

Sharing Understandings of Information Systems Development
Methodologies: A Critical Reflexive Issue for Practice and
Curriculum

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ABSTRACT

The University of Manchester

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Most contemporary organizations make use of computer-based information systems to support their management activities. There is considerable evidence that many of these systems experience problems during the development phases and a large proportion of these systems may, using specific criteria, be classed as failures. The reported high level of such failure in the development of computer-based information systems is not a new phenomenon for business, having been present almost from the inception of these systems. The frameworks that guide developers through the process can be labelled as information systems development methodologies, or ISDMs.

For an educator involved with the teaching of some or all aspects of the development process this perceived high level of failure of systems development and implementation in practice raises some significant concerns. If there is a 'silver bullet' approach that students need to be equipped with to become successful systems developers we need to identify it and ensure that they are proficient with it. If there is no silver bullet we need to acknowledge this in our teaching and equip the students with the critical thinking skills to help them appreciate this in their later practice.

This thesis takes as its central theme the view that there is currently no 'silver bullet' and one may never be found to fit all development projects and environments. Under such a constraint our students, as would-be practitioners, need to be helped to approach practice unfettered by a naïve belief that there is a single approach that offers guaranteed success in the development of information systems. Flexible, contingent and possibly creative approaches need to be fostered so that students can both work in the field and can contribute to both the overall understanding of that field and to their own personal development.

The thesis considers the role of multiple perspectives, constructivism, language, communication and reflection as vehicles to allow the building and sharing of accessible understanding of information systems development methodologies in a tertiary education setting. The issues are explored through the design and development of a Masters course titled 'Information Systems Development Methodologies' that was designed and implemented at the University of South Australia in the period 1999 to 2008.

The course was initially designed within an interpretivist paradigm and rather than following a traditional systems analysis and design path could be viewed more as a liberal arts course. However, as the course moved towards the end of its life it began to take on a more positivistic flavour.

The story of the course emerged from a series of action learning cycles and is told from the perspective of the author who was both the researcher and the subject of the research.

DECLARATION

No portion of the work in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

David Anthony Banks

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DEDICATION

Special thanks must go to my partner, Ann Monday, who has always been there, despite pursuing her own research and publications, to listen patiently and actively, to provide critique and to share ideas. This thesis would not have been completed without her support.

Many people have influenced my career in education, and hence, directly or indirectly, this specific piece of work. Acknowledgements for the earliest influences must go to those members of the Adult Education Department at the University of Leeds who recognized my thirst for learning about education and provided me with opportunities, support and encouragement. Reg Marks provided a valuable grounding in psychology and sociology and also encouraged me, as an applicant with a non-standard background, to apply for a place on the Diploma in Adult Education. George Hauger and Norman Jepson, as senior academics, accepted his recommendation and were always helpful and supportive. My fellow students on the Diploma course were a delight to study alongside and the shared stories from such diverse educational areas as prison education, youth counselling, industrial training and professional cookery training provided a valuable insight to the broader educational sector.

Stuart Marriott taught me to appreciate the value of history in education during the Diploma and later, as my M.Phil. Research Supervisor, was always there to encourage me when I struggled with the conflict between part time research activities and the pressures of a full time job. The historical perspective he engendered coloured much of my later thinking.

In more recent times Trevor Wood-Harper has been a valuable source of ideas and literature. He stayed with me through the political turmoil when he moved from the University of South Australia and I sincerely thank him for that.

My small band of IS colleagues at the University of South Australia provided opportunities to test ideas and discuss PhD issues relating to both content and approach. Our informal mutual support sessions were always characterized by openness in the sharing of ideas and literature and provided a venue for the exploration of issues that were often surprisingly common to our individual areas of interest, although with very different orientations and interpretations. Particular thanks go to Don Falconer and Chris Stewart for those stimulating conversations.

Thanks also go to Michael Gendron for providing me with access to computing facilities in the final stages of the work when I was based in Connecticut.

I must also thank all of the Information Systems Development Methodologies students who coped with the juggling (both real and metaphorical), the art and film critique, the study of chess piece design, the musical interludes, the role play sessions and the other often improvisational activities that formed the basis for the sometimes unexpected journeys of exploration that we undertook together over the years. It was a delight to informally meet with those students who wished to follow up ideas after the course was completed and these discussions sometimes resulted in the joint publication of conference papers. They justified my belief that learning is both a two-way and a lifelong process.

