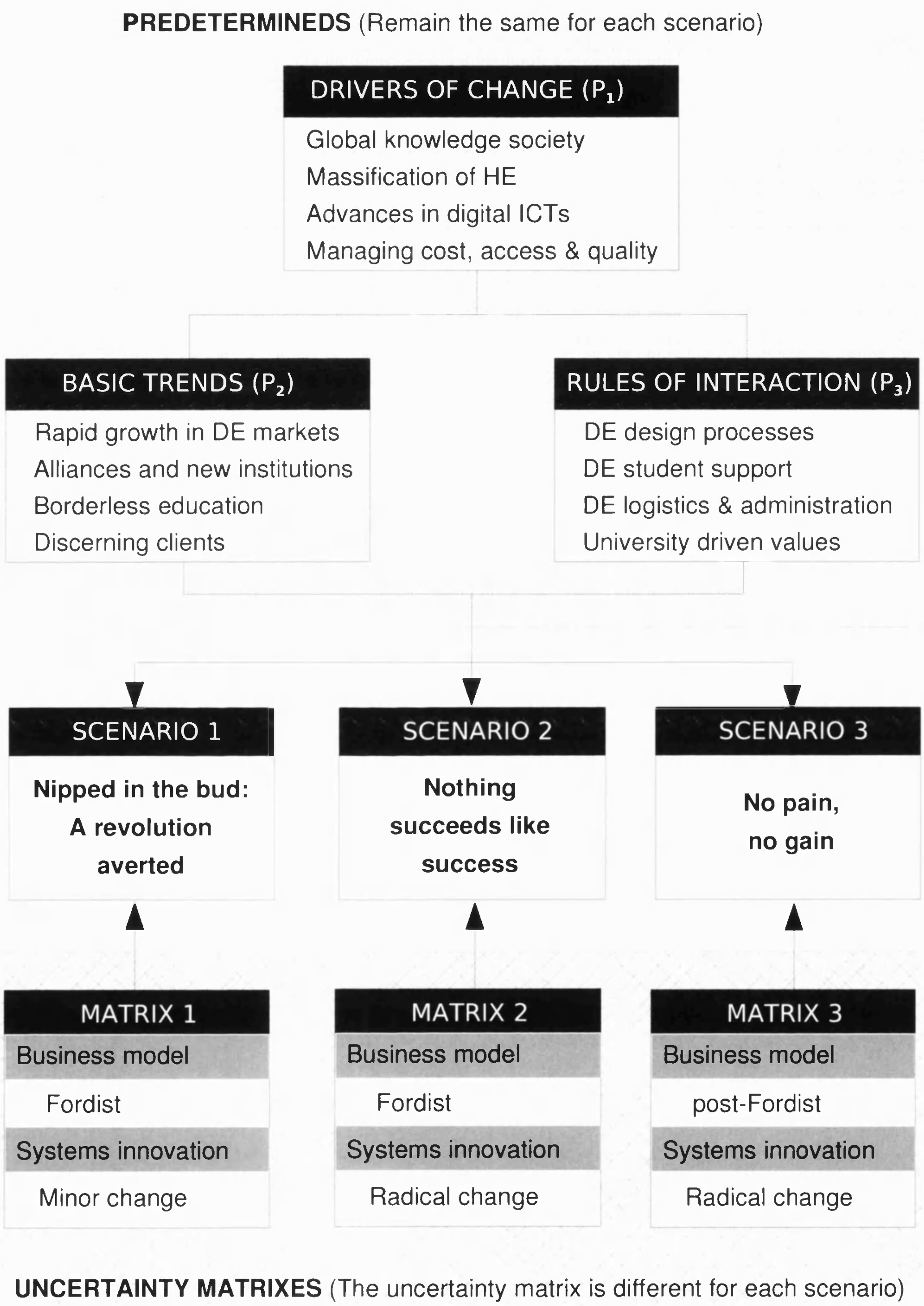
> *It's easy to get lost in the 'trees' of these details and lose sight of the 'forest' — mastering the dynamic complexity essential to successful strategy. Here's where the discipline of systems thinking finds its greatest advantage. By using the systems archetypes we can learn how to 'structure' the details into a coherent picture of the forces at play.* (1994: 130)

Dealing with this complexity is best achieved using a dynamic systems approach (Ward & Schriefer 1998: 141). A system consists of two or more interrelated elements as well as the dynamic interplay among these elements. In this section, the systems architecture used to structure the "details into a coherent picture of the forces at play" (Senge 1994: 130), is presented in Figure 1. This was constructed according to the building blocks of the scenario planning process and provides a summary of the conceptual framework used to build the scenarios.

The scenario planning model used in this study examines the interaction between *predetermineds* and *uncertainties* (see Mercer 1995; Schoemaker 1995; Van der Heijden 1996). These constructs are represented by the two shaded rectangles in Figure 1.

Predetermineds refer to those events, factors, and trends which are reasonably predictable over the short-term relying largely on a forecasting approach where predictability is based on historical observations and interpretations of the relevant context. The effect of the predetermineds remains the same for each of the scenarios.

Figure 1 Macro systems architecture for the scenarios



Drawing on the work of Mercer (1995), the predetermineds are divided into the subcategories of:

- *drivers of change* which in a given sector push (or pull) organisations away from a "business as usual" state of mind;
- *basic trends* which delineate the environmental context within which an organisation operates; and
- *rules of interaction* which set down the framework within which the scenarios will evolve.

The three predetermineds are labelled P_1, P_2 and P_3 respectively in Figure 1. The elements of each predetermined are summarised in the subsections below with corresponding examples of their respective interaction with the total system.

In contrast to the predetermineds, the outcome of uncertainties is fundamentally unknown. Thus forecasting approaches are ineffective because uncertainties do not have a reliable history. Individual uncertainties can assume states that are significantly different from the present context displaying the characteristics of disruptive technologies[1]. Two uncertainties were prioritised for analysis in this study (See Chapter 3) and each uncertainty assumes two opposing states:

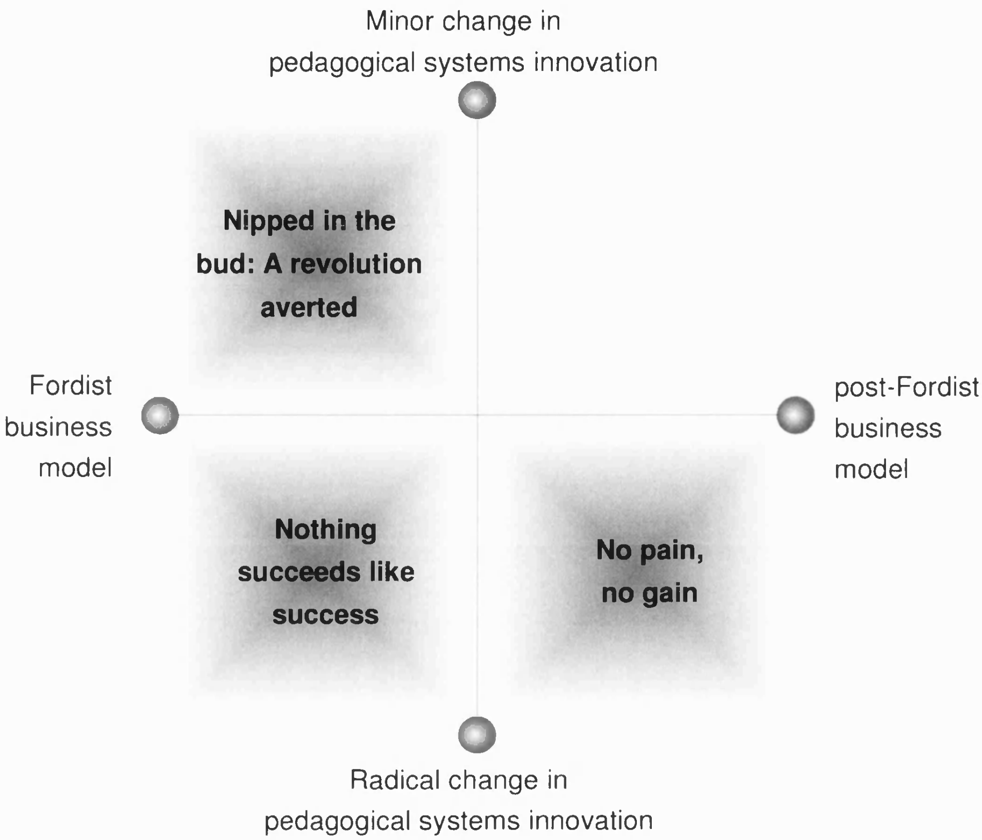
1. the *dominant ODL business model* (mass stadardisation versus mass-customisation in other words a Fordist versus post-Fordist business model); and.
2. *pedagogical systems innovation* resulting from advances in the technology of digital knowledge granules[2] (minor change versus radical change).

The distinct states of each uncertainty can be represented graphically using a two-by-two matrix shown in Figure 2. This generates three valid uncertainty matrixes and corresponding scenarios. Note that a post-Fordist business model characterised by high-levels of customisation would not be possible with a minor change state of the "pedagogical innovation" uncertainty. The reason for this is that sustainable and cost-effective implementation of mass-customisation will call for radical advances in the technology of digital knowledge granules. This intersection is not a valid uncertainty matrix and therefore the fourth quadrant is left blank.

[1] A disruptive technology is a technology that establishes a new value proposition that did not exist before and is a key determinant of the "innovators dilemma" (Christensen 2000). The dynamics of this variable were explained under the heading: "Large-scale higher education and the innovator's dilemma" in Section 3.3.2 of Chapter 3.

[2] The concept of digital knowledge granules was defined and analysed in detail in Section 3.4.1 of Chapter 3. In summary, this concept is described as a digital resource that: represents a fragment of understandable knowledge; is capable of multi-mode and multimedia presentation; is storage, carrier and delivery technology independent and is designed for reusability of both content and pedagogical form aspects (for instance, instructional sequence, the forms of embedded learning activities or phase elements of the learning process).The concept of "digital knowledge granules" is used in the scenarios to distinguish this form of digital object from the more generic term of "learning objects" found in the literature. The generic concept of "learning objects" as it is used in the literature, eludes precise definition and there is much debate about what constitutes a "learning object". For example, how big (or small) a learning object is. To avoid confusion, the scenarios use the concept of "digital knowledge granules" as described in Section 3.4.1, thus signifying a particular understanding of the concept.

Figure 2 Uncertainty matrixes and corresponding scenarios



Consequently three scenarios will be developed according to the following uncertainty matrix combinations:

- *Nipped in the bud: A revolution averted* (Scenario 1) based on the interaction of a Fordist model of standardisation combined with minor change in the technology of digital knowledge granules, thus a low level of pedagogical systems innovation;
- *Nothing succeeds like success* (Scenario 2) representing the combination of a Fordist business model with radical advances in the technology of digital knowledge granules; and
- *No pain, no gain* (Scenario 3) based on a post-Fordist business model and radical changes in the technology of digital knowledge granules.

Before building scenarios for any organisation, it is necessary to understand the "organizational context in which the scenarios are to be developed and used" (Schoemaker & Mavaddat 2000: 219). As the context of this study is determined by the variables listed under the three main predetermineds (that is: the drivers of change, basic trends, and rules of interaction[3]) it is necessary to provide a consise summarise of these factors. The major thrust of each factor is briefly summarised in order to clarify its relationship with the larger system. To avoid duplication arising from repeating the details of individual factors, a system of footnotes will be used to cross reference the

[3] Refer to Section 1.4 and Figure 1.7 in Chapter 1.

independent factor with the more detailed discussions and justifications of these factors in the preceding chapters. Selected examples of the dynamic interaction among different factors will also be illustrated.

2. Drivers of change

The transformation of tertiary education was analysed in this thesis from the perspective and interplay among three main drivers of change. In addition, managing the triangle associated with reducing cost, increasing access and quality in DE was also considered. The essence of each factor as well as examples of important interrelationships is captured in the paragraphs below.

2.1 Massification of higher education

Notwithstanding the impressive achievements of higher education in general (and ODL in particular) regarding the opening of opportunities and widening of access to tertiary education, global demand for higher education far outstrips global supply and the problem is particularly acute for the developing economies of the world[4].

This demand is not limited to the pre-service sector of the tertiary education market, as changing demands of the new economy are resulting in continuing emphasis on lifelong learning. Therefore, further differentiation in the tertiary education sector is probable, both in terms of the content and form dimensions of university delivery systems.

The direct implication for DE futures is that the campus-based model is not capable of dealing with these levels of global demand, hence considerable growth in DE is anticipated. Massification as a driver of change is also closely related to the basic trend of rapid growth of the DE market illustrating the complex dynamic of the system where the distinction between cause and result becomes diffuse and where a factor can simultaneously be both cause and result.

Massification of higher education is also linked to the social objective of breaking down barriers of elitism traditionally associated with the medieval university, particularly when measured against post-war expansion of university education in the most industrialised economies. However, the university may become partisan to new forms of elitism where sophisticated forms of e-learning may prove too costly for many and therefore reserved for those who can afford it. An argument can be developed on the grounds that the cheaper standardised and mass-produced forms of DE will cater for the poorer sectors of society, while elite forms of educational provision will remain the preserve of those who can afford the costs (and corresponding benefits) of pedagogical enhancement associated with pedagogical innovation through technology[5]. While tertiary education may be less elitist than the past, new forms of elitism may emerge and existing forms of elitism may be amplified through further differentiation of the higher education sector. This illustrates a dynamic relationship between the massification of higher education and the values underpinning university practice — identified as a rule of interaction in Figure 1.

[4] Refer to the detailed discussion in Section 1.3.2 in Chapter 1.

[5] See for example the discussion on the uncertainty associated with post-Fordism in ODL under Section 3.3.3 of Chapter 3.

2.2 Global knowledge society

The new economy is global because the core activities of the value network incorporating design, development, production, marketing and delivery of goods and services are now organised on a global scale. Most components of the value network are knowledge-based and knowledge is increasingly becoming an important factor in the new economy. Moreover, epistemology and society are evolving particularly with regards to shifts from Mode 1 to Mode 2 knowledge generation, including for example changes in the traditional custodianship of knowledge; how it is produced; and even transformations concerning perceptions about what counts as knowledge[6].

The implications are that universities will have to establish new knowledge networks to remain engaged in the distributed practice of producing knowledge in the context of application. Furthermore, the role of teaching will necessarily shift from that of imparting knowledge as the traditional custodian thereof to one of reconfiguring knowledge for learning that may be generated outside the confines of conventional university research practice. Furthermore, universities that are driven by a research-led teaching philosophy will need to examine how changing epistemology will influence their practice and traditions.

The global knowledge society is closely interwoven with the change dynamics emerging from the convergence and pervasive advances in digital ICTs. In fact, the global information economy would not be able to function at its current levels without digital networks and the ubiquitous nature of modern ICTs. Globalisation is also closely related to the following basic trends of the total system depicted in Figure 1: borderless education; the large number of global alliances emerging in higher education; and the appearance of new forms of institution in the tertiary sector — which did not exist before[7]. DE is ideally suited to delivering learning opportunities across national boundaries, and from this perspective is closely related to developments of the global knowledge society.