The Author: a brief biography

My first career, starting as an apprentice, was with British Telecom where I was involved with a variety of tasks including the implementation and first-line maintenance of speech, music, data, commercial television and security video systems. The transition from engineer to educator began when I took a role as a part-time Civilian Instructor with the Air Training Corps, teaching radio and radar to cadets. I later moved to the non-vocational adult education sector where I taught part-time evening classes in the subjects of computer programming (BASIC), home electrics, practical electronics and computers in society. I was fascinated by the educational process and completed a basic adult education course that was offered by the Yorkshire and Humberside Council for Further Education. This whetted my appetite to learn more about teaching and learning and I attended part-time sociology and psychology courses at the University of Leeds. I was encouraged by the lecturer of those courses to apply for a place on the Diploma in Adult Education and was subsequently accepted. The Diploma was completed in 1981 and was followed by completion of a Master of Philosophy, by research, in 1985 also at the University of Leeds. The M.Phil. focused upon the curriculum development aspects of non-vocational computing provision. Domestic personal computers had only just become available at that time and I was interested to see how educational provision was being developed, in terms of content, curriculum, recruitment of tutors and longer-term planning, by the non-vocational educational providers. During this period I wrote, edited and co-presented two series of radio programs for BBC Radio Leeds. The first series of programs ('Abacus', broadcast in 1982) had a technical flavour and was aimed at individuals who had acquired personal computers, while the second series ('Countdown to 1984', commissioned and broadcast in 1983) considered some of the possible future impact of computers and information systems upon society. I was also appointed by the Open University as a part-time Associate Student Counsellor.

In 1986 I decided to make a career change from British Telecom to the higher education sector and I secured a full time appointment at the Humberside College of Higher Education in Hull. I taught a wide range of subjects, initially technical in nature (computer systems architecture, database design, communications and networking) but gradually became involved with other subject areas including communications and project implementation, project management, decision support systems, IT for chemists, IT for housing administrators and the Effective Learning Program. As a result of involvement in the latter area I became part of the team that successfully gained significant funding from the Enterprise in Higher Education scheme and helped to design and deliver a range of workshops and seminars to encourage faculty to identify and adopt innovative approaches in their teaching.

I spent 1993/4 in New Zealand at the Auckland Institute of Technology as a Visiting Research Fellow, again working closely with faculty to help identify individual and group research projects and to encourage them to prepare for the institutions forthcoming change to University status. During that period I also taught Management Information Systems and Strategic Information Systems subjects on the Henley Management Executive MBA program that was offered in New Zealand. I returned to the UK for a short period before moving to Australia in 1998 to take up a position with the University of South Australia. Courses taught there included E-Business, E-Commerce, Project Management, Approaches to Office Automation, Contemporary Issues in IT/IS, Information and Systems for Competitive Advantage, Collaborative Information Systems and Information Systems Development Methodologies. It is the latter course that forms the focus for this thesis. The final writing-up stage of the thesis was completed in the USA where I was a Visiting Research Scholar at Central Connecticut State University.

CHAPTER 1: INTRODUCTION

This chapter provides an introduction to the central elements and themes within the thesis and indicates how these will be developed within the overall structure.

The thesis addresses the complex issues of ‘what’ and ‘how’ to teach in the subject area of Information Systems Development Methodologies (ISDMs) and is explored through the eyes of a practicing educator involved in the development and teaching of an Information Systems Development Methodologies course at an Australian university.

The thesis charts a journey of exploration as the ISDM course was developed and refined over a period of approximately nine years with different perspectives, techniques and tools being progressively introduced to the learning landscape to help students develop a critical, inquiring and reflective view of the subject. The challenges and benefits of using eclectic multi-perspective and interpretive approaches grounded in constructivist learning are examined. It is argued that approaches that are designed to encourage reflection on the part of the learners also necessitate both continual reflection in action and reflection on action (praxis) to be undertaken by the learning facilitator. This reflective process generates sometimes deliberate and sometimes subconscious incremental changes in content and process, which, in turn can lead to the long term need for a significant review of the original design rationale.

A significant issue that will be addressed in the conclusion of the thesis is the way that a strong educational focus on constructivism may, over time, lead to dilution of the core ‘technical’ aspects of a course and result in a course that leans more towards liberal arts than computer science. The resulting potential tension between the emergence of an exploratory rather than prescriptive view of information systems development methodologies is examined from the perspectives of faculty, students and practitioners within the general ethos of a specific computer science school in the higher education sector.

1.1 The key themes

Three interconnected key themes form the core of this thesis, namely information systems development methodologies, education, and communication. The ISDM and educational themes can be visualised as two distinct but co-related themes connected by the communication theme in the general way suggested by Figure 1-1 (source: <http://www.fundraw.com/clipart/clip-art/00000805/Double-Helix/>).

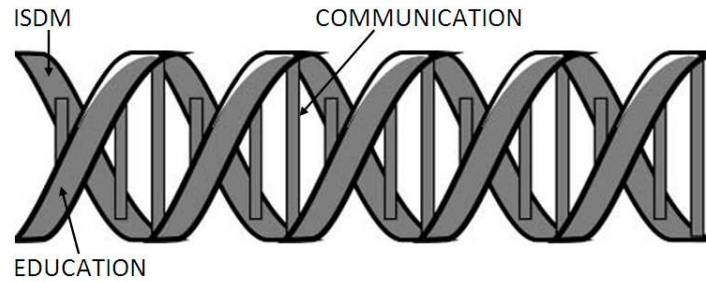


Figure 1-1: Broad visualisation of the relationship between the three key themes in the thesis

The linking communication theme relates to both the transfer of understanding of ISDMs within the information systems community and also to the communication between students, IS academics and IS practitioners. Although this underlying ‘double helix’ view of the relationship between these three areas serves as a useful allegorical device, a more detailed explication of the themes is introduced below as a prelude to further development in the main body of the thesis.