2.3 Advances in digital ICTs

Digital technology cuts across systems, processes and functions and therefore interrelates dynamically with virtually all the variables in the system. More fundamentally, it is the enabler of DE practice because without it, overcoming the physical barriers of time and space in educational delivery would not be possible. Oscillations and changes in this driver will have a direct influence on how DE futures evolve. Two facets are of particular importance for DE futures: first, the ubiquitous nature of digital ICTs resulting from (and spurring on) the rapid rate of change with regard to continuous reduction of the cost of technology in parallel with exponential increases in computing power; second, the convergence of technologies enabling interoperable communication independently of the specific communication device, storage medium, distribution technology, and delivery platform[8].

There is a perplexing dichotomy facing developing societies, which will influence how DE futures evolve in this sector of society. On the one hand, ICT infrastructure is virtually non-existent in many developing society contexts, which suggests that legacy

---

[6] A detailed discussion of globalisation and the emerging knowledge society is provided in Section 1.3.1 of Chapter 1.

[7] Refer to the discussion of borderless education and internationalisation under Section 3.3.1 of Chapter 3.

[8] An analysis and justification discussing ICTs as a predetermined can be found in Section 1.3.3 of Chapter 1.

DE pedagogy, and first generation delivery systems would be more appropriate. On the other hand, digital ICTs provide the vehicle to overcome many of the other barriers associated with quality DE delivery in developing societies — for example, the availability of a range of suitably qualified tutors to provide student support in remote rural areas[9]. The significance of this dichotomy is that existing DE models (legacy systems) would not be able to exploit the potential of digital ICTs effectively in developing-society contexts, whereas a shift to a post-Fordist orientation would be better positioned to find innovative solutions to this problem. This provides an example of the important dynamic interrelationship between the advances of digital ICTs and the second scenario uncertainty, relating to the dominant business model that will be adopted in future DE systems.

Anytime, anywhere educational delivery is a reality today and combined with the convergence phenomenon, it is now possible to develop ODL pedagogy and corresponding delivery systems that did not exist before. A very significant interrelationship exists between the pervasive advances of digital ICTs and the emergence of the technology of digital knowledge granules — one of the key uncertainties in the dynamic scenario system of Figure 1. Furthermore, the sophisticated networking systems and knowledge strategy tools that are prerequisites for the effective operations of a post-Fordist institution would not be possible without the contemporary capabilities of digital ICTs. This illustrates an additional example of an interrelationship with the second key uncertainty[10].

2.4 Managing the triangle of cost, access and quality in ODL

All higher education institutions are faced with the challenge of how to widen access, reduce costs and increase quality of learning with the implementation of DE technologies on campus. Managing sustainable economics in the university sector is becoming an important driver of instutional change.

The large-scale, single-mode DE providers have developed a delivery system that has succeeded in managing the eternal triangle in a unique way[11]. The delivery model and processes associated with the large-scale single-mode DE universities have succeeded in:

- widening access by virtue of its delivery model (time-space separation) but also through the philosophy of open learning which underpins its practice[12];
- reducing the unit cost of university-level qualifications, for example, the costs of undergraduate degrees in most of the mega-universities is 50 percent or less than the average unit cost of campus-based models in the same country;

---

[9] Student support is classified as one of the core distinguishing functions of large-scale distance teaching systems (see description under Section 2.2.2 of Chapter 2). Furthermore, the provision of individualised support to learners is one of four critical factors underpinning the success of the mega-universities (see the end of Section 1.3.4 in Chapter 1.)

[10] The discussion on the practical implications of a post-Fordist business model in ODL highlighted the need for complex networked systems regarding, for example: the effective management and record keeping that will be required in an education system with increasing differentiation; the complex communication and networking infrastructure that will be required to manage multiple and ever-changing teams comprising multiskilled professionals in the design, development and delivery of post-Fordist learning materials; and systems necessary to manage ever-increasing vertical de-integration of the value network.

[11] The justifications showing how the large-scale, single-mode DE providers have managed the eternal triangle can be found in Section 1.3.5 of Chapter 1.

[12] A detailed analysis and discussion of the philosophy of "open learning" and its corresponding role as a guiding vision for the future evolution of DE practice is provided in Section 2.2.1 of Chapter 2.

- providing quality teaching that is characterised by its consistency with repeated presentations of the same course. Regarding quality, the British Open University, for example, is independently ranked within the top 10 percent of universities in the United Kingdom for the quality of its teaching.

Cost, access and quality consitute core determinants of competitive advantage. In other words, institutions should theoretically be able to gain market share or improve dominance in a particular sector when they are able to enhance quality; and/or reduce cost; and/or expand access of the product or service to its customers. In recent years the university sector is increasingly becoming more "client-focused" — not only in terms of administrative and campus related services but also pedagogically as evidenced by the growing interest in socio-constructivist learning ideology.

Peter Drucker's predication that "thirty years from now the big university campuses will be relics" (1997a) is a consequence of the trend that prospective learners (future "customers") are becoming more discerning regarding their choices for tertiary education study based on value decisions taking the dimensions of access, cost and quality into account. In other words, they will be basing their choice for acquiring knowledge and the corresponding credentialing of that process on a value-for-money rational as opposed to allegiance to the university as institution. Managing the future dynamic of the eternal triangle is therefore closely related to the basic trend of more discerning students taking questions of access, cost and quality into account.

3. Basic trends

The basic trends analysed in this thesis are derived from observations and interpretations of the contemporary context of global DE practice — essentially a process drawing on the philosophy underpinning forecasting techniques. Per definition, trends are important factors which are highly predictable. Collectively these trends have the potential of transforming the tertiary education market and the overall direction of these forces is clearly evident. The following trends relating to the evolution of DE practice underpin the scenarios in this study[13]:

- *Unprecedented growth in the practice of DE:* Until the 1990s, the single-mode open universities, the dual mode systems of Australia, and peripheral external studies departments at some campus-based universities represented the sum of global DE practice. However, the situation at the turn of the century was very different. Today, almost all campus-based institutions have some form of DE activity as part of their mainstream delivery alternatives, largely due to advances in ICTs but also as a result of the removal of the traditional barriers of entry into DE markets. These barriers came down through cost efficiencies that can be achieved at considerably lower student numbers than those associated with the large-scale systems. The growth in the number of colleges and universities in the United States now offering DE courses has been exponential, for example, distance learning is growing at three times the rate of face-to-face programmes (Christensen, Aaron & Clark 2003: 45). Almost every institution now has courses that are delivered in distance format (see for example CHEA 1999b).
- *Emerging alliances and new institutional forms that did not exist before:* Corresponding with developments in ICTs, a range of tertiary education providers and institutional arrangements are now emerging — over and above the traditional campus-based universities and single-mode DE providers as dominant market providers. This list includes, for example: new stand-alone,

[13] A detailed discussion of the factors listed below is provided in Section 1.3.1 of Chapter 3

degree-granting online institutions; degree-granting online consortia; nondegree-granting online consortia; corporate universities; and non-affiliated institutions that offer online courses and programmes (see Hanna: 2003).
- *The phenomenon of borderless education:* In recent years, a number of significant studies have been commissioned to examine the opportunities and threats associated with borderless education (Cunningham *et al* 1998; Cunningham *et al* 2000; CVCP & HEFCE 2000a, 2000b & 2000c) thus indicating concern about this phenomenon at national policy level. There is an identifiable threat associated with borderless education, and while it is difficult to predict the finite implications thereof, this trend is likely to strengthen.
- *More discerning client base:* Student demand for tertiary education will not continue to support rising costs of university education indefinitely and students are increasingly becoming more discerning regarding choices of study based on the interaction among access, cost and quality. Furthermore, the growing lifelong learning market comprises more "educated" consumers by virtue of their experience in the workplace and other consumer markets. For many universities, it will become increasingly difficult in the future to maintain their market share based primarily on decisions motivated by personal loyalty to the university as institution.

Collectively, the interplay among the factors listed above is resulting in the DE market becoming increasingly volatile and more complex. Strategic planners in the tertiary education arena will have to pay considerably more attention to the dynamic of competitive advantage when planning for the future. The dynamic of this competitive advantage is closely related to the management of the eternal triangle, but it is also directly related to the way in which the two scenario uncertainties should be managed in the future. For example, the pedagogical potential of digital learning objects cannot be pursued irrespective of the cost thereof, because this could price an organisation out of the market, consequently losing competitive advantage and corresponding market share. On the other hand, avoiding the risks of experimentation regarding the challenges of finding cost-effective solutions for technology-enhanced delivery alternatives (using learning objects) may also result in organisations depleting strategic opportunities. This is because the core skills, competencies and experiences required to operate in these futures have not been developed and supported within the organisation.

There is also a complex relationship and interplay between these issues of competitive advantage and maintaining the core values of the university, which is defined as a rule of interaction for this dynamic system (see Figure 1). It is relatively easy for the for-profit universities to discard the costly activities of academic research, thus gaining competitive advantage in terms of cost. Yet this is a core value of the university which impacts on the perceived and actual value of a university-based education.

4. Rules of interaction

The rules of interaction set the framework within which the different scenarios will be developed. The rules of interaction define the constraints for the scenario building process, but also direct the strategic focus of the exercise. The overriding rule of interaction for this study concerns the unique requirements of DE provision[14], that are distinct from campus-based systems. This is a distinguishing feature of the research reported in this thesis. To date, well-founded scenario work in the university sector has not taken the theory, research and experience of DE into account when building

[14] A detailed analysis explaining the differences between face-to-face and DE delivery systems is provided in Chapter 2 of the thesis.

scenarios (see for example Firminger 2002; Learning Circuits 2004; Miller 2003; University of Michigan 1996).

Notwithstanding the unique requirements of DE, it would appear that the pedagogy of DE and the pedagogy of campus-based teaching are converging at campus-based institutions moving into online delivery. DE futures must carefully consider the analytical systems framework discussed in Section 2.2.2 of Chapter 2 (also see Figure 2.3 in Chapter 2) in order to ensure sustainable delivery of quality learning.

Given that this study focuses on DE futures within the generic practice of tertiary education provision, it is necessary to ensure that the future scenarios cater for the requirements of successful DE provision. The practical implications of the uniqueness of DE for planning are that DE systems require "special techniques of course design, special instructional techniques, special methods of communication ... as well as special organizational and administrative arrangements" (Moore & Kearsely 1996:2). These are best summarised by the following attributes (see Daniel 2001b):

- Quality DE resources should be designed and developed by a team of multi-skilled professionals, which have specific implications for the organisational structure and design processes of DE providers. Moreover, as new technologies evolve, new skills requirements will emerge which may have systemic organisational implications for future structures and design processes;
- DE requires special processes and structures to provide individualised learner support over and above the uniform DE learning materials. In the future, higher levels of customisation within learning resources will be possible. However, the personal student support interface is a distinctive systemic feature of successful DE systems;
- Robust logistics and administrative systems must be in place to ensure the smooth operation of the DE initiative. Conventional campus-based administrative systems have not been designed for the specialised requirements of DE (which increase in complexity when operating at scale because of increasing levels of specialisation and division of labour);
- Successful DE systems have faculty members who remain actively involved in research as this promotes the intellectual excitement for learners and also enhances the "token value" of qualifications from these institutions within the market place and society.

An important rule of interaction is that the scenarios are being generated from the perspective of the university sector and will attempt to retain the core values of the university as institution. These values include, for example, the maintenance of scholarship and academic scepticism; academic independence and autonomy; and the roles associated with being a critical voice for society. The university as institution and its corresponding values will experience increased pressure from non-university providers and this will impact on the competitive advantage in the sector. This rule of interaction does not disregard the potential impact of competitive advantage in the tertiary sector from non-university providers, but stresses the focal requirement for universities to bring innovation to their own futures. Moreover, it illustrates the complex relationship between this rule of interaction and competitive advantage in the tertiary education sector — that is, the factors discussed under the trends of Figure 1.

Entrepreneurial approaches in the university sector must be carefully balanced with the requirements of the core values of the university. For example, consider the compromise of values relating to functioning as a critical voice in society should a university accept significant “brand” funding from a company found to be involved in questionable practices in one of the developing society countries (see for example, Daniel & Mackintosh: 2003). This is a difficult balance because universities are not primarily businesses but must function within competitive business environments.

None of the scenarios being plotted in this chapter will attempt to describe the possible demise of the university as institution, but they rather aim to promote the continued survival of the core values of the university as institution as a positive point of departure. (While the development of scenarios depicting the demise of the university as institution could be used as a powerful tool in challenging the assumptions underpinning university practice, they would fall outside the scope of this thesis and this is suggested as an area of future research.)

5. Further analysis of the uncertainty matrixes

Both the innovation of pedagogical systems and the dominant ODL business model have been identified as the two key uncertainties that will be used in the scenarios for this study (see Figure 2)[15]. The thesis does not infer that these are the only uncertainties that will possibly impact on DE futures in the tertiary sector; however, incorporating more uncertainties will result in too many scenarios that become difficult to manage and understand, thus diluting the power of the technique. Nonetheless, those selected are substantive uncertainties relating to strategic futures in DE as justified earlier in the thesis.

Universities are faced with a difficult dilemma: on the one hand, they should embrace new technologies, particularly when viewed from an ethical perspective regarding the huge potential for enhanced pedagogy and widening of access to tertiary education; on the other hand, the university needs to protect the traditions of the academy, as partly embedded in the practices of professing knowledge within the context of a community of scholars. This takes place in the face of the potential onslaught on the university-level market from the for-profit providers who are not likely to cherish and protect these values for the sake of a healthy bottom-line. Scenario planning is capable of dealing with this dilemma by examining distinct alternatives in a systematic and holistic way — in this case using the resultant three uncertainty matrixes.

The distinction between Fordist and post-Fordist delivery systems in DE have been analysed elsewhere in the thesis and will not be repeated here[16]. However, there is one dimension that requires further elucidation, namely the difference between minor change and radical change concerning the technology of digital knowledge granules and corresponding prospects for pedagogical system’s innovation. Examples of these differences are illustrated below.

[15] The significance and plausibility of digital knowledge granules as a vehicle for pedagogical innovation in future DE systems is analysed in detail under Section 3.3.2 of Chapter 3.

[16] The Fordist versus post-Fordist organisational approaches were discussed under Section 2.3.2 of Chapter 2 and Section 3.3.3 of Chapter 3.

Minor change in the technology of digital knowledge granules is characterised by the following features:

- Learning management and delivery systems are dominated by digital learning resources generated by commercial authoring software, however, limited interoperability[17] of the content objects themselves are achieved by using open standards like HTMLand evolving specifications for interoperability;
- Instructional design is embedded within the learning resources because content and form have been combined as part of the resource itself;
- Although multi-media applications can be incorporated in the digital learning resources, they are not necessarily pre-designed as multi-mode pedagogy[18];
- Resources are dependent on the delivery platform, limiting "playback" to the medium for which they were designed[19];
- Digital learning resources cannot accommodate collaborative co-design customisation[20];
- Portable access devices remain expensive toys for the business ellites thus limiting ubiquitous access to multi-mode, multi-media pedagogy;
- Limited application of pedagogical research on learning about learning such as recording and observation is not necessarily integrated into or automated within the learning management systems. Furthermore, limited interoperability of learning resources means that research is constrained to individual projects[21];
- Learning resources cannot be automatically aggregated or disaggregated in meaningful ways[22];
- Pedagogy develops according to existing bandwidth and infrastructure access limitations, thus limiting pedagogy to available technology. Consequently technology drives pedagogy[23];
- Longevity of current Web technologies as the dominant ICT application in education is assumed thus limiting experimentation with alternative delivery technologies;
- Technology-related "innovation" tends to mirror existing pedagogy, for example in the case of campus-based institutions, video-conferencing remains popular and electronic versions of text-based study guides are the preferred mode of content delivery at single-mode DE institutions with peripheral integration of computer mediated interaction.