1.2 Theme 1: Information Systems and Systems Development Methodologies

In a world where business and society make widespread use of computer-based information and communication technologies to support or extend their activities the need for the design, development and delivery of computer-based information systems is increasingly important. The term ‘system’ is used here to broadly denote a collection of technical and human elements that are brought together in a specific environment to achieve some specific purpose. In the context of this thesis the term ‘system’ applies both to information systems as a focus for the learning activities and to the learning system itself.

The key technical elements of a business ‘computer system’ comprise hardware and software that facilitate the collection, storage, manipulation and output of data. In the context of this thesis this collection of hardware, software, network equipment and so on is regarded as Information Technology (IT). Most business computer systems are designed to be used directly by human beings and therefore these systems involve people, policies, processes and services. This total interactive collection of computers and people can be regarded as a socio-technical system and in the context of this thesis is regarded as an Information System (IS). The development of a socio-technical system requires attention to both the design of effective and efficient hardware and software and the ways in which these elements fit with the requirements of the human users. This mix of human and

computer components suggests that the design process will be complex and that multiple perspectives will be required to gauge the success, or otherwise, of such socio-technical systems. For example, from a technical perspective it is possible to construct a computer system that is faultless in operation but it may not meet the needs of the human users. Equally, the defects in a poorly designed computer system can be overcome by the creative nature of human operatives. The process of attempting to develop appropriately functional information systems in a timely and cost-effective manner can be pursued in a number of ways. It can be approached in a purely ad-hoc, system-by-system manner that is guided by the idiosyncratic skills and preferences of individuals or teams. Learning from practice becomes problematic in such situations because there is no consistency of action from project to project leading to difficulty in identifying and incorporating underlying reasons for success or failure. At the other end of the spectrum of possibilities is the adoption of a rigidly prescribed path that details and mandates every step along the way. In this situation blind rule-following or fetishistic behaviour (Wastell, 1996) may inhibit learning with failures being attributed to the mandated practice rather than the actions of individuals or prevailing environmental circumstances.

Between these two poles there is a large number of information systems development approaches that offer frameworks that claim to be applicable to projects of differing sizes, complexity, technological novelty and so on. The availability of possibly thousands of artefacts described as ISDMs can pose a problem for developers who wish to choose one that may offer the best opportunity for a successful outcome. No single ISDM appears to offer a repeatable guarantee of success and there is thus a need to have some mechanism that allows detailed comparison of the various ISDMs that are available. Detailed but rather simplistic comparisons typically use a 'tick-box' approach where features such as number of steps, level of documentation etc are used. This quantitative approach can reveal differences between the various ISDMs but provides limited insights to the nature of ISDMs in the broader sense. Other commercial and academic literature offers a broader approach to facilitate comparison of ISDMs but they often utilise relatively complex or sometimes contradictory language. For example the word 'methodology' is itself presented in a number of different ways depending on the background of the writer and this word is also frequently used interchangeably with 'method'. This may appear to be a minor linguistic issue but, as the next chapter will discuss, any comparison process needs to include tangible elements of ISDMs (tools and techniques, or 'methods') as well as less tangible elements (philosophies). Part of the ambiguity stems from the historical origins of ISDMs where computer science and business worldviews can be identified. Much of the

literature is written using academic or specialist language and for practitioners with a non-academic background this can prove to be troublesome. This proved to be even more problematic for students who participated in the ISDM course at the heart of this thesis because many of them had English as a further language.

There is a commonly held, (eg Arnott, 2004a; Nash, 2004; Knights, 2004; Standish Group Reports) although complex and debateable, view in the literature that significant numbers of information systems development projects fail to meet the commonly stated key required targets of time, cost, and functionality. This appears to be despite the existence of an abundance of literature advocating ISDMs. If the global level of the failure is as high as reported then the cost to business for these failed systems can be conservatively viewed as representing billions of ineffective pounds/dollars every year. This is not a recent phenomenon, rather it is an enduring story that has been told since computer-based information systems first emerged. The next chapter of the thesis expands the story of the expansion in the number of ISDMs over a period of time, examines the way that the language within the domain reflects the origins of particular approaches and considers ways in which the artefacts collected under the umbrella term 'ISDMs' can be compared as a prelude to eventual choice. Two significant aspects of ISDMs emerge, namely the underlying philosophy which influences the thinking of the developer and the tools and techniques that are used to operationalise that thinking within the context of the broader development environment.

1.3 Theme 2: Systems Development and Education

Two associations can be identified when considering education in relation to systems development. The first is a characterization of an educational course as a system, that is a collection of parts brought together to achieve some defined purpose within a specific organisational setting. The second, following from the first, is the notion of an information systems development methodology being used to develop the course. If the focus of the course is itself concerned with systems development there is a reflexive connection between the subject of the course, the design of the course and the implementation and modification of the course in terms of both content and teaching and learning approach. The involvement of the researcher as an integral part of the development and delivery of the course thus represents both reflection-in-action and reflection-on-action, or praxis.