---

[17] Interoperability refers to the technical capability of "digital knowledge granules" developed on one system to function equally well in another system without having to manipulate or transform the digital resource. This is achieved through the adoption of open standards by software developers. For example, the HTML tagging system used for displaying web pages uses open standards developed by the World Wide Web Consortium. All web-browser technologies strive to implement these standards; consequently web content can be displayed reliably irrespective of the specific "brand" of browser software on the user's desktop. In the case of learning objects, standards generating bodies like the IMS and IEEE are working towards the development of de facto standards for these digital resources. (See the discussion on examples of initiatives working on the technology of digital learning objects in Section 3.4.1 of Chapter 3).

[18] Refer to the discussion of digital knowledge granules as point of departure in Section 3.4.1 of Chapter 3.

[19] For example, courses designed for delivery on a web-based learning management system cannot easily be transformed or adapted for alternative delivery systems.

[20] This refers to customisation where the student actively determines the content and form of the learning resource (see basic approaches of mass-customisation in Section 3.4.2 of Chapter 3).

[21] The potential for intelligent learning design based on the automated tracking of student activity is not realised.

[22] Reconfiguring discrete components for alternative learning contexts is limited because automated aggregation and automated disaggregation of digital learning materials is not possible.

[23] For example, course designs do not consider the development of broadband, multi-media resources because of the bandwidth constraints of the majority of the student population.

- General acceptance and implementation of digital ICTs is slow within the higher education context, and remains largely on the periphery of administrative applications.

Conversely, radical change in the technology of digital knowledge granules is characterised by the following features:

- Any learning management and delivery system can import and read learning objects. This interoperability is achieved by the universal implementation of interoperability standards that are non-proprietary and based on open system standards. Groundswell around open source learning management systems increases[24];
- Content and form are separated, thus enabling intelligent instructional design to be customised just-in-time[25];
- Digital learning resources are purposefully designed to be multi-media, multi-mode digital knowledge granules;
- Digital knowledge granules are independent of the delivery platform meaning that they can automatically be reconfigured — just-in-time — for alternative delivery platforms;
- Digital knowledge granules are purposefully designed for collaborative customisation[26];
- Personal access devices become ubiquitous, affordable devices and are obviously not limited to educational applications;
- Extensive integration of pedagogical research on learning about learning because digital tracking incorporates improvements intelligently — that is, software developing software;
- Digital learning objects can be aggregated and disaggregated in intelligent ways;
- Pedagogy assumes broadband connectivity and allows pedagogy to drive pedagogy;
- The "future" web will replace existing Internet protocols over the short term[27];
- Experimentation and innovation will occur with new pedagogical modes that did not exist before;
- Rapid expansion and acceptance of digital ICTs in the university sector and they are integrated into the core functions of the university in fundamental and innovative ways.

The examples specified here are not intended to be exhaustive. They are included to provide the reader with a sense of the differences between minor and radical change in the technology of digital knowledge granules and the potential for pedagogical innovation. The following section will translate the dynamics of the total system described in this section into a number of key scenario themes.

---

[24] Open Source Software is distributed free, under a licensing arrangement that protects the openness of the code. A salient feature of open source software is that the source code is distributed with the software thus enabling the wider international community to refine the source code for local conditions, alternatively to contribute to the ongoing development and improvement of the software. Examples of open source software include: the Linux operating system; MySQL database software; Apache web server software; and learning management systems like Atutor, ILIAS and Moodle.

[25] Refer to the discussion on the separation of content and form in Section 3.4.1 of Chapter 3.

[26] Refer to basic approaches of mass-customisation discussed in Section 3.4.2 of Chapter 3.

[27] The "future" web is a concept used to indicate that future communication systems will inevitably be different and not necessarily confined to the current Internet technology.

References

ADEA (Association for the Development of Education in Africa). 2000. President Thabo Mbeki, president of South Africa, opens the Biennale. *ADEA Newsletter*. 12(2): 3. Online: http://www.adeanet.org/newsletter/Vol12No2/V12N2_eng.pdf. Retrieved: 14 May 2001.

ADL (Advanced Distributed Learning Initiative). 2002. About SCORM™. Online: http://www.adlnet.org/. Retrieved: 11 February 2002.

Agre, P. 1998. Meet me at the crux. In Noble, D., Shneiderman, B., Herman, R., Agre, P. & Denning, P. Technology in education: The fight for the future. *Educom Review*. 33(1): 1-11. Online: http://www.educause.edu/pub/er/review/reviewArticles/33322.html. Retrieved: 12 April 2004.

Albon, R.I. 2004. iLectures: Their current role in learning. Conference paper. *Higher Education and Development Society of Australia. Annual Conference*, 4 – 7 July 2004.

Allen, J. 1992. Fordism and modern industry. In Allen, J., Braham, P. & Lewis, P. (eds.) *Political and economic forms of modernity*. Cambridge: Polity Press and The Open University.

Al-Rustom, H. & Smith, J. 2004. *Tuition fees survey for international students. 2003 Entry*. Policy Research Unit, Association of Commonwealth Universities.

American Heritage Dictionary of the English Language (The). 2000. Fourth Edition. S.v. 'technology'. Boston, MA: Houghton Mifflin Company. Online: http://dictionary.reference.com. Retrieved: 26 April 2004.

Amidon, D.M. 1997. *Innovation strategy for the knowledge economy*. Boston: Butterworth-Heinemann.

Anderson, D.M. 2000. The end of the line for mass production. No time for batches and queues. Online: http://www.build-to-order-consulting.com/Mass%20Production.htm. Retrieved 8 February 2002.

Anderson, T. 2003. Modes of interaction in distance education: Recent developments and research questions. In Moore, M.G. & Anderson, W.G. (eds.) *Handbook of distance education*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Andrews, D.H. & Goodson, L.A. 1991. A comparative analysis of models of instructional design. In Anglin, G.J. (ed.) *Instructional technology: past, present and future*. Englewood Cliffs, NJ: Libraries Unlimited.

Aplin, J.C. & Cosier, RA. 1980. Managing creative and maintenance organisation. *The Business Quarterly*. 45(1): 56-63.

Arvan, L., Ory, J.C., Bullock, C.D., Burnaska K.K., & Hanson, M. 1998. The SCALE Efficiciency Projects. *Journal of Asynchronous Learning Networks*. 2(2). Online: http://www.sloan-c.org/publications/jaln/v2n2/v2n2_arvan.asp. Retreived: 23 march 2006.

Ashkenas, R. 1997. The organization's new clothes. In Hesselbein F., Goldsmith, M. & Beckhard, R. (eds.) *The Organization of the future*. The Drukker Foundation. San Francisco: Jossey-Bass Publishers.

Ausubel, D.P. 1963. *The psychology of meaningful verbal learning. An Introduction to school learning*. New York: Grune and Stratton.

Bååth, J. 1981. On the nature of distance education. *Distance Education*. 2(2): 212-219.

Badham, R. & Mathews, J. 1989. The new production systems debate. *Labour and industry.* 2(2): 194-246.
Bannan-Ritland, B., Dabbagh, N. & Murphy, K. 2000. Learning object systems as constructivist learning environments: Related assumptions, theories, and applications. In Wiley, D.A. (ed.), *The instructional uses of learning objects.* Online: http://reusability.org/read/chapters/bannan-ritland.doc . Retrieved 5 December 2001.
Barber, I. & Bristow, J. 1997. Changing times, changing paradigms. *Organisations & People.* 4(4): 11-17.
Bacsich, P. (ed.). 2005. *Report 08. University of Phoenix Online.* The Higher Education Academy. UK eUniversities Worldwide Limited. Online: http://www.heacademy.ac.uk/documents/r08-phoenix.doc. Retrieved 25 June 2006.
Barnett, R. 2000a. *Realizing the university in an age of supercomplexity.* Buckingham: The Society for Research into Higher Education and Open University Press.
Barnett, R. 2000b. The University is dead, long live the university. *The Times Higher Education Supplement.*
Barnett, R. 1997a. A knowledge strategy for universities. In Barnett, R. and Griffin, A. (eds.) *The end of knowledge in higher education.* Institute of Education series, University of London. London: Cassell.
Barnett, R. 1997b. *Higher education: A critical business.* Buckingham: The Society for Research into Higher Education and Open University Press.
Barnett, R. 1997c. Beyond competence. In Coffield F. & Williamson, B. (eds.) *Repositioning Higher Education.* Buckingham: Society for Research into Higher Education & Open University Press.
Barone, C.A. 2001. Conditions for transformation. Infrastructure is not the issue. *Educause Review.* 36(3): 41 – 47.
Bates, A.W. 1997a. The impact of technological change on open and distance learning. *Distance Education.* 18(1): 93-109.
Bates, A.W. 1997b. Restructuring the university for technological change. The Carnegie Foundation for the Advancement of Teaching. What kind of University? London: 18-20 June. Online: http://bates.cstudies.ubc.ca/carnegie/carnegie.html. Retrieved: 7 February 2003.
Bates, A.W. 2000. *Managing technological change. Strategies for college and university leaders.* San Fransisco: Jossey-Bass Publishers.
BECTA (British Educational Communications and Technology Agency) 2005. *Open Source Software in Schools. A study of the spectrum of use and related ICT infrastructure costs.* Coventry: BECTA
Bell, D. 1973. *The coming of Post-industrial society.* New York: Basic Books.
Bell, D. 1980. The social framework of the information society. In Forester, T. (ed.) *The microelectronics revolution.* Oxford: Basil Blackwell.
Bloodgood, J.M. & Morrow, J.L. 2000. Strategic organizational change within an institutional framework. *Journal of Management Issues.* 12(2): 208 – 227.
Blurton, C. 1999. New directions in education. In UNESCO. *World Communication and Information Report 1999 – 2000.* Paris: UNESCO.
Boehnke, K, Distefano, A.C., Distefano, J.J. & Bontis, N. 1997. Leadership for extraordinary performance. *Business Quarterly.* 61(4): 57-63.
Boettcher, J.V. 1999. *How many students are just right in a web course?* Online: http://www.cren.net/~jboettch/number.htm. Retrieved: 27 September 2005.
Bond, J. 1997. The drivers of the information revolution — cost, computing power and convergence. *Public policy for the private sector.* July. The World Bank Group.
Bonnett, T.W. & Olson, R.L. 1998. How scenarios enrich public policy decisions. In Fahey, L. & Randall, R.M. (eds.) *Learning from the future. Competitive foresight scenarios.* New York: Wiley, John & Sons, Inc.
Boucher, M. 1973. *Spes in arduis — a history of the University of South Africa.* Pretoria: University of South Africa.
Boroush, M.A. & Thomas, C.W. 1992. Alternative scenarios for the defense industry after 1995. *Planning Review.* 20(3): 24 – 30.

Boutellier, R., Gassmann, O. & Von Zedtwitz, M. 1999. *Managing global innovation. Uncovering the secrets of future competitiveness.* Berlin: Springer.

Bowles, S. & Gintis, H. 1975. The problem with human capital theory – A Marxian critique. *American Economic Review.* 65(2): 74 – 82.

Braga, C.A.P. 1998. Inclusion or exclusion. Will the networked economy widen or narrow the gap between developing and industrialized countries? *Unesco Courier.* December. Online: http://www.unesco.org/courier/1998_12/uk/dossier/txt21.htm. Retrieved: 12 May 2001.

Brown, G. 1996. 2000 and beyond — the university of the future. In Smith, T. (ed.) *Ideas of the university.* Sydney: Research Institute for the Humanities and Social Sciences, The University of Sydney in association with Power Publications.

Brown, J.S. 1998. Seeing differently: A role for pioneering research. *Research Technology Management* 41(3): 24-34.

Brown, J.S. 2000. The persistence of paper. *Across the board.* 37(8): 27-30.

Brown, J.S. & Duguid, P. 1995. *Universities in the digital age.* Work in progress. Online: http://www.parc.xerox.com/ops/members/brown/papers/university.htm. Retrieved: 5 February 2002.

Brown, J.S. & Duguid, P. 2000. *The social life of information.* Boston, Massachusetts: Harvard Business School Press.

Brown, P. & Lauder, H. 1992. Education, economy, and society: An introduction to a new agenda. In Brown, P. & Lauder, H. (eds.) *Education for economic survival. From fordism to post-fordism?* London: Routledge.

Brown, P. & Lauder, H. 1997. Education, globalization and economic development. In Halsey, A.H., Lauder, H., Brown, P. & A. Stuart Wells (eds.) *Education. Culture, economy and society.* Oxford: Oxford University Press.

Brown, P. & Lauder, H. 2003. Globalisation and the knowledge economy : Some observations on recent trends in employment, education and the labour market. *Working Paper Series, Paper 43.* School of Social Sciences, Cardiff University. Online: http://www.cf.ac.uk/socsi/publications/workingpapers/pdf-files/wrkgpaper43.pdf. Retrieved 11 November 2004.

Buckley, D.P. 2002. In pursuit of the learning paradigm. Coupling faculty transformation and institutional change. *Educause Review.* 37(1): 29-38.

Butler, D.L. & Sellbom, M. 2002. Barriers to adopting technology for teaching and learning. *Educause Quarterly.* No 2.

Burkhardt, M.E. & Brass, D.J. 1990. Changing patterns or patterns of change: the effects of a change in technology on social network structure and power. *Administrative Science Quarterly.* 35(1): 104 – 128.

Campion, M.G. 1989. Distance education and the debate about post-Fordism. In *Proceedings of the biennial forum of the Australian and South Pacific External Studies Association.* Churchill: Monash University College, Gippsland.

Campion, M.G. 1990. Post-Fordism and research in distance education. In Evans, T (ed.) *Research in distance education.* (Revised papers from the first Research in Distance Education seminar.) Geelong: Deakin University.

Campion, M.G. 1996. Responses to 'Labour market theories and distance education' Post-Fordism: not poison either! *Open Learning* 11(1): 41-46.

Campion, M.G. & Renner, W. 1992. The supposed demise of Fordism: Implications for distance education and higher education. *Distance Education.* 13(1): 7-28.

Carnevale, D. 2000. 2 Models for Collaboration in Distance Education. *Chronicle of Higher Education,* May 19.

Carr, S. 2001. Is anyone making money on distance education? *Chronicle of Higher Education.* 47(23): 41 – 43.

Carr, S & Kiernan, V. 2000. For-Profit Web Venture Seeks to Replicate the University Experience Online. *The Chronicle of Higher Education*, April 14.

Carlson, S. 2003. After losing millions, Columbia U. will close its online-learning venture. *Chronicle of Higher Education.* 17 January. 49(19) Online: http://www.chronicle.com/free/2003/01/2003010701t.htm. Retrieved 4 February 2003.

Carlson, S. & Carnevale, D. 2001. Debating the demise of NYUonline. *Chronicle of Higher Education.* 48(16): 31 – 32.

Casper, G. 2000. *Transitions and endurances.* State of the university address, 2 March. Stanford: Stanford University. Online: http://www.stanford.edu/dept/news/report/news/march8/stateutext-38.html. Retrieved: 7 January 2003.

Castells, M. 1996. The rise of the network society. *The information age: Economy, society and culture.* Volume I. Oxford: Blackwell Publishers Inc.

Castells, M. 1997. The power of identity. *The information age: Economy, society and culture.* Volume II. Oxford: Blackwell Publishers Inc.

Castells, M. 1998a. End of the millennium. *The information age: Economy, society and culture.* Volume III. Oxford: Blackwell Publishers Inc.

Castells, M. 1998b. Information technology, globalization and social development. Paper prepared for the *UNRISD Conference on information technologies and social development.* Geneva: June 22 – 24 1998. Online: http://www.acca21.org.cn/info21/link/bg/info/7/castelp1.htm. Retrieved: 19 March 2004.

Castells, M. 2000. Information technology and global capitalism. In Hutton, W. and Giddens, A. (eds.) *On the edge: Living with global capitalism.* London: Jonathan Cape.

Castells, M. & Himanen, P. 2002. *The information society and the welfare state: The Finnish model.* New York: Oxford University Press.

CEN/ISSS 2001. See European Committee for Standardisation/Information Society Standardisation System (CEN/ISSS) below.

CEN/ISSS 2002. See European Committee for Standardisation/Information Society Standardisation System (CEN/ISSS) below.

Centre National d'Enseignement a Distance. 2006. Online: http://www.cned.fr/en. Retrieved 22 May 2006.

Chattell, A. 1995. *Managing for the future.* London: Macmillan Press.

CHEA (Council for Higher Education Accreditation) 1999a. *Distance learning in higher education.* CHEA Update: No 2. Online: http://www.chea.org/Research/distance-learning/distance-learning-2.cfm. Retrieved 25: September 2001.

CHEA (Council for Higher Education Accreditation) 1999b. *Distance learning in higher education.* CHEA Update: No 3. Online: http://www.chea.org/Research/distance-learning/distance-learning-3.cfm. Retrieved 25: September 2001.

Choat, D. 2006. Strategic review of the tertiary education workforce: Changing work roles can career paths. Scoping Report. Prepared for the Tertiary Education Commission. Education Directions and Martin, Jenkins and Associates.

Christensen, C.M. 1992. Exploring the limits of the technology S-curve. Part 1: Component technologies. *Production and operations management.* 1(4): 334–66.

Christensen, C.M. 2000. *The innovator's dilemma. When new technologies cause great firms to fail.* New York: HarperBusiness edition.

Christensen, C.M., & Overdorf, M. 2000. Meeting the challenge of disruptive change. *Harvard Business Review.* 78(2): 66-76.

Christensen, C.M., Aaron, S., & Clark, W. 2003. Disruption in education. *Educause Review.* 38(1): 44-54.

Chung, F. 1990. Strategies for developing distance education. Keynote address in Croft, M., Mugridge, I., Daniel, J., & Hershfield, A. (eds.) *Distance education: Development and Access.* Papers prepared for the Fifteenth World Conference of the International Council for Distance Education. Caracas, Venezuela. November 4-10: 61-66. Online: http://www1.worldbank.org/disted/policy/national/str-02.htm. Retrieved: 13 April 2001.

Claes, T. 2002. "It was not a bad idea ...": Defining 'the university'. Paper prepared for *The idea of Education.* Mansfield College, Oxford: July 3-4 2002. Online: http://www.inter-disciplinary.net/ioe1prog.htm. Retrieved 10 April 2004.

Cleveland, H. 2000. Coming soon: The nobody-in-charge society. *Futurist.* 34(5): 52 – 57.

Codling, A. & Meek, L.V. 2003. The impact of the state on institutional differentiation in New Zealand. *Higher Education Management and Policy.* 15(2): 83 – 164.

Coffield, F. & Williamson, B. 1997. The challenges Facing Higher Education. In Coffield, F. & Williamson, B. (eds.) *Repositioning Higher Education.* Buckingham: Society for Research into Higher Education & Open University Press.

COL (Commonwealth of Learning) 2004. *The Virtual University for Small States of the Commonwealth.* Invitation to participate. Vancouver: COL.

Conceição P & Heitor, M.V. 1999. On the role of the university in the knowledge economy. *Science and Public Practice.* 26(1): 37-51.

Courtney, R. 2002. *Strategic management for voluntary nonprofit organizations.* Routledge studies in the management of voluntary and non-profit organizations. London: Routledge.

Cunliffe, D. 2005. Minster's Forward. *The Digital Strategy: Creating our digital future.* Online: http://www.digitalstrategy.govt.nz/templates/Page____173.aspx. Retrieved: 7 march 2006.

Cunningham, S., Tapsall, S., Ryan, Y., Stedman, L., Bagdon, K. & Flew, T. 1998. *New media and borderless education. A review of the convergence between global media networks and higher education provision.* Canberra: Australian Government Publishing Service. Funded under the Evaluations and Investigations Program of the Department of Employment, Education, Training and Youth Affairs.

Cunningham, S., Tapsall, S., Ryan, Y., Stedman, L., Bagdon, K. & Flew, T. 2000. *The business of borderless education.* Canberra: Australian Government Publishing Service. Funded under the Evaluations and Investigations Program of the Department of Employment, Education, Training and Youth Affairs.

CVCP & HEFCE (Committee of Vice-Chancellors and Principals of the Universities of the UK & the Higher Education Funding Council for England). 2000a. *The business of borderless education: UK perspectives. Summary Report.* London: CVCP.

CVCP & HEFCE (Committee of Vice-Chancellors and Principals of the Universities of the UK & the Higher Education Funding Council for England). 2000b. *The business of borderless education: UK perspectives. Analysis and recommendations.* London: CVCP.

CVCP & HEFCE (Committee of Vice-Chancellors and Principals of the Universities of the UK & the Higher Education Funding Council for England). 2000c. *The business of borderless education: UK perspectives. Case studies and annexes.* London: CVCP.

Daniel, J.S. 1995. What has the Open University achieved in 25 years? In Sewart, D. (ed.) *One world many voices: Quality in open and distance learning.* Vol 1, ICDE and The Open University: Milton Keynes, 400-403.

Daniel, J.S. 1997. Why universities need technology strategies. *Change.* 29(4): 11-17.

Daniel, J.S. 1999a (Reprint with revisions) *Mega-universities and knowledge media. Technology strategies for higher education.* London: Kogan Page.

Daniel, J.S. 1999b. Open learning and/or distance education: which one for what purpose? In Harry, K. (ed.) *Higher education through open and distance learning. World review of distance education and open learning.* London: Routledge and Commonwealth of Learning.

Daniel, J.S. 1999c. Innovation at Scale in the Delivery of Learning and Teaching: will the whole be greater than the sum of the parts? Address at 12th International Meeting of University Administrators. Edinburgh: 6 September 1999. Online: http://www.open.ac.uk/vcs-speeches/edin-admin.htm. Retrieved 21 June 2001.

Daniel, J.S. 1999d. International collaboration and competition: The development of an academic community spanning the world. Keynote address: HEERA- CASE Annual Conference. 12 September. Online: http://www.open.ac.uk/vcs-speeches/edin-admin.htm. Retrieved 21 June 2001.

Daniel, J.S. 1999e. Distance learning and academic values. *Teaching and learning with technology conference.* Indianapolis: 10 November 1999. Online: http://www.open.ac.uk/vcs-speeches/edin-admin.htm. Retrieved 21 June 2001.

Daniel, J.S. 2000a. The Internet and higher education: Preparing for change. *The Internet revolution conference*. London: 9 May. Online: http://www.open.ac.uk/vcs-speeches/edin-admin.htm. Retrieved 21 June 2001.

Daniel, J.S. 2000b. The open university — A global learner. Global Learn Day IV. 7 October. Online: http://www.open.ac.uk/vcs-speeches/edin-admin.htm. Retrieved 21 June 2001.

Daniel, J.S. 2000c. The university of the future and the future of universities. *Improving university learning and teaching. 25th International conference.* Frankfurt: 18 July 2000. http://www.open.ac.uk/vcs-speeches/edin-admin.htm. Retrieved 21 June 2001.

Daniel, J.S. 2001a. Life in the eternal triangle: Access, quality and cost. Presentation at the annual meeting of the National Association of Independent Colleges and Universities. Washington D.C.: 30 January. Online: http://www.open.ac.uk/vcs-speeches/edin-admin.htm. Retrieved: 26 June 2001.

Daniel, J.S. 2001b. Partnerships in distance learning: The genesis of the United States Open University. ACU Executive Heads Conference (Session 7, Workshop 2). Cyprus: 22 – 26 April 2001. Online: http://www.open.ac.uk/vcs-speeches/edin-admin.htm. Retrieved 21 June 2001.

Daniel, J.S. & Mackintosh, W.G. 2003. Leading ODL futures in the eternal triangle: A mega-university response to the greatest moral challenge of our age. In Moore, M.G. & Anderson, W.G. (eds.) *Handbook of distance education.* Mahwah, New Jersey: Lawrence Erlbaum Associates.

Daniel, J.S., Mackintosh, W.G., & Diehl, W.C. (In Press). The Mega-University Response to the Moral Challenge of Our Age. In Moore, M.G. (ed.) *Handbook of distance education. 2nd Edition.* Mahwah, New Jersey: Lawrence Erlbaum Associates.

Davis, S. 1987. *Future perfect.* Reading, Massachusetts: Addison-Wesley Publishing Company.

Davis, S. & Botkin, J. 1994. *The monster under the bed. How business is mastering the opportunity of knowledge for profit.* New York: Simon & Schuster.

Davis, S. & Meyer, C. 1998. *Blur: The speed of change in the connected economy.* Reading, Massachusetts: Addison-Wesley.

Day, R.S., Executive Director: Information and Communications Technology, Unisa 2001. *Electronic correspondence* 30 July.

Day, G.S. & Schoemaker, P.J.H. 2000. A different Game. In Day, G.S., Schoemaker, P.J.H. & Gunther, R.E. (eds.) *Wharton on managing emerging technologies.* New York: John Wiley & Sons Inc.

Deakin Centre for Academic Development. 1996. *Flexible teaching and learning —A guide to development and delivery.* Geelong: Deaking University.

De Geuss, A. 1997. *The living company.* Boston, Massachusetts: Harvard Business School Publishing.

De Long, B. 1998. Attack of the neo-luddites! Letter to the editor of First Monday in response to Noble, D.F. 1998. Digital diploma mills: The automation of higher education. *First Monday.* 3(1). Online: http://econ161.berkeley.edu/Teaching_Folder/Digital_Diploma_Mills.html. Retrieved 12 April 2004.

DETYA (Department of Education, Training and Youth Affairs). 2000. The business of borderless education in brief. *Higher Education Series.* Report No. 38. August. Higher Education Division, DETYA, Australia.

Dhanarajan, G. 1999. Forward. In Harry, K. (ed.) *Higher education through open and distance learning. World review of distance education and open learning.* London: Routledge and Commonwealth of Learning.

Dhanarajan, G. 2000. Technologies. A window for transforming higher education. *Techknowlogia.* 2(1): 11-13. Online: www.techknowlogia.org. Retrieved: 18 April 2001.

DiBiase, D. 2000. Is distance teaching more work or less? *American Journal of Distance Education.* 14(3): 6-20.

Douglas, N. & Wykowski, T. 1999. *Beyond reductionism. Gateways for learning and change.* London: St. Lucie Press.

Downes, S. 1998. The future of online learning. *Online Journal of Distance Learning Administration,* 1(3): 1 – 27. Online: http://www.westga.edu/~distance/downes13.html. Retrieved: 1 October 2001.

Downes, S. 2001. Learning objects: Resources for distance education worldwide. *International Review of Research in Open and Distance Learning.* 2(1): http://www.icaap.org/iuicode?149.2.1.2. Retrieved: 1 October 2001.

Dr. B.R. Ambedkar Open University. 2006. Online: http://www.braou.ac.in. Retrieved 16 May 2006.

Drucker, P.F. 1993. *Post-capitalist society.* New York: HarperBusiness.

Drucker, P.F. 1994. (Reprint) *The frontiers of management.* Oxford: Butterworth-Heinemann Ltd.

Drucker, P.F. 1995. *Managing in a time of great change.* New York: Truman Talley Books/Plume.

Drucker, P.F. 1997a. *Forbes,* March 10.

Drucker, P.F. 1997b. Introduction: Toward the new organisation. In Hesselbein, F., Goldsmith, M. & Beckhard, R. (eds.) *The organization of the future.* San Francisco: Jossey-Bass Publishers.

Drucker, P.F. 1998. The future that has already happened. *Futurist.* 32(8): 16-19.

Drucker, P.F. 1999. Be ahead of change. *Executive Excellence.* 16(4): 8

Drucker, P.F. 2000. Putting more now into knowledge. *Forbes* 165(11): 84-87.

DSS (Department of Student Support). 1998. 1998 Annual Report. Pretoria: Unisa.

Dublin Core Metadata Initiative. Online undated.a. Initiative Overview. Online: http://www.dublincore.org/about/ Retrieved: 1 October 2001.

Dublin Core Metadata Initiative. Online undated.b. DCMI Education Working Group. Online: http://www.dublincore.org/education/ Retrieved: 11 February 2002.

Duderstadt, J.J. 1999. Can colleges and universities survive in the information age? In Katz, R.N. and Associates (eds.) *Dancing with the devil. Information technology and the new competition in higher education.* San Francisco: Jossey-Bass Publishers.

Duin, A.H., Baer, L.L., & Starke-Meyerring, D. 2001. *Partnering in the learning marketspace.* Educause Leadership Strategies No.4. San Francisco: Jossey-Bass.

Duguid, P. 2002. The social life of legal information: First impressions. *First Monday.* 7(9): 1 – 24. Online: http://www.firstmonday.org/issues/issue7_9/duguid/index.html. Retrieved: 10 February 2003.

Eaton, J.S. 2001. *Distance learning: Academic and political challenges for higher education accreditation.* CHEA Monograph series 2001, Number 1. Washington D.C.: Council for Higher Education Accreditation.