For an educator charged with developing a course to help students understand information systems development methodologies a useful starting point in the design process is the reported level of failure in practice. This, contrasted with the large number of available

ISDMs and the apparent difficulty in selecting a viable ISDM, creates an interesting dilemma in terms of where to focus the learning. A spectrum of possibilities exists, ranging from an extreme positivistic position that would advocate a single solution accompanied by appropriate training, through to an extreme interpretivist view that would resist the idea of an optimum solution and instead concern itself with the problem situation rather than with a possible solution.

The positivist end of a spectrum of possibilities is most likely to be grounded in a purely practical and doctrinaire approach that would take for granted the efficacy of the methodology being taught and concentrate upon ensuring that the students became proficient in following a mandated set of procedures. The procedures may be drawn from a specific ISDM in the 'real world', may be a synthesised version based upon an actual or interpreted understanding of real world ISDMs, or may be an ISDM developed by the academic themselves. The underlying educational belief here would be predicated on the view that the chosen ISDM is viable in practice and that the students should gain practice in working with the ISDM to prepare them for the workplace. The educational philosophy here may be to lean towards a view of education as a knowledge transfer and skilling process that is often labelled as the 'sage on the stage' approach.

A possible middle path would be to select a number of methodologies from the available range and to provide the students with a working familiarity with each of them. Here the underlying educational belief may be predicated on a view that there is an ideal solution but that it may not be obvious and that the key is to be able to arrive at an informed conclusion in the face of multiple options. Having a practical familiarity with a range of ISDMs would provide the students with workplace skills and may allow them to blend or switch between the various ISDMs. There is still an implied belief that one of the possible options will actually be appropriate. The educational approach here contains much of the 'sage on the stage' but also recognises the need for promoting flexibility of approach and an awareness of a range of possible options rather than promoting an 'optimum' solution.

At the interpretivist end of the spectrum there exists an opportunity to explore the possibly more philosophical than practical issue of why it is possible to have so many approaches available when none of them appear to confer the user with a strong confidence in a successful outcome. Such an approach would not focus so much on detailed understanding of any particular ISDM but more upon the paradox of many proffered solutions, none of which appear to guarantee success. An educational approach driven by this worldview could be manifested as the 'explorer' mode where both teacher and learner set out on a

journey of discovery with a general idea of where they want to be but with no pre-defined path or permanent leader. Outcomes would be the result of discussion and consensus, with external evidence being carefully and critically weighed, with an overall objective of achieving not only an understanding of the course content but also an appreciation of social constructivism and its relevance to individuals as potential systems designers. The educational approach that influenced the design and implementation of the specific course that forms the focus of this thesis accords most strongly with this 'explorer' mode. It is recognised however that students and faculty are not equal, the invested power of the member of faculty leading to political inequality.

All of the above approaches are viable and practical course designs that emerge will be predicated upon the characteristics of both the system within which the course is being developed and by the worldview of the developer. In common with the development of ISDMs the approach adopted relates to the underlying philosophy of the system developer and this in turn will influence the choice of tools and techniques that are adopted to operationalise the course within the broader educational environment. In this instance the course was developed from an interpretivist perspective and framed in a constructivist teaching and learning frame.

1.4 Theme 3: Communication

The communication of any set of ideas that includes beliefs, values, ideology and so on will be subject to potential distortions at many points along the communication path from ISDM designer or user to other potential users and also from faculty to student. These distortions may occur where the original ideas are translated in communicable form, within overall the communication channel or channels and at the point where the ideas are ultimately received and interpreted within the context of the receiver. It is argued that these distortions, combined with weak feedback mechanisms, in the communication of ISDMs from originator to end user and faculty to student pose a significant obstacle for learners because the distortions can disguise or selectively diminish significant aspects of the ISDM. Communication channels that will be considered here include self-to-self (personal reflection), face-to-face conversations, published papers that are peer reviewed through a gate-keeping mechanism and multiple paths from original writer through to eventual recipient. It will be argued that these mechanisms introduce interpretive distortion, omissions, re-interpretations, re-contextualisation, linguistic aberrations and selective filtering in the communication channel. All of these lead to a situation where the meaning as understood by the originator of the document may be lost or selective parts of the

message may be lost. For example, descriptions of actions, methods, tools and techniques may pass through the channel relatively undistorted while the philosophical component may be un-transmitted or weakened during transmission. If, as will be argued, a constituent part of ISDMs is the rationale, or philosophy, and this is distorted or lost in transmission then recipients will be denied the full data with which to attempt to carry out evaluations of the efficacy of an ISDM or to compare ISDMs. If parts of the totality of constitutive elements of an ISDM are lost in the transmission process it is important for educators, students and practitioners to be aware of this and to develop strategies that attempt to re-constitute the original material. This will require the consideration of multiple sources of literature to identify potential filters and other sources of distortion. The specific language used within the academic community can also be a barrier to communication and some way of ‘translating’ that language to more everyday language or signs needs to be considered to remove another layer of potential obfuscation. This theme of signal distortion will be explored to greater depth in a later chapter.

1.5 The actors of interest

There are three groups of actors of interest in this thesis: faculty teaching in the area of ISDMs, students engaged in the study of such courses and ISDM practitioners.

Faculty are typically responsible for designing and/or delivering ISDM courses. A course can be regarded as content, assessment tools and the tools and techniques used to deliver the course. Faculty may also be responsible for the design of ISDMs or be involved with consultancy in the ISDM area either as individuals or in partnership with practitioners. If faculty are engaged in studying the role and application of ISDMs in external organizations they may also be regarded as students.

Students may be regarded as potential practitioners and, particularly in the case of mature students studying Masters level courses, may bring with them some previous experiences with systems development. If students are viewed as potential practitioners the role of education may be seen as equipping them to deal with the complex world of ISDMs in practice. If they have some previous experience then the role of education may be to help them to reflect on their experience with ISDMs and to critically consider the efficacy of that previous ISDM in the light of available ISDMs.

Practitioners are those people engaged in daily activities connected with information systems development process and who are consumers or creators of ISDMs. Practitioners may have been students of higher education, may choose to re-enter education after some period in practice and become students, may employ students or may contribute to learning

via guest lectures. Information systems developers are thus intimately linked with higher education. Gill and Bhattacharjee (2009) note that

“ ... the community of MIS practitioners is a highly desirable client of the MIS discipline because this community can supply resources to the discipline directly, through consulting and grants, or indirectly, through employing graduates, which serves to increase the perceived value of, and demand for, MIS education among future students.” (Gill and Nhattacherjee, 2009, p.218)

All of the actors operate around the literature relating to the field of systems development and draw from and contribute to the collection of theory and practice available to a community who share a particular area of interest (ie a Body of Knowledge, or BOK). The disciplines of Software Engineering (SE) and Project Management (PM) have clearly defined and publicly available BOKs (although they acknowledge that they can never contain all knowledge relating to each discipline or field) but the Information Systems (IS)

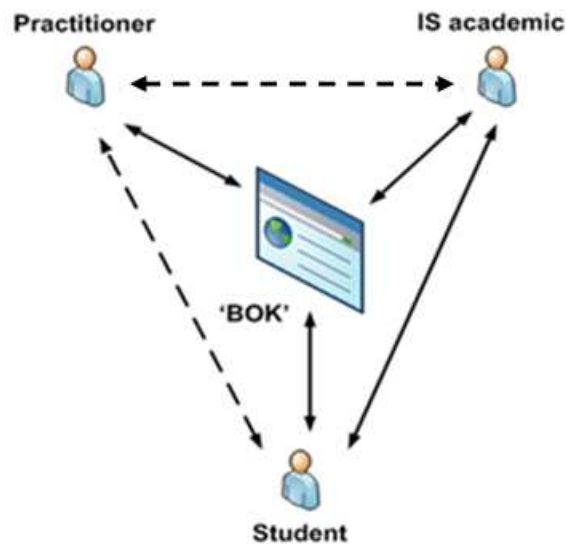


Figure 1-2: Relationships of actors through a BOK

field does not yet appear to have a fully formed BOK. The literature that may be regarded as the basis for the IS BOK is diffusely spread within the broader literature relating to the wider information technology, software engineering, project management and business arenas. The dotted lines in Figure 1-2 indicate the interchangeable roles of the student as potential practitioner and practitioner as potential student and faculty as practitioner and vice versa. The solid lines indicate communication paths linking the actors and between actors with the notional BOK acting as a significant communication node.

1.6 The role of Reflection

All three of these actors typically engage in reflection as they review the practical outcomes of previous plans with a view to identifying lessons that could be learned for

application to future situations (reflection on action). As well as active and possibly formal post-event reflection there may be ongoing personal reflection during the execution of plans, that is reflection in action.

For the reflective practitioner one formal post-event reflection point is the Post Implementation Review (PIR) that would normally be incorporated into any project development plan. However, in practice a PIR may not take place when practitioners involved in multiple simultaneous projects have to rapidly move their focus of attention to the next immediate project, where projects have long durations and multiple contractors or where there is no funding for the process (New South Wales Treasury, 2004). For practitioners reflection in action may therefore be more significant than reflection on action.

For students opportunities for reflection are also typically most evident at the closure of points in a course of study when assignment work is completed and returned to them with feedback from the marker. The feedback will identify strengths and weaknesses and this should allow students the opportunity to modify future actions. One observed problem here is that grades appear to have become the only real measure of outcomes for many students, evidenced by the number of students who do not collect returned and commented work. It would appear therefore that a useful strategy would be to include opportunities for reflection into contact time sessions and this was deliberately incorporated into the design of the course that forms the focus of this thesis.

For the educator and researcher reflection is a vital activity as past experience is weighed against potential alternatives and deliberate and accountable action is taken as a result of that process. At the end of each course students provide formal feedback to aid the reflective process even though formal course evaluation instruments are rather unreliable, given their focus on teaching rather than learning. The quality and quantity of feedback is also usually quite limited. Less formal contact with students during and after sessions provides more useful ongoing feedback that can be considered and appropriate actions incorporated on an ongoing basis wherever feasible. For the researcher and educator attending conferences that have IS and educational themes also provide opportunities to verbalise reflections with other educators and to receive comments that also provide input to the reflective process. Listening to and reading about the experiences of other educators at such events provides opportunities for consideration of alternate philosophical positions as well as practical tools and techniques.