Eckaus, R.S. 1990. The US economy and higher education. In Hanson, K.H., & Meyerson, J.W. (eds.) *Higher education in a changing economy.* New York: American Council on Education and Macmillan Publishing Company.
Education New Zealand 2004. *Immigration issues impacting upon the export education industry.* Briefing paper prepared for the meeting of 23 March 2004 with the Minister of Immigration and the Minister of Education. Online: http://www.educationnz.org.nz/facts_stats/nzis/PaperForMeetingSwainMallard.pdf. Retrieved: 6 March 2006.
Education New Zealand. 2005a. *International Education exceeds $2 billion second year running - the challenge is keeping it there.* Media release, 10 April. Online: http://www.educationnz.org.nz/comm_media/media_files/mr10April2005.htm. Retreived: 2 March 2006.
Education New Zealand. 2005b. *Decline in International Students Continues.* Media release, 12 December. Online: http://www.educationnz.org.nz/comm_media/media_files/MR13DecemberIntEdDeclineContinues.pdf. Retrieved: 6 March 2006.
Education New Zealand. 2006. *Responsive immigration policy key to international education success.* Media Release, 26 January 2006.
Edvinsson, L. 1997. Foreword. In Amidon, D.M. *Innovation strategy for the knowledge economy.* Boston: Butterworth-Heinemann.
Edwards, R. 1991. The inevitable future? Post-Fordism and open learning. *Open Learning* 6(2): 37-42.
Eisenstadt, M. 1995a. Overt strategy for global learning. *Times higher education supplement, multimedia section,* 7 April: vi-vii.
Eisenstadt, M 1995b *The knowledge media generation.* Online: http://kmi.open.ac.uk/kmi_misc/kmi-feature.htm Retrieved 25 January 2002.
ELAG (E-learning Advisory Group). 2002. *Highways and pathways. Exploring New Zealand's elearning opportunities.* Report of the E-learning Advisory Group. Online: http://www.steo.govt.nz/download/e-learning.pdf. Retrieved: 25 May 2002.
Epper, R.M., & Garn, M. 2004. Virtual universities: Real possibilities. *Educause Review.* 39(1): 28 – 34.
Etzkowitz, H., Webster, A. & Healey, P. 1998. *Capitalizing knowledge. New intersection of industry and academia.* Albany: State University of New York Press.
European Committee for Standardisation/Information Society Standardisation System (CEN/ISSS). 2001. *Learning Technology eBrochure.* No.: 1. Online: http://www.cenorm.be/isss/Workshop/lt/ebrochure/number1.htm. Retrieved: 8 February 2002.
European Committee for Standardisation/Information Society Standardisation System (CEN/ISSS). 2002. *Survey of Educational Modelling Languages.* CEN/ISSS Workshop on learning technologies (WSLT) project. Online: http://www.ni.din.de/sixcms/list.php3?page=test&rubrik_id=422. Retrieved 8 February 2002.
Evans, T. 1995. Globalisation, post-fordism and open and distance education. *Distance Education.* 16(2): 256-269.
Evans, T. & Nation, D. 1989. Dialogue in practice, research and theory in distance education. *Open Learning.* 4(2): 37-42.
Evans, T. & Nation, D. 1992. Theorising open and distance education. *Open Learning.* 7(2): 3-13.
Evans, T. & Nation, D. 1996. *Opening education: Policies and practices from open and distance learning.* London: Routledge.
Evans, T. & Nation, D. 2003. Globalisation and the reinvention of distance education. In Moore, M.G. & Anderson, W.G. (eds.) *Handbook of distance education.* Mahwah, New Jersey: Lawrence Erlbaum Associates.
Fahey, L. 1998a. Industry Scenarios. In Fahey, L & Randall, R.M. (eds.) *Learning from the future. Competitive foresight scenarios.* New York: Wiley, John & Sons, Inc.

Fahey, L. 1998b. Competitor scenarios: Projecting a rival's marketplace strategy. In Fahey, L & Randall, R.M. (eds.) *Learning from the future. Competitive foresight scenarios.* New York: Wiley, John & Sons, Inc.

Fahey, L & Randall, R.M. 1998. What is scenario learning? In Fahey, L & Randall, R.M. (eds.) *Learning from the future. Competitive foresight scenarios.* New York: Wiley, John & Sons, Inc.

Fahey, L & Randall, R.M. (eds.) 1998. *Learning from the future. Competitive foresight scenarios.* West Sussex: Wiley, John & Sons.

Farrell, G.M. (ed.) 1999. *The development of virtual education: A global perspective.* Vancouver: The Commonwealth of Learning.

Farrell, G.M. (ed.) 2001. *The changing faces of virtual education.* Vancouver: The Commonwealth of Learning.

Farrington, G.C. 1999. The new technologies and the future of residential undergraduate education. In Katz, R.N. & Associates (eds.) *Dancing with the devil. Information technology and the new competition in higher education.* San Francisco: Jossey-Bass Publishers.

Farnes, N. 1993. Modes of production: Fordism and distance education. *Open Learning.* 8(1): 10-19.

Firminger, L. 2002. Scenario planning in the TAFE system. Swinburne University of Technology TAFE Division. Online: http://www.tafe.swin.edu.au/sps/documents/emerging/scenario_Planing.pdf. Retrieved: 18 July 2004.

Flowers, B. 2003. The art and strategy of scenario writing. *Strategy & leadership.* 31(2): 29 – 33.

Fontaine, M. 2000. Supporting teachers with technology: Don't do today's jobs with yesterday's tools. *Technologia.* 2(6):14-16. Online: www.technowlogia.org. Retrieved: 8 May 2001.

Gamblin, C. 1997. Why the paradigm shift approach rarely works: In search of the magic bullet. *Organisations & People.* 4(4): 18-20.

Garrison, D.R. 1985. Three generations of technological innovation in distance education. *Distance Education.* 6(2): 235-41.

Garrison, D.R. 1989. *Understanding distance education.* London: Routledge.

Garrison, D.R. 1997. Computer conferencing: the post-industrial age of distance education. *Open Learning.* 12(2): 3-11.

Garrison, D.R. 2003. Self-directed learning and distance education. In Moore, M.G. & Anderson, W.G. (eds.) *Handbook of distance education.* Mahwah, New Jersey: Lawrence Erlbaum Associates.

Garrison D.R. & Baynton, M. 1987. Beyond independence in distance education: the concept of control. *The American Journal of Distance Education.* 1(3): 3-15.

Garrison, D.R. & Shale, D. 1987. Mapping the boundaries of distance education: Problems in defining the field. *The American Journal of Distance Education.* 1(1): 4-13.

Georgantzas, N. & Acar, W. 1994. *Scenario driven planning. Learning to manage strategic uncertainty.* Westport Connecticut: Quorum Books.

Gerber Scientific. Undated. *Mass customization: The silent revolution.* Online: http://www.mass-customization.com/default2.html Retrieved: 8 February 2002.

Gerber Scientific. 2001. *What is mass customization?* Online: http://www.mass-customization.com. Retrieved 18 February 2002.

Gibbons, A.S., Nelson, J. & Richards, R. 2000. The nature and origin of instructional objects. In Wiley, D.A. (ed.), *The instructional uses of learning objects.* Online: http://reusability.org/read/chapters/gibbons.doc Retrieved 5 December 2001.

Gibbons, M. 1998. Higher Education Relevance in the 21st Century. Paper presented at the UNESCO World Conference on Higher Education. Paris: October 5-9, 1998.

Gibbons, M., Limoges, H., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. 1994. *The new production of knowledge: Science and Research in contemporary societies.* London: Sage.

Giddens, A. 1990. *The consequences of modernity.* Stanford: Stanford University Press.

Giddens, A. 1996. The Times Higher Education Supplement, 13 December 1996.

Giddens, A. 1999. Globalisation. *Runaway world.* Lecture 1. BBC Reith Lectures. Online: http://news.bbc.co.uk/hi/english/static/events/reith_99/week1/week1.htm. Retrieved: 22 July 1999.
Gilbert, A. 1997. *Times Higher Education Supplement.* 22 August, p11.
Giles, J. 2005. Internet encyclopaedias go head to head. *Nature.* 438:(7070): 900-901.
Gilmore, J.H. & Pine B.J. 1997. The four faces of mass customisation. *Harvard Business Review.* 75(1): 91-103.
Glazer, R. 1999. Winning in smart markets. *Sloan Management Review.* 40(4): 59-70.
Glick, M.D. & Kupiec, J. 2001. The answer is still technology — Strategic technology. *Educause Review.* 36(6): 44.
Goldsmith, W. & Clutterbuck, D. 1997. *The winning streak. Mark II. How the world's most successful companies stay on top through today's turbulent times.* London: Orion Business Books.
Gonick, L. 2002. Leadership. A new role. *Educause Review.* 37(4): 8-9.
Gourley, B.M. 2002. Leadership, Management and Administration in Open Distance Learning. Keynote address. *2nd Pan-Commonwealth Forum on Open Learning.* Durban: 29 July – 2 August.
Granger, D. 1990. Open learning and individualized distance learning at Empire State College. *Open Learning.* 5(1): 24-30.
Graves, W.H. 1999. Developing and using technology as a strategic asset. In Katz, R.N. & Associates (eds.) *Dancing with the devil. Information technology and the new competition in higher education.* San Francisco: Jossey-Bass Publishers.
Green, M.F. 1997a. The context. In Green, M.F. (ed.) *Transforming higher education: Views from leaders around the world.* Phoenix: American Council on Education and The Oryx Press.
Green, M.F. 1997b. Institutional leadership in the change process. In Green, M.F. (ed.) *Transforming higher education: Views from leaders around the world.* Phoenix: American Council on Education and The Oryx Press.
Green, M.F. & Hayward, F.M. 1997. Forces for change. In Green, M.F. (ed.) *Transforming higher education: Views from leaders around the world.* Phoenix: American Council on Education and the Oryx Press.
Griffin, A. 1997. Knowledge under attack: Consumption, diversity and the need for values. In Barnett, R. & Griffin, A. (eds.) *The end of knowledge in higher education.* Institute of Education series, University of London. London: Cassell.
Habermas, J. 1989. *The theory of communicative action. Volume 2. Lifeworld and System: A critique of functionalist reason.* Translation. McCarthy, T. Boston: Beacon Press.
Halm, M.J., Oliver, B., Farooq, U., & Hoadley C. 2005. Collaboration in learning design using peer-to-eer technologies. In Koper, R., & Tattersall, C. (eds.) *Learning Design. A handbook on modelling and delivering networked education and training.* Heidelberg: Springer.
Hamel, G. 1998. Strategy innovation and the quest for value. *Sloan Management Review.* 39(2): 78-85.
Hamel, G. 1999a. The quest for value. *Executive Excellence.* 16(3): 3-4.
Hamel, G. 1999b. New wealth. *Executive Excellence Excellence.* 16(4): 3-4.
Hamel, G. 2000a. Waking up IBM. How a gang of unlikely rebels transformed Big Blue. *Harvard Business Review.* 78(4): 137-145.
Hamel, G. 2000b. Reinventing competition. *Executive Excellence.* 17(1): 11-12.
Hamel, G. 2000c. Conceptual thinking. *Executive Excellence.* 17(4): 17-18.
Hamel, G. 2000d. *Leading the revolution.* Boston, Massachusetts: Harvard Business School Press.
Hamel, G. & Prahalad, C.K. 1994. *Competing for the future.* Boston, Massachusetts: Harvard Business School Press.
Hamel, G. & Prahalad, C.K. 1995. Thinking differently. *Business Quarterly.* 59(4): 22 – 31.

Hammer, J.S. 1996. The public economics of education. Washington D.C.: World Bank. Online: http://www.worldbank.org/education/economicsed/tools/training/econ2/Hammer.htm. Retreived 13 November, 2000.
Hammer, M. & Champy. 1993. *Re-engineering the corporation.* New York: HarperCollins.
Handy, C. 1994. *The age of paradox.* Boston, Massachusetts: Harvard Business School Press.
Handy, C. 1995a. *Beyond certainty. The changing worlds of organisations.* London: Hutchinson.
Handy, C. 1995b. *The age of unreason.* London: Arrow Business Books.
Hanna, D.E. 2003. Organizational models in higher education, past and future. In Moore, M.G. & Anderson, W.G. (eds.) *Handbook of distance education.* Mahwah, New Jersey: Lawrence Erlbaum Associates.
Harasim, L., Hiltz, S., Teles, L. & Turoff, M. 1995. *Learning Networks.* Cambridge, USA: MIT Press.
Hargadon, A. & Sutton, R. 2000. Building an innovation factory. *Harvard Business Review.* 78(3): 157-167.
HEFCE (Higher Education Funding Council of England). 2000. *Strategic planning in higher education. A guide for heads of institutions, senior managers and members of governing bodies.* Reference 00/24. Bristol: HEFCE.
HEFCE (Higher Education Funding Council of England). 2004. Progress on e-Universities restructuring. *News and events posting.* 23 April 2004.
Heimann, P. 1962. Didaktik als Theorie und Lehre. In Reich, K., Thomas, H. & Heimann, P. (eds.) Didaktik als Unterrichtswissenschaft. Stuttgart: Klett.
Henderson, R.M. and Clark, K.B. 1990. Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. *Administrative Science Quarterly.* 35(1): 9-22.
Herman, R. 1998. Private sector partnerships. In Noble, D, Shneiderman, B., Herman, R., Agre, P. & Denning, P. Technology in education: The fight for the future. *Educom Review.* 33(1): 1-11. Online: http://www.educause.edu/pub/er/review/reviewArticles/33322.html. Retrieved: 12 April 2004.
Herman, L. & Mandell, A. 1999. Towards opening the lifeworld within adult higher education systems. In Tait, A. & Mills, R. (eds.) *The convergence of distance and conventional education.* New York: Routledge.
Hesselbein, F., Goldsmith, M. & Beckhard, R. 1997. *The organization of the future.* San Francisco: Jossey-Bass Publishers.
Hirst, P. & Thompson,G. 1999. *Globalization in Question: The International Economy and the Possibilities of Governance*, 2nd edition. Cambridge: Polity Press.
Hirst, P. & Thompson, G. 2002. The future of globalization. *Cooperation and Conflict.* 37(3): 247-266.
Holmberg, B. 1977. *Distance education: a survey and bibliography.* London: Kogan Page.
Holmberg, B. 1989. *Theory and practice of distance education.* Second Edition. London: Routledge.
Holmberg, B. 1995a. The evolution of the character and practice of distance education. *Open Learning.* 10(2): 47-53.
Holmberg, B. 1995b. *Theory and practice of distance education.* Second Edition. London: Routledge.
Holmberg, B. 1997. Distance education theory again. *Open Learning.* 12(1): 31-39.
Holusha, J. 1996. Making the shoe fit perfectly. *The New York Times.* 29 March.
Honore, C. 2000a. In conversation: Charles Handy: An inventive mind. *Ivey Business Journal.* 64(5): 52-60
Honore, C. 2000b. In conversation: Charles Handy: An inventive mind: Part 2. *Ivey Business Journal.* 64(6): 30-37

Hood, J. 2004. University's response to Dr Cullen. Media Release, 26 March 2004. Online: http://www.auckland.ac.nz/uoa/about/news/articles/2004/03/0023.cfm. Retrieved: 3 March 2006.

Hounshell, D.A. 1984. *From the American system to mass production 1800-1932: The development of manufacturing technology in the United States.* Baltimore: John Hopkins.

Hülsmann, T. 1999. The costs of distance education. In Harry, K. (ed.) *Higher education through open and distance learning. World review of distance education and open learning.* London: Routledge and Commonwealth of Learning.

Hurst, DK. 1995. *Crisis and renewal.* Boston: Harvard Business School Press.

ICDL (International Centre for Distance Learning). 1995. *Mega-universities of the world. The top ten.* Compiled by the ICDL on the occasion of the meeting of the executive heads of these universities at the 17th world conference of the International Council for Distance Education in Birmingham. Milton Keynes: The Open University.

IMS Global Learning Consortium Inc. 2002a. About IMS. Online: http://www.imsproject.org/aboutims.html Retrieved: 11 February 2002.

IMS Global Learning Consortium Inc. 2002b. IMS Membership. Online: http://www.imsproject.org/membership.html Retrieved: 11 February 2002.

IMS Global Learning Consortium Inc. 2002c. Working groups. Online: http://www.imsproject.org/workinggroups.html Retrieved: 11 February 2002.

IMS Global Learning Consortium Inc. 2002d. Membership. Online: http://www.imsproject.org/members.html Retrieved: 11 February 2002.

IMS Global Learning Consortium Inc. 2002e. IMS Collaboration. Online: http://www.imsproject.org/collaboration.html Retrieved: 11 February 2002.

IMS Global Learning Consortium Inc. 2002f. MIT Open Knowledge Initiative, ADL Co-laboratory, and IMS cooperate to advance learning technology. Press Release 29 June 2001. Online: http://www.imsproject.org/press.html Retrieved: 12 February 2002.

Inglis, A. 1996. Theories of learning in educational development: Relocating the paradigmatic divide. *Open Learning.* 11(2): 28-37.