Terms used to describe the various reflective loops include surface and deep learning in educational literature and single and double loop in other literature. The outcome of such reflective actions on the part of all three groups of actors may lead to a number of possible outcomes. One outcome may be that the reflections lead the individual to decide that their actions were appropriate and no future changes to behaviour or actions are required. A second possibility is that minor procedural modifications are incorporated into future plans (surface learning/single loop). A third possibility is that a much deeper consideration of the broader value systems within which the plan was developed may take place leading to longer term changes of behaviour or approach occurring (deep learning/double loop). Although the language used to describe the reflective practices of students and practitioners differs the reflective patterns mirror each other as suggested in Figure 1-3. (Faculty are regarded here as both learners and practitioners). The ‘mirror’ has been located within the context of Information Systems as an applied area of interest and both sides of the mirror will be considered in more detail in chapter 5 of the thesis.

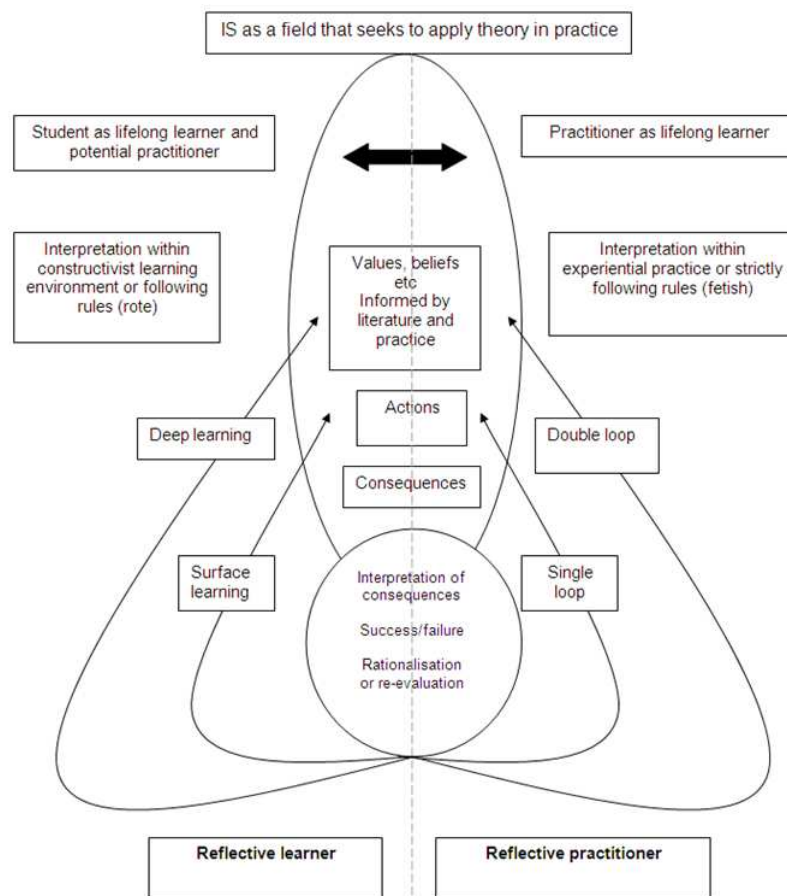


Figure 1-3: Holding a mirror to student-practitioner reflection

1.7 Underlying research issues

The key issue that emerges from the considerations above is:

Given the evidence of a considerable body of literature describing and extolling the merits of a wide variety of artefacts identified as ISDMs, how can we help students reconcile that position with the equally voluminous evidence suggesting that they repeatedly fail to deliver systems that meet prescribed business requirements?

This apparent contradiction forms the principal rationale for the development of the specific ISDM Masters course at the heart of this thesis and leads to a further more specific educational question:

If no particular ISDM can be shown to confer any great advantage to a practitioner, how should we approach the development and delivery of an educational course for students who may eventually become part of the systems development community?

As will be highlighted in Chapter 2 the information systems literature identifies two distinct elements of development methodologies, namely an underlying philosophy and a set of tools and techniques that are enacted within or guided by that philosophy. Given that an educational course can be considered as a system it will be argued that a methodology will be used to develop this specific kind of system and that these two elements will also be present. The predominant educational philosophy used by the author for over a decade can be characterised as one that encourages and supports the social construction of meaning by the learners. This constructivist approach formed the basis for the development of the ISDM course and the tools and techniques that were adopted over a period of time were influenced by this philosophy. However, as will be discussed in the research approach chapter, the researcher has also operated within highly structured, engineering environments where he was philosophically aligned with a more positivist position. Two interesting issues emerge from this history of occupying two distinct philosophical spaces. The first issue relates to the espoused position versus the position adopted in practice, that is to say, the relationship between intention to practice within a particular philosophical framework and actual practice. The second issue relates to the tension potentially caused when adopting what may be regarded as a liberal arts approach within a teaching and learning environment predominantly oriented to a more science and engineering approach.

Exploration of these research issues was carried out during the course design and development process and subsequently during the implementation and revision of the course over a number of years. During each new version of the course additional literature was identified that suggested possible alternative directions and this was incorporated into

practice on an ongoing basis. In the reflective period between iterations new tools and techniques identified either during the delivery period or during the post-delivery reflective period were evaluated and, where it was felt appropriate, incorporated into the subsequent iteration. It is quite difficult to accurately map the exact process of development because reflection was both post-event and contemporaneous and these reflections tended to merge into a continuous process of educational praxis. The development process was located within a set of 'Russian doll' boundaries, that is the boundaries lay within a program of courses and that was, in turn, located within a School, located in a Division, ultimately housed within the overall institution of higher education. The development process was thus constrained to some extent by the multiple shells of the environment and had to be presented, at least at the formal documentary level, as a highly structured artefact that conformed with institutional norms and expectations. However, once in operation, although being cognizant of these over-arching educational expectations, actions could be characterized more as an agile development process.

The foregoing issues relate largely to the design and implementation of the course but one, unanticipated, issue emerged during the process of writing the thesis and reflecting on the developmental history of the course. Although the course was deliberately designed to take a 'soft' approach to the subject the need to answer questions about the comparison of ISDMs led to consideration of the use of more positivistic approaches. The dilemma that began to emerge was that although it was felt that a useful course had been produced and executed it was perhaps too liberal an offering for the School of Computer and Information Science within which it was eventually located. The final issue that unexpectedly emerged at a late stage in the thesis development was:

Can a liberal arts approach be justified in the implementation of a course that is located within a school of computer science and that has as its focus ISDMs which are essentially used to develop computer-enabled systems?

This issue forms the central focus of the final chapter of the thesis.

1.8 Research Aim

The overall aim of the research that emerged from the issues above was thus:

To take a critical and reflective view of the development and subsequent multiple iterations of a higher education course that has information systems development methodologies as its core focus and that is developed from an espoused philosophical position of constructivism within a school of computer and information science.

1.9 Research objectives

The development and implementation of the ISDM course, and hence this research, required that a number of specific research objectives be attained:

1. Critical review of the history of ISDMs, emphasising the business and computing influences and the difficulty in placing boundaries upon developmental eras.
2. Identification of ambiguities in the language used in the literature describing ISDMs that have arisen from the historical development of the field.
3. Critical examination of the problems that lie in the communication paths that link ISDM originators or practitioners with other interested parties, particularly via publication routes and the development of strategies for helping students deal with such problems.
4. Identification and understanding of the way in which an underlying philosophy influences the design and operation of a higher education course designed to explore information systems development methodologies.
5. Development of tools and techniques that promote critical, reflective and problem-based learning within the underlying philosophy.
6. Monitoring and critique, through reflective practice, of any changes that occurred in the authors' philosophical positioning as a result of the adoption of specific tools and techniques.
7. Critique of the course development approach and implementation within its specific development environment. Although this was not an original research objective, as noted above, it emerged as a significant point during the research process.

1.10 Broad significance of the research

From a business ISDM perspective it is recognised that it would be extremely difficult to demonstrate beyond doubt that ISDMs are a major factor in systems development failure but as an integral part of the overall process they clearly have the potential to significantly negatively impact on the overall development and delivery of information systems. The losses reportedly sustained by the business community are substantial and any improvements, however minor, to the efficacy of the development process could yield significant dividends in terms of cost savings, reduced delivery times and greater match with intended functionality. As increasing emphasis is placed on the governance of IT and IS in organizations it will become increasingly important that efficient, effective and appropriate efforts have been made to create and implement new systems. The previous

levels of failure may well become the focus of renewed scrutiny as governance-driven reporting mechanisms start to focus more publicly on return on investments (ROI), total cost of ownership (TCO) and the overall strategic value of information systems. Changes in IS management structures and roles in response to the increasing emphasis on governance will require future IS workers, including those engaged in systems development, to be able to demonstrate that their choice of approach and subsequent practice was based upon a clearly determined and defensible strategy rather than simply ad hoc or custom-and-practice.

From an educational perspective it is important that the debate concerning exactly what subjects should be taught in the IS field remains active and becomes more visible. There would appear to be little point in teaching students a specific ISDM if it cannot be demonstrated that it is either used extensively in practice or is effective. Helping students to understand, and reflect upon, possible causes of failure and to appreciate and begin to compare the wide range of ISDMs available to them may produce future practitioners who are able to adopt a holistic view of the domain. This is not to argue that specific ISDMs should not be taught. Employers do place stress upon receiving a trained workforce from modern universities and thus it is important that students do have ISDM-related understanding and can contribute to the workforce. My concern is that there does not appear to be any clear indication which particular ISDM, if any, should be taught. Even if one is taught it may not transfer into the workplace due to the often mandated ISDMs that may already be in place in specific work settings. It is for this reason that the approach taken in the course that forms the focus of attention for this thesis is more about helping students to identify the complexity of the real-world development environment and to bring a broader and more creative view to bear on systems development issues.