Inglis, A. 1999. Is online delivery less costly than print and is it meaningful to ask? *Distance Education.* 20(2): 220 - 39.

Irvine, M. 2001. *Net knowledge: The coming revolution in higher education.* Online: http://www.georgetown.edu/faculty/irvinem/articles/netknowledge.html. Retrieved: 22 January 2003.

Jarausch, K.H. 1983. Higher education and social change: Some comparative perspectives. In Jarausch, K.H. (ed.) *The transformation of higher learning. 1860 – 1930.* Stuttgart: Klett-Cotta.

Jarvis, P. 1996. Responses to "Labour market theories and distance education" Distance education in a late modern society: a response to Greville Rumble. *Open Learning.* 11(1): 47-50.

Jewitt, F. 1999. *A framework for the comparative analysis of the costs of classroom instruction vis-a- vis distributed instruction.* Study undertaken for the New Jersey Institute for Collegiate Teaching. California State University.

Jochems, W., Van Merriënboer, J., & Koper, R. 2004. An introduction to integrated e-learning. In. Jochems, W., Van Merriënboer, J., & Koper, R. (eds.) *Integrated e-learning. Implications for pedagogy, technology and organization.* London: RoutledgeFalmer.

Johnston, J. 1996. Time to rebuild human resources. *Business Quarterly.* 61(2): 46-52.

Jones, M.K., Li, Z. & Merrill, M.D. 1990. Domain knowledge representation for instructional analysis. *Educational Technology.* 30(10): 7-32.

Jost, K.L. & Schneberger, S. L. 1994. Educational technology adoption and implementation: Learning from information systems research. *Canadian Journal of Educational Communication.* 23 (3): 213–230.

Jung, I. 2005. Quality Assurance Survey of Mega Universities. In McIntosh, C. (ed.) *Perspectives on Distance Education. Lifelong Learning & Higher Education.* Vancouver & Paris: Commonwealth of Learning / UNESCO Publishing.

Kahane, A. 2001. How to change the world: Lessons for entrepreneurs from activists. *Reflections: The SoL Journal.* 2(3): 16 – 29.
Katz, R.N. 2002. The ICT infrastructure a driver of change. *Educause Review.* 37(4): 51-61
Katz, R.N. & Oblinger, D.G. 1999. Renewal as an institutional imperative. In Oblinger, D.G. & Katz, R.N. (eds.) *Renewing administration. Preparing colleges and universities for the 21st century.* Bolton, Massachusetts: Anker Publishing Company Inc.
Keegan, D.J. 1980. On defining distance education. *Distance Education.* 1(1): 13-36.
Keegan, D.J. 1986. *Foundations of distance education.* First Edition. London: Routledge.
Keegan, D.J. 1988. Problems in defining the field of distance education. *The American Journal of Distance Education.* 2(2): 4-11.
Keegan, D.J. 1992. The theoretical underpinnings of distance education. In Ortner, G.E., Graff, K. & Wilmersdoefer, H. (eds.) *Distance education as two-way communication: Essays in honour of Börje Holmberg.* Frankfurt: Peter Lang.
Keegan, D.J. 1993. A typology of distance teaching systems. In Harry K., John M. & Keegan D. (eds.) *Distance education: New perspectives.* London: Routledge.
Keegan, D.J. 1995. Teaching and learning by satellite in a virtual European classroom. In Lockwood, F. (ed.) *Open and distance learning today.* London: Routledge.
Klein, N. 2000. *No logo: Taking aim at the brand bullies.* London: Flamingo Press.
Keller, G. 1983. *Academic strategy, the managerial revolution in American higher education.* Baltimore: The John Hopkins Press.
Knight, P.T. 1996. Destined to leapfrog: Why a revolution will occur in Brazil, Russia, and South Africa. Paper prepared for the *Second International Conference on Distance Education in Russia.* 2-5 July 1996. Online: http://www.knight-moore.com/html/leapfrog.html. Retrieved: 13 June 1999.
Koper, R. 2000. *From change to renewal: Education technology foundations of electronic learning environments.* Heerlen: Educational Technology Expertise Centre, Open University of the Netherlands. Online: http://eml.ou.nl/introduction.articles.htm. Retrieved: 20 February 2002.
Koper, R. 2001. *Modelling units of study form a pedagogical perspective: The pedagogical meta-model behind EML.* Heerlen: Educational Technology Expertise Centre, Open University of the Netherlands. Online: http://eml.ou.nl/introduction.articles.htm. Retrieved: 20 February 2002.
Kotter, J.P. 1996. *Leading change.* Boston: Harvard Business School Press.
Kumar, K. 1992. New theories of industrial society. In Brown, P & Lauder, H. (eds.) *Education for economic survival. From fordism to post-fordism.* London: Routledge.
Kumar, K. 1997. *The Post-modern condition.* In Halsey, A.H., Lauder, H., Brown, P. & A. Stuart Wells (eds.) *Education. Culture, economy and society.* Oxford: Oxford University Press.
Lampel, J., & Mintzberg, H. 1996. Customizing customization. *Sloan Management Review.* 38(1): 21-31.
Lane, T. 2001. Analysis of learning, experiences of art and ideas for connections. Paper prepared for *Museums and the Web 2001.* Boston, Massachusetts: April 17 – 21, 2001. Online: http://www.archimuse.com/mw2001/papers/lane/lane.html. Retrieved: 10 April 2004.
Latchem, C., & Hanna, D.E. 2002. Leadership for open and flexible learning. *Open Learning.* 17(3): 203 – 215.
Laurillard, D. 2002. Rethinking teaching for the knowledge society. *Educause Review.* 37(1): 16 – 25.
Lazerson, U., Wegener, U. & Shumanis, N. 2000. What makes a revolution? Teaching and Learning in Higher Education, 1980-2000. *Change.* 32(3): 12 – 20.
Learning Circuits. 2004. The Edinburgh Scenarios. Prepared for the 2004 eLearninternational World Summit. Edinburgh, February 2004. Online: http://www.internettime.com/lcmt/archives/cat_edinburgh_scenarios.html. Retrieved 18 July 2004.

Lenz, T.O. 1997. The new U. *PS: Political Science and Politics.* 30(1): 11-14.

Lewin, K. 1999. Preface. In Schein, E.H. (ed.) *The corporate culture survival guide.* San Francisco: Jossey-Bass.

Lewis, R. 1989a. Open learning: the future. In Paine, N. (ed.) *Open learning in transition: an agenda for action.* London: Kogan Page.

Lewis, R, 1989b. The open school? In Paine, N. (ed.) *Open learning in transition: an agenda for action.* London: Kogan Page.

Lewis, R. 1990. Open learning and the misuse of language: A response to Greville Rumble's article. *Open Learning.* 5(1): 3-8.

Lewis, R. 1997. Open learning in higher education. *Open Learning.* 12(3): 3-13.Liechty, J, Ramaswamy, V., & Cohen, S.H. 2001. Choice menus for mass customization: An experimental approach for analysing customer demand with an application to a web-based information service. *Journal of Marketing Research.* 38(2): 183-197.

Lowe, R. 1983. The expansion of higher education in England. In Jarausch, K.H. (ed.) *The transformation of higher learning. 1860 – 1930.* Stuttgart: Klett-Cotta.

LTSC (Learning Technology Standards Committee) 2001. IEEE P1484.12 Learning object metadata working group. Scope and Purpose. Online: http://ltsc.ieee.org/wg12/index.html. Retrieved: 1 October 2001.

Lyotard, J.F. 1984. *The postmodern condition: A report on knowledge.* Manchester: Manchester University Press.

Mackintosh, W.G. 1996. One Person Commission into the Project Team Production Process at Unisa. Pretoria: University of South Africa.

Mackintosh, W.G. 1998. Report on re-engineering Unisa=s learning materials process. Pretoria: University of South Africa.

Maltha, H.W., Gerrissen, J.F. & Veen, W. 1999. *The means and the ends. ICT and Third World higher education.* Amsterdam: Nuffic.

Mallard, T. 2005. *Tertiary education funding switches to quality*. Media Release, 19 May 2005. Online: http://www.beehive.govt.nz/ViewDocument.aspx?DocumentID=23108. Retrieved 22 March 2006.

Mansell, R. & Wehn, U. 1998. (eds.) *Knowledge societies: Information Technology for sustainable development.* For the United Nations Commission on Science and Technology for Development. New York: The United Nations and Oxford University Press.

ManufacturingNews.com 1998. *Dell's make-to-order system leaves competitors in the dust.* 5(13): 1-7. Online: http://www.manufacturingnews.com/news/98/0703/art1.htm. Retrieved: 8 February 2002.

Marsh, B. 1998. Using scenarios to identify, analyze, and manage uncertainty. In Fahey, L and Randall, R.M. (eds.) 1998. *Learning from the future. Competitive foresight scenarios.* New York: Wiley, John & Sons, Inc.

Marsh, V. 2005. Education: Foreign students transform the system. *Financial Times Online,* 18 March 2005.

Marshall, S. 2005. *Report on the e-learning maturity model evaluation of the New Zealand tertiary sector.* Research project supported by the New Zealand Ministry of Education Tertiary E-Learning Research Fund.

Martin, J. 1997. Give 'em exactly what they want. *Fortune.* 10 November.

Massy, W. 1990. Commentary. In Hanson, K.H., and Meyerson, J.W. (eds.) *Higher education in a changing economy.* New York: American Council on Education and Macmillan Publishing Company.

Mawditt, R. 1998. University management — professional competence in a competitive environment. *Perspectives.* 2(2): 2-4.

Mayer, R.E. & Anderson, R.B. 1992. The instructive animation: Helping students build connections between words and pictures in multimedia learning. *Journal of Educational Psychology.* 84(4): 444 – 452.

Mayer, R.E., Bove, W., Mars, R. & Tapangco, L. 1996. When less is more: Meaningful learning from visual and verbal summaries of science textbook lessons. *Journal of Educational Psychology.* 88(1): 64 - 73.

Mayer, R.E. & Gallini, J.K. 1990. When is an illustration worth ten thousand words? *Journal of Education Psychology.* 82(4): 715 - 726

McCallum, J.S. 1997. The face behind change. *Ivey Business Quarterly.* 62(2): 73-75.

Mccully, G. 1973. Multiversity and university. *Journal of Higher Education.* 44(7): 514-531.

McNair, S. 1997. Is there a crisis? Does it matter? In Barnett, R. & Griffin, A. (eds.) *The end of knowledge in higher education.* Institute of Education series, University of London. London: Cassell.

McNay, I. 1995. From the collegial academy to corporate enterprise: The changing cultures of universities. In Schuller, T. (ed.) *The changing university?* Buckingham: The Society for Research into Higher Education and Open University Press.

McHugh, J. 1996. A shoe that really fits. *Forbes.* 3 June.

Meade, P.H. 1997. *Challenges facing universities: Quality, leadership and the management of change.* Dunedin: University of Otago.

Mercer, D. 1995. Simpler scenarios. *Management Decision.* 33(4): 32-41.

Merrill, M.D. 1983. Component display theory. In Reigeluth, C.M. (ed.) *Instructional-design theories and models.* Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Merrill, M.D. 1987. A lesson based on component display theory. In Reigeluth, C.M. (ed.) *Instructional-design theories in action.* Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Merrill, M.D. 1998. Knowledge analysis for effective instruction. *CBT Solutions.* March/April: 1–11. Online: http://www.coe.usu.edu/it/id2/cbtko.htm. Retrieved: 10 February 2002.

Merrill, M.D. 1999. Instructional Transaction Theory (ITT): Instructional design based on knowledge objects. In Reigeluth, C.M. (ed.). Instructional-design theories and models: A new paradigm of instructional theory. Mahwah, New Jersey: Lawrence Erlbaum Associates. Online: http://www.coe.usu.edu/it/id2/ddc0997.htm. Retrieved: 10 February 2002.

Merril, M.D. 2000. Knowledge objects and mental models. In Wiley, D.A. (ed.), *The instructional uses of learning objects.* Online: http://reusability.org/read/chapters/merrill.doc .Retrieved 5 December 2001.

Merrill, M.D. & ID_2 Research Team. 1996. Instructional Transaction Theory: Instructional Design based on knowledge objects. *Educational Technology.* 36(3): 30-37.

Merril, M.D. & Thompson, B.M. (In Press). The IDXelerator™: Learning-centred instructional design. In Nieweb, N. & Gustafson, K. *Design methodology and developmental research in education and training.* Online: http://www.coe.usu.edu/it/id2/xelor.htm. Retrieved: 10 February 2002.

Michaels, J.W. & Smillie, D. 2000. Webucation. *Forbes*, May 15.

Middlehurst, R. 1995. Changing leadership in universities. In Schuller, T. (ed.) *The changing university?* Buckingham: The Society for Research into Higher Education and Open University Press.

Millet, S.M. 1998. Futuring consumer products: An illustrative example of scenario analysis. In Fahey, L & Randall, R.M. (eds.) 1998. *Learning from the future. Competitive foresight scenarios.* New York: Wiley, John & Sons, Inc.

Millet, S.M. 2003. The future of scenarios: challenges and opportunities. *Strategy & leadership.* 31(2): 16 – 24.

Miller, H.D.R. 1995. *The management of change in universities. Universities, state and economy in Australia, Canada and the United Kingdom.* Buckingham: The Society for Research into Higher Education and Open University Press.

Miller, M, A. 2000. The market place and the village green. *Change.* 32(4): 4.

Miller, R. 2003. The Future of the tertiary education sector: Scenarios for a learning society. Report prepared for the OECD/Japanese seminar on the future of Universities. Tokyo, December 11-12, 2003. Online: http://www.plausiblefutures.com/cparticle109888-6691a.html. Retrieved: 18 July 2004.

Minogue, K.R. 1973. *The concept of a University.* London: Weidenfeld and Nicolson.

Mintzberg, H. 1994. *The rise and fall of strategic planning.* New York: Free Press.

Mintzberg, H. and Van der Heyden, L. 1999. Organigraphs: Drawing how companies really work. *Harvard Business Review.* 77(5): 87-94

MOE (Ministry of Education). Undated. *E-Learning Projects.* Online: http://www.steo.govt.nz/eLearningProjects.aspx. Retrieved: 1 October 2004.

MOE (Minstry of Education). 2001. *Export education in New Zealand. A strategic approach to developing the sector.* Wellington: Ministry of Education.

MOE (Ministry of Education). 2002. *Tertiary Education Strategy 2002/07.* Wellington: Ministry of Education.

MOE (Ministy of Education). 2004a. *Profile & trends. New Zealand's tertiary education sector.* Wellington: Ministry of Education.

MOE (Ministry of Education). 2004b. *Interim Tertiary e-Learning Framework.* Wellington: Ministry of Education. Accessible online from http://www.steo.govt.nz/eLearningProjects.aspx. Retrieved: 1 October 2004.

MOE (Ministry of Education). 2005. *Fee Maxima Reference Group.* Online: http://www.moe.govt.nz. Retrieved: 3 March 2006.

MOE (Ministry of Education). 2006. New Zealand's Offshore Public Tertiary Education Programmes. Online: http://www.minedu.govt.nz/index.cfm?layout=document&documentid=6876&data=1#P229_14845. Retrieved: 7 March 2006.

Moonen, J. 1997. The efficiency of telelearning. *Journal of Asynchronous Learning Networks.* 1(2). Online: http://www.sloan-c.org/publications/jaln/v1n2/v1n2_moonen.asp. Retrieved 23 March 2006.

Moore, D. 2000. *From correspondence to flexible learning. Thoughts on educational and institutional change at Technikon SA.* Rectorate occasional papers No.1. Johannesburg: Technikon South Africa.

Moore, G.A. 1991. *Crossing the chasm.* New York: HarperBusiness.

Moore, G.A. 1995. *Inside the tornado.* New York: HarperBusiness.

Moore, M.G. 1973. Toward a theory of independent learning and teaching. *Journal of higher education.* 44: 666-679.

Moore, M.G. 1987. Speaking personally – with Charles Wedemeyer. *The American Journal of Distance Education.* 1(1): 59-64.

Moore, M.G. 1990. Recent contributions to the theory of distance education. *Open Learning.* 5(3): 10-15.

Moore, M.G. 1991. International aspects of independent study. In Watkins, B.L. & Wright, S.J. (eds.) *The foundations of American distance education.* Dubuque: Kendal/Hunt Publishing Company.

Moore, M.G. 1993. Three types of interaction. In Harry, K., John, M. & Keegan, D. (eds.) *Distance education: New perspectives.* London: Routledge.

Moore, M.G. 1997. A personal message from Michael Moore. In Mackintosh W.G., Waghid, Y. and van Niekerk, M.H. *Open and distance learning. Course1, Study Manual A. Postgraduate diploma in distance education.* Pretoria: University of South Africa.

Moore, J., Gale, J., Dew, K. & Simmers, D. 2006. Student debt amongst junior doctors in New Zealand. Part 2: Effects on intentions and workforce. *The New Zealand Medical Journal.* 119(1229) Online: http://www.nzma.org.nz/journal/index.shtml. Retrieved: 3 March 2006.

Moore, M.G. & Kearsley, G. 1996. *Distance education. A systems view.* Belmont: Wadsworth Publishing Company.

Morrison, J.L. & Mendenhall, R.W. 2001. Renaissance at Western Governors University: An Interview with Robert W. Mendenhall. *Virtual University.* May/June 2001. Online: http://ts.mivu.org/default.asp?show=article&id=865. Retrieved: 29 July 2004.

Mousavi, S.Y., Low, R., & Sweller, J. 1995. Reducing cognitive load by mixing auditory and visual presentation modes. *Journal of Educational Psychology.* 87(2): 319 - 334.

Mutz, J. 2000. Change can be seen as an organized epidemic. *Indianapolis Business Journal.* 21(22): 13 – 14.

Nash, P. 2000. *Unisa's vision for the future. Information and computer technology implications.* Unpublished consultant report. Unisa: Pretoria.

Newman, J.H. 1996. [Series including Newman's original text with selected commentaries] The idea of a university. In Turner, F.M. (ed.), McMackin Garland, M., Castro-Klarén, S., Landow, G.P., Marsden, G.M., & Turner, F.M. (contributors). *Rethinking the Western tradition.* New Haven: Yale University Press.

Newman, K.L. 2000. Organisational transformation during institutional upheaval. *Academy of Management Review.* 25(3): 602 – 620.

Nicoll, K. & Edwards, R. 1997. Open learning and the demise of the discipline? *Open Learning.* 12(3): 14-24.

Nipper, S. 1989. Third generation distance learning and computer conferencing. In Mason, R. & Kaye, A. (eds.) *Mindweave.* Oxford: Pergamon Press.

Noam, E.M. 1995. Electronics and the dim future of the university. *Science.* 270: 247-249.

Noble, D.F. 1998a. Digital diploma mills: The automation of higher education. *First Monday.* 3(1). Online: http://firstmonday.org/issues/issue3_1/noble/index.html. Retrieved: 10 February 2003.

Noble, D.F. 1998b. Digital diploma mills, Part II: The coming battle over online instruction: Confidential agreements between universities and private companies pose serious challenge to faculty intellectual property rights. Online: http://communication.ucsd.edu/dl/ddm2.html. Retrieved: 10 February 2003.

Noble, D.F. 1998c. Digital diploma mills, Part III: The bloom is off the rose. Online: http://communication.ucsd.edu/dl/ddm3.html. Retrieved: 10 February 2003.

Noble, D, Shneiderman, B., Herman, R., Agre, P. & Denning, P. 1998. Technology in education: The fight for the future. *Educom Review.* 33(1): 1-11.

Norris, D.M., & Morrison, J.L. 1997. Leveraging the forces of transformation on campus. In Norris D.M. & J.L. Morrison (eds.) *Mobilizing for transformation: How campuses are preparing for the knowledge age.* San Francisco: Jossey-Bass Publishers.

NZQA (New Zealand Qualifications Authority) 2006. New Zealand qualifications for international students. Online: http://www.nzqa.govt.nz/for-learners/nzstudy/index.html. Retrieved: 1 March 2006.

NZCER (New Zealand Council for Educational Research). 2004. *Critical Success Factors and Effective Pedagogy for e-learning in Tertiary Education: Background paper for ITP New Zealand.* Online: www.itpnz.ac.nz/issuespapers/NZCER_Final_Report_Critical_Success_Factors.pdf. Retrieved 8 March 2006.

NZVCC (New Zealand Vice-Chancellors' Committee). 2004. *Annual Report 2004.* Wellington: NZVCC.

Oakeshott, M. 1989. The idea of a university. In Fuller, T. (ed.) *The voice of liberal learning: Michael Oakeshott on education.* London: Yale University Press.

OECD (Organisation for Economic Co-operation and Development). 2005. *E-learning in tertiary education. Where do we stand?* Paris: Centre for Educational Research and Innovation, OECD.

Oblinger, D. 2001. Will E-business shape the future of open and distance learning? *Open Learning.* 16(1): 10-25.

Oblinger, D. & Kidwell, J. 2000. Distance learning: Are we being realistic? *Educause Review.* 35(3): 31 – 39.

Observatory on Borderless Higher Education (The). 2002. *Briefing Note: Issue 7.* Online Learning in Commonwealth Universities: selected data from the 2002 Observatory survey – Part 1. London: Association of Commonwealth Universities (ACU) and Universities UK.

Open University. 2005. The Open University builds student online environment with Moodle and more. Media release, 8 November 2005. Online: http://www3.open.ac.uk/events/7/2005118_40887_nr.doc. Retrieved 22 April 2006.

Open University of the Netherlands. 2001a. EML What's it all about. Online: http://eml.ou.nl/introduction/explanation.htm. Retrieved: 25 November 2001.

Open University of the Netherlands. 2001b. New IMS specification about learning design in development. Online: http://eml.ou.nl/forum/sept/item1.htm. Retrieved: 25 November 2001.

Oxford English Dictionary. 2004. S.v. 'technology'. Online: http://dictionary.oed.com. Retrieved: 26 April 2004.

Paine, N. 1989. *Open learning in transition: an agenda for action.* London: Kogan Page.

Paine, N. 1990. Open learning and the misuse of language: Some comments on the Rumble/Lewis debate. *Open Learning.* 5(2):42-44.

Payame Noor Univesity. 2006. Online at http://www.pnu.ac.ir/engilish/htm/about.htm. Retrieved 28 May 2006.

Peeke, G. 1994. *Mission and Change. Institutional mission and its application to the management of further and higher education.* Buckingham: SRHE and Open University Press.

Peters, O. 1965. *Der fernunterricht: Materialen zur diskussion einer neuen unterrichtsform.* Weinheim, Berlin: Beltz.

Peters, O. 1967. *Das fernstudium an universitäten und hochschulen: didaktische struktur und vergleichende interpretation: ein beitrag sur theorie der fernlehre.* Weinheim: Beltz

Peters, O. 1968. *Das hochschulfernstudium: Materialien zur diskussion einer neuen studienform.* Weinheim, Berlin: Beltz. (Pädagogisches Zentrum: Veroffentlichungen. Reihe C. Bd. 5).

Peters, O. 1973. *Die didaktische struktur des fernunterrichts. Untersuchungen zu einer industrialisierten form des lehrens und lernens.* Weinheim, Berlin: Beltz. Tübinger Beiträge zum Fernstudium, Bd. 7.

Peters, O. 1989. The iceberg has not melted: Further reflections on the concept of industrialisation and distance teaching. *Open learning.* 4(3): 3-8.

Peters, O. 1992. Distance education: A revolutionary concept. In Ortner, G.E., Graff, K. & Wilmersdoerfer, H. (eds.) *Distance education as two-way communication. Essays in honour of Börje Holmberg.* Frankfurt: Peter Lang.

Peters, O. 1993a. Understanding distance education. In Harry K., John M. & Keegan D. (eds.) *Distance education: New perspectives.* London: Routledge.

Peters, O. 1993b. Distance education in a postindustrial society. In Keegan, D. (ed.) *Theoretical principles of distance education.* London: Routledge.

Peters, O. 1994. [Translation of Peters's texts into English.] In Keegan, D. (ed.) *Otto Peters on distance education. The industrialisation of teaching and learning.* London: Routledge.

Peters, O. 1996. Responses to 'Labour market theories and distance education' Distance education is a form of teaching and learning sui generis. *Open Learning.* 11(1): 51-54.

Peters, O. 1997. A personal message from Otto Peters. In Mackintosh W.G., Waghid, Y. and van Niekerk, M.H. *Open and distance learning. Course1, Study Manual A. Postgraduate diploma in distance education.* Pretoria: University of South Africa.

Peters, O. 1998. *Learning and teaching in distance education. Analyses and interpretations from and international persepctive.* London: Kogan Page.

Peters, O. 1999. *A pedagogical model for virtual learning space.* Online: http://www.uni-oldenburg.de/zef/cde/found/peters99.htm. Retrieved: 16 January 2003.

Peters, O. 2002. *Distance education in transition. New trends and challenges.* Second Edition. Oldenburg: Carl von Ossietsky University of Oldenburg, Centre for Distance Education.
Peters, O. 2003. Learning with new media in distance education. In Moore, M.G. & Anderson, W.G. (eds.) *Handbook of distance education.* Mahwah, New Jersey: Lawrence Erlbaum Associates.
Phillips, R.J. 2000. Digital technology and institutional change from the gilded age to modern times: The impact of the telegraph and the Internet. *Journal of Economic Issues.* 34(2): 266 – 290.
Piller, F.T. 2000. *Mass customisation and customer relationship management. The information cycle of mass customisation: Why information is the critical success factor for mass customisation.* The German Mass Customization Institute. Online: http://www.mass-customization.de/engl_infocycle.htm. Retrieved: 8 February 2002.
Pine, B.J. 1993. *Mass customization.* Boston, Massachusetts: Harvard Business School Press.
Pine, B.J., & Bart, V. 1993. Making mass customization work. *Harvard Business Review.* 71(5): 108-118.
Pine, B.J., & Peppers, D. 1995. Do you want to keep your customers forever? *Harvard Business Review.* 73(2): 103-114.
Porter, M. 2001. Object lessons from the Web: Implications for instructional development. In Farrel, D.M. (ed.) *The changing faces of virtual education.* Vancouver: The Commonwealth of Learning.
Porter, M.E. 1980. *Competitive strategy: Techniques for analysing industries and competitors.* New York: Free Press.
Porter, M.E. 1985. *Competitive advantage: Creating and sustaining superior performance.* New York: Free Press.
Porter, M.E. 1996. What is strategy? *Harvard Business Review.* 74(6): 61 -78.
Porter, M.E. 2001. Strategy and the Internet. *Harvard Business Review.* 79(3): 62-78.
Prahalad, C.K. 1998. Managing discontinuities: The emerging challenges. *Research Technology Management.* 41(3): 14-23.
Prebble, T., Hargraves, H., Leach, L., Naidoo, K., Suddaby, G. & Zepke, N. 2004. *Impact of student support services and academic development programmes on student outcomes in undergraduate tertiary study: A synthesis of the Research.* Wellington: Ministry of Education.
Priesmeyer, HR. 1992. *Organizations and chaos. Defining the methods of nonlinear management.* London: Quorum books.
Quinn, C.N. 2000. Learning objects and instructional components. *Formal discussion initiation of the International Forum of Educational Technology and Society*: 14-25 February 2000. Online: http://ifets.ieee.org/discussions/discuss_feb2000.html. Retrieved: 1 October 2001.
Raggatt, P. 1993. Post-Fordism and distance education - a flexible strategy for change. *Open Learning.* 8(1): 21-31.
Readings, B. 1996. *The university in ruins.* Cambridge, Massachusetts and London: Harvard University Press.
Reich, R 1991. *The Work of Nations*, London, Simon & Schuster
Reigeluth, C.M. 1983. *Instructional-design theories and models: an overview of their current status.* Hillsdale: Lawrence Erlbaum.
Reigeluth, C.M., Bunderson, C.V. & Merrill, M.D. 1994. Is there a design science of instruction? In Merrill, M.D. & Twitchell, D.G. *Instructional design theory.* Englewood Cliffs, NJ: Educational Technology Publications.
Ringland, G. 1998. *Scenarios planning. Managing the future.* Chichester: Wiley, John & Sons.
Robertson, D. 1997. Social justice in a learning market. In Coffield F & Williamson, B (eds.) *Repositioning Higher Education.* Buckingham: Society for Research into Higher Education & Open University Press.
Rogers, E.M. 1995. *Diffusion of Innovations.* 4th edition New York: The Free Press.

Rowley, D. J., Lujan, H.D. & Dolence, M.G. 1997. *Strategic change in colleges and universities. Planning to survive and prosper.* San Francisco: Jossey-Bass Publishers.

Rowntree, D. 1991. *Teach yourself with open learning.* London: Sphere.

Rowntree, D. 1992. *Exploring open and distance learning.* London: Kogan Page.

Rumble, G. 1989a. On defining distance education. *The American Journal of Distance Education.* 3(2): 8-21.

Rumble, G. 1989b. Open learning, distance learning and the misuse of language. *Open Learning.* 4(2): 28-33.

Rumble, G. 1995a. Labour market theories and distance education I: Industrialisation and distance education. *Open Learning.* 10(1): 10-21.

Rumble, G. 1995b. Labour market theories and distance education II: How Fordist is distance education? *Open Learning.* 10(2): 12-28.

Rumble, G. 1995c. Labour market theories and distance education III: Post-Fordism the way forward. *Open Learning.* 10(3): 25-42.

Rumble, G. 1997a. A personal reflection from Greville Rumble. In Mackintosh W.G., Waghid, Y. & van Niekerk, M.H. *Open and distance learning. Course1, Study Manual A. Postgraduate diploma in distance education.* Pretoria: University of South Africa.

Rumble, G. 1997b. *The costs and economics of open and distance learning.* London: Kogan Page.

Rumble, G. 2001. Just how relevant is E-education to global educational needs? *Open Learning.* 16(3): 223-232.

Rumble, G. 2002. *Managing the costs and pedagogic quality of flexible and distance learning initiatives at the University of Auckland: Cost drivers and overheads.* Unpublished consultancy report.

Rustum, R. 1990. The relationship of technology to science and the teaching of technology. Journal of Technology Education. 1(2): Online: http://scholar.lib.vt.edu/ejournals/JTE/v1n2/html/roy.html. Retrieved: 22 May 2006.

Ryan, Y. 2000. The business of borderless education and lifelong learning. *Techknowlogia.* September/October. 36- 39. Online: http://www.technknowlogia.org. Retrieved: 13 January 2002.

SAIDE (South African Institute for Distance Education). 1994. *Open learning and distance education in South Africa.* Report of the international commission organised by SAIDE. Braamfontein: SAIDE.

Saint, W. 1999. *Tertiary distance education and technology for Sub-Saharan Africa.* Washington D.C.: Working group on Higher Education, Association for the Development of Education in Africa, The World Bank.

Salmi, J. 2001. Tertiary education in the 21st century: Challenges and opportunities. *Higher Education Management.* 13(2): 105-130.

Salmon, G. 2002. Future learning encounters. Keynote address. *Eurocall 2002.* Online: http://www.atimod.com/presentations/download/Eurocall.htm. Retrieved: 30 June 2004.

Schjoedt, L. 2000. An empirical investigation: Can human capital theory explain CEO compensation? In Snavely, W.B. (ed.) *Midwest Academy of Management Proceedings.* Online: http://www.sba.muohio.edu/management/mwAcademy/2000/34a.pdf. Retrieved 2 January 2003.

Schmoller, S. 2004. UkeU. Extract from "Update on the future of the UK eUniversity – finished as an independent organisation, but did it have to be this way?" Mailing Number 34 – 3 May 2004. Online: http://www.schmoller.net/mailings/ukeu.html. Retrieved: 29 July 2004.

Schoemaker, P.J.H. 1995. Scenario planning: A tool for strategic thinking. *Sloan Management Review.* 36(2): 25-40.

Schoemaker, P.J.H. 1998. Twenty common pitfalls in scenario planning. In Fahey, L & Randall, R.M. (eds.) 1998. *Learning from the future. Competitive foresight scenarios.* New York: Wiley, John & Sons, Inc.

Schoemaker, P.J.H. & Mavaddatt, V.M. 2000. Scenario planning for disruptive technologies. In Day, G.S., Schoemaker, P.J.H., & Gunther, R.E. (eds.) *Wharton on managing emerging technologies.* New York: John Wiley & Sons, Inc.

Schoemaker, P.J.H. & van der Heijden C.A.J.M. 1992. Integrating scenarios into strategic planning at Royal Dutch Shell. *Planning Review.* 20(3): 41-47.

Schwartz, P. 1996. *The art of the long view: Planning for the future in an uncertain world.* New York: Doubleday and Co.

Scott, J.W. & El-Assal, M. 1969. Multiversity, university Size, university quality and student protest: An empirical study. *American Sociological Review.* 34(5): 702-709.

Scott, P. 1997a. The postmodern university? In Smith, A. & Webster, F. (eds.) *The postmodern university? Contested visions of higher education in society.* Buckingham: The Society for Research into Higher Education and Open University Press.

Scott, P. 1997b. The changing role of the university in the production of new knowledge. *Tertiary education and management.* 3(1) 5-14.

Scott, P. 1997c. The crisis of knowledge and the massification of higher education. In Barnett, R & Griffin, A (eds.) *The end of knowledge in higher education.* London: London Institute of Education.

Senge, P.M. 1994. *The fifth discipline. The art and practice of the learning organization.* New York: Currency Doubleday.

Senge, P., Kleiner, A, Roberts, C., Ross, R., Roth, G. & Smith, B. 1999.*The dance of change. The challenges of sustaining momentum in learning organizations.* New York : Currency Doubleday.

Seshagiri, N. 1999. Two years of technological progress and innovation. In UNESCO. *World Communication and Information Report 1999 – 2000.* Paris: UNESCO.

Shata, O. 2001. A critique of Steven Downes' Article, "Learning objects": A Middle Eastern perspective. *International Review of Research in Open and Distance Learning.* 2(1): http://www.icaap.org/iuicode?149.2.1.3. Retrieved: 1 October 2001.

Shattock, M. 2000. Strategic management in European universities in an age of increasing institutional self reliance. *Tertiary Education and Management.* 6: 93-104.

Shattock, M. 2003. *Managing Successful Universities.* Berkshire: SRHE and Open University Press.

Shore, P. 1992. *Thy myth of the university. Ideal and reality in higher education.* Lanham: University Press of America.

Simon, H.A. 1978. *Rational decision-making in business organisations.* Nobel Memorial Lecture, 8 December, 1978. Online: http://scholar.google.com/url?sa=U&q=http://nobelprize.org/economics/laureates/1978/simon-lecture.pdf. Retrieved: 9 November 2006.

Schriefer, A. 1995. Getting the most out of scenarios: Advice from the experts. *The Future.* 23(5): 33-35.

Sibley, WM. 1993. The University in the 1990s: Crisis or Predicament? *The Canadian Journal of Higher Education* 23(1): 114-132.

Sjogren, J & Fay, J. 2002. Cost issues in online learning. Using "co-opetition" to advantage. *Change.* 34(3): 53-55.

South, J.B. & Monson, D.W. 2000. A university-wide system for creating, capturing, and delivering learning objects. In Wiley, D.A. (ed.), *The instructional uses of learning objects.* Online: http://reusability.org/read/chapters/south.doc. Retrieved: 5 December 2001.

Sperling, J. 1999. A Business Model of Higher Education in 2025. In Thorne, M. (ed.)*Universities in the Future.* London: Department of Trade and Industry, pp. 104-119.

Statistics New Zealand. 2005. *Demographic Trends 2004. Part 8.* Online: http://www.stats.govt.nz/analytical-reports/dem-trends-04/part-8.htm. Retrieved: 3 March 2006.

Steiner, G.A. 1979. *Strategic Planning: A Step-By-Step Guide.* New York: The Free Press.

Swift, D.F. 1993. An impressionistic review of Unisa first year courses with recommendations for action. SAIDE Report to the Vice-Principal (research). Pretoria: University of South Africa.

Taffinder, P. 1998. *Big change. A route-map for corporate transformation.* Chichester: John Wiley & Sons.

Tait, A. 1994. The end of innocence: critical approaches to open and distance learning. *Open Learning.* 9(3): 221-238.

Tait, A. 1999. The convergence of distance and conventional education. Some implications for policy. In Tait, A. & Mills, R. (eds.) *The convergence of distance and conventional education.* New York: Routledge.

Tait, A. 2000. Planning student support for open and distance learning. *Open Learning.* 15(3): 287-299.

Tapp, L. 1997. Emerging triumphant. *Business Quarterly.* 6(3): 27-28.

Taylor, J.C. 2000. Fifth Generation Distance Education. *Higher Education Series.* Report No. 40. June. Higher Education Division, DETYA, Australia.

Taylor, C.D. & Eustis, J.D. 1999. Assessing the changing impact of technology on teaching and learning at Virginia Tech: A case study. In Katz, R.N. & Rudy, J.A. (eds.) *Information technology in higher education: Assessing its impact and planning for the future.* New directions for institutional research. San Francisco: Jossey-Bass Publishes in collaboration with Educause.

TEC (Tertiary Education Commission). 2004. *Overview and key findings. Performance-Based Research Fund. Evaluating research excellence: the 2003 assessment.* Wellington: Tertiary Education Commission.

TEC (Tertiary Education Commission). Undated. *Fee/course costs maxima.* Online: http://www.tec.govt.nz/funding/ttf/fee_maxima/fee_maxima.htm. Retrieved: 3 March 2006.

TEC (Tertiary Education Commission). Undated. *Performance Based Research Fund.* Online: http://www.tec.govt.nz/funding/research/pbrf/pbrf.htm. Retrieved: 22 March 2006.

Thomas, C.W. 1998. Scenario-based planning for technology investments. In Fahey, L & Randall, R.M. (eds.) 1998. *Learning from the future. Competitive foresight scenarios.* New York: Wiley, John & Sons, Inc.

Toffler, A. 1970. *Future shock.* London: Pan Books.

Toffler, A. 1981. *The third wave.* London: Pan Books.

Trow, M. 1973. *Problems in the transition form elite to mass higher education.* Berkeley, California: Carnegie Commission on Higher Education.

Turnoff, M. 1997. Alternative futures for distance learning: The force and the darkside. Working paper prepared for a keynote presentation at the UNESCO/Open University International Colloquium. *Virtual learning environments and the role of the teacher.* Milton Keynes: 27-29 April.

TVNZ (Television New Zealand) 2004. *Student debt hits $7 billion.* One News. 28 April 2004. Online: http://tvnz.co.nz/views/news_story_skin/423251%3Fformat=html. Retrieved: 3 March 2006.

Twigg, C.A. 1999. *Improving learning & reducing costs: Redesigning large-enrollment courses.* Centre for Academic transformation, Rensselaer Polytechnic Institute. New York: The Pew Learning and Technology Program.

Twigg, C.A. 2003. Improving learning and reducing costs: New models for online learning. *Educause Review.* 38(5): 28-38.

UNDP (United Nations Development Programme) 1999. *The human development report.* Cary, NC: Oxford University Press.

UNESCO 2000a. *World education report 2000.* Paris: UNESCO Publishing.

UNESCO 2000b. *Education for all assessment: Statistical Document.* World Education Forum, Dakar Senegal. Nîmes: UNESCO.

UNESCO. 2000c. The Dakar framework for action. Education for All: Meeting our collective commitments. Text adopted by the World Education Forum Dakar, Senegal, 26-28 April 2000. Online: http://www2.unesco.org/wef/en-leadup/dakfram.shtm. Retrieved: 4 May 2001.

UNESCO. 2000d. Expanded commentary on the Dakar framework for action. Paris: UNESCO. 23 May 2000. Online: http://www2.unesco.org/wef/en-leadup/dakfram.shtm. Retrieved: 4 May 2001.

UNESCO. 2002. *Open distance learning. Trends, policy and strategy considerations.* Paris: UNESCO.

UNESCO 2005. Statistics in brief. Unesco Institute for Statistics. Online: http://www.uis.unesco.org/profiles. Retrieved: 2 March 2006.

Unisa. (University of South Africa) 1995a. *Into the future. Report on a visit to the Open University. 6-24 March, 1995.* Pretoria: University of South Africa.

Unisa. (University of South Africa) 1995b. *Open Universiteit. The Netherlands. Report on a visit 28/8 –8/9/1995.* Pretoria: University of South Africa.

Unisa. (University of South Africa). Department Planning and Analysis. 2006. Personal communication to W. Diehl, June 15, 2006 in preparation for Daniel, J.S., Mackintosh, W.G., & Diehl, W.C. (In Press). The Mega-University Response to the Moral Challenge of Our Age. In Moore, M.G. (ed.) *Handbook of distance education. 2nd Edition.* Mahwah, New Jersey: Lawrence Erlbaum Associates.

University of Auckland. 2006. Academic programme changes 2006. Online: http://www.auckland.ac.nz/uoa/about/teaching/policiesprocedures/qualifications_restructuring.cfm#Student%20Workload. Retrieved: 17 March 2006.

University of Michigan. 1996. *Vision 2010.* A scenario planning project overseen by the Commission on Preservation and Access and managed by the University of Michigan's School of Information. Online: http://www.si.umich.edu/V2010/projhist.html. Retrieved: 18 July 2001.

Useem, A. 1999. Wiring African universities proves a formidable challenge. *The Chronicle of Higher Education.* April 2: A51-A53.

Utterback, J.M. 2004. The dynamics of innovation. *Educause Review.* 39(1): 42 – 51.

Utterback, J.M. & Kim, L. 1986. Invasion of a stable business by radical innovation. In Kleindorfer, P. (ed.) *The management of productivity and technology in manufacturing.* New York: Plenum Press.

Valiant, R. 2002. *Using what we know about the brain to design learning environments.* Online: http://valetc.com/article.php?sid=2. Retrieved: 26 January 2003.

Van der Heijden, K. 1996. *Scenarios. The art of strategic conversation.* Chichester: Wiley, John & Sons.

Vergnani, L. 2000. South African universities grapple with the growth in distance learning. *The Chronicle of Higher Education.* June 23.

Ward, E. & Schriefer, A.E. 1998. Dynamic scenarios: Sytems thinking meets scenario planning. In Fahey, L and Randall, R.M. (eds.) 1998. *Learning from the future. Competitive foresight scenarios.* New York:: Wiley, John & Sons, Inc.

Webster's Revised Unabridged Dictionary. 1998. S.v. 'technology'. Plainfield, NJ: Micra Incorporated. Online: http://dictionary.reference.com. Retrieved: 26 April 2004.

Wedemeyer, C.A. 1968. *University of South Africa. Report and recommendations.* Pretoria: Unisa.

Wedemeyer, C.A. 1978. Independent Study. In Knowles, A.S. (ed.) *The international encyclopedia of higher education.* San Francisco: Josey-Bass Publishers.

Wedemeyer, C. 1981. *Learning at the back door: Reflections on non-traditional learning in the lifespan.* Madison: University of Wisconsin Press.

Wedemeyer, C.A. 1982. The birth of the Open University — a postscript. *Teaching at a distance.* 21: 21-27.

Wedemeyer, C.A. and Childs, G.B. 1961. *New perspectives in university correspondence study.* Chicago: Centre for the study of liberal education for adults.

Werner, N. 1999. SimCity 3000's beauty is in the details. CNN.com, Computing. Posted 9 February 1999. Online: http://www.cnn.com/TECH/computing/9902/09/simcity.idg/. Retrieved 10 April 2004.

Wheeler, B. 2004. Open source 2007. How did this happen? *Educause.* 39(4): 12 – 27.

White, F. 1999. Digital Diploma Mills: A dissenting voice. *First Monday.* 4(7): 1 – 8. Online: http://www.firstmonday.dk/issues/issue4_7/white/. Retrieved: 12 April 2004.

Wiley, D.A. 2000. Connecting learning objects to instructional design theory: A definition, a metaphor, and a taxonomy. In Wiley, D.A. (ed.), *The instructional uses of learning objects.* Online: http://reusability.org/read/chapters/wiley.doc. Retrieved: 5 December 2001.

Wiley, D.A. 2006. *The current state of open education resources.* Online: http://opencontent.org/blog/archives/247. Retrieved: 29 March 2006.

Wilson, I. 1992. Teaching decision makers to learn from scenarios: A blueprint for implementation. *Planning Review.* 20(3): 18-23.

Wilson, I. 1998. Mental maps of the future: An intuitive logics approach to scenarios. In Fahey, L & Randall, R.M. (eds.) 1998. *Learning from the future. Competitive foresight scenarios.* New York: Wiley, John & Sons, Inc.

Wößmann, L. 2003. Specifying human capital. *Journal of economic surveys.* 17(3): 239 – 270.

Wolff, M.F. 1999. In the organisation of the future, competitive advantage will lie with inspired employees. *Research Technology Management.* 42(4): 2-4.

World Bank. 2000. *Higher education in developing countries. Peril and promise.* Washington D.C.: The World Bank.

World Wide Web Consortium 1997 Extensible Markup Language (XML). Online: http://www.w3.org/XML/ Retrieved: 4 February 2002.

World Wide Web Consortium 2001 Extensible Markup Language (XML). Activity Statement. Online: http://www.w3.org/XML/activity . Retrieved: 4 February 2002.

Wulf, W.A. 2003. Higher Education Alert. The information railroad is coming. *Educause Review.* 38(1): 12 – 21.

Yashwantrao Chavan Maharashtra Open University. 2006. Online: http://www.ycmou.com/. Retrieved 15 May 2006.

Young, B.A. 2002. The paperless campus. In trying to make a campus "paperless," you will end up needing to buy more paper along the way. *Educause Quarterly.* No. 2: 4-5.

Zemsky, R. & Massy, W.F. 2004. Thwarted innovation. What happened to e-learning and why. *Final report for the Weatherstation Project.* College Park: The Learning Alliance at the University of Pennsylvania.