From the communication perspective it will be argued that there are a number of inherent distortions in the communication channels typically used to convey considerations of ISDMs from original designers to eventual recipients, be those recipients faculty, students or practitioners. These distortions arise as a result of interpretive effects at one or more points along the communication path, and through omissions, re-framing or subjective filtering resulting from the actions of gatekeepers. The outcome may be such that selective attenuation of parts of the signal path leads to situations where there is insufficient data to carry out informed comparison of ISDMs as part of a selection process. The mixture of specialist, highfalutin, imprecise or ambiguous language used by different

parties in the ISDM literature can also hamper understanding, particularly for readers who may have English as a further language.

1.11 Significance for the key actors

For practitioners of systems development: Much of the thinking and debate in this thesis would also have direct relevance to MBA style courses where students may be active practitioners. This claim is based on actual medium-term experience with a system development project in Adelaide. It was clear from my involvement in that project that the problems of ISDM identification, selection and implementation are significant and do impact upon actual or perceived success and failure. The details of the project cannot be accommodated within the scope of the thesis but have been reported in Appendix 6. 'Practitioners' can also be viewed as 'students as potential practitioners' given that the research and teaching activities relate to Masters students at an institution of higher education.

For students: Students are increasingly required to be able to demonstrate work-related skills to employers. Designing ISDM courses is particularly problematic because it is difficult to decide exactly what skills to furnish students with. If there was a clear-cut ISDM that would always work, or a widely used industry standard, then clearly it could be argued that higher education should train them in the use of that ISDM. However, if there is no demonstrable 'silver bullet' but students are still trained as though there were, we are in danger of simply indoctrinating them in an ISDM favoured by the individual member of faculty. The argument developed here is that a favourable alternative is to help students appreciate the potential problems in any ISDM and to be able to look for similarities between all ISDMs in a way that helps them build a repertoire that appreciates the needs of the users, the system owners and the developer. It is argued that providing them with an understanding of the complexity of the subject and also with some basic tools that help them to take creative and flexible approaches offers viable employment skills in the systems development arena.

For faculty: The thesis tracks the quite subtle changes in philosophical direction from the initial conception of this educational provision and how this impacted upon the potential relevance of the original design. All educators are located within a worldview that influences the way that they design and deliver courses. The thesis identifies the need to ensure that ongoing self-reflection is vital to the growth and viability of courses over time. The outcomes of such self-reflection may mean that the views developed are at odds with that of the overall institution and decisions need to be made about the personal response to

such potential conflicts. Uncritical adoption of institutional trends of constructivism, training-centred approaches, case-based initiatives, problem-based experiential learning and so on without due reflection and reaction may lead to fetishistic adherence to such initiatives. The ISDM literature suggests that such blind rule-following is detrimental to the creativity of the individual involved and does not necessarily produce appropriate systems in practice. All educators engaged in the systems development area therefore need to learn from the subject they are involved with and to reflect on the lessons that can be learned from practice in their field of interest.

1.12 Words, language and changes in thinking

Language is a significant issue in this thesis. As will be demonstrated, there is considerable ambiguity in some of the key terms used in the systems development, and indeed research, literature. One prime example is that of the use of the word ‘methodology’. This word is often used interchangeably with ‘method’. In conversational settings this may be only a minor issue but the words ‘method’ and ‘methodology’ are taken as having specific meanings in the context of this thesis. Method here is seen in the sense of a recipe or set of instructions, with methodology referring specifically to the idea of both a method and an underlying philosophy, in other words both the ‘how’ and the ‘why’. This may seem to be rather pedantic, but it is an important distinction to make in the context of the overall theme of this thesis. The underlying view subscribed to by the author is that an ISDM comprises both a philosophy and a collection of complementary tools and techniques.

In referring to the thesis author a number of descriptors are used. Use of term ‘the author’ clearly refers to this particular writer but provides that sense of distance from the writing and research, ie a relatively objective position. However, the use of the personal pronoun ‘I’ in some places is used to indicate that the perspective is more personal and reflective in nature in line with the autoethnographic research approach adopted. This issue will be elaborated in the Research Approach chapter.

References to the role of those (including the author) engaged in the teaching aspects of educational practice include ‘educational practitioner’, ‘learning facilitator’, ‘academic’ and ‘faculty’. The latter term was included quite late in the writing as a result of my time spent at a US university in late 2009. The US convention is to refer to those who are involved with educational processes as ‘faculty’ and those involved in the administrative aspects to be identified collectively as staff. In the Australian university where the course at the heart of this thesis was designed and implemented those engaged in teaching and administration were identified generically as ‘staff’. I have adopted the US terminology

because I feel that it alludes to the underlying politics of higher education and although power and politics were not initially seen as significant issues for the thesis they gradually assumed more importance in my thinking. As I worked through the development of the thesis I became more aware of the tension between my educational aspirations and beliefs and the broader higher educational environment within which I was acting. This ideological undercurrent does not receive specific attention in the thesis but has been identified here as another issue that, either consciously or unconsciously, influenced the teaching approaches and the research and writing of this thesis. The next section identifies the way that the words in the thesis title are being used.

1.13 Unpacking the title

‘Information Systems Development Methodologies’ (ISDMs) can be viewed as collections of documents that describe philosophical and practical frameworks that may assist practitioners in their endeavours to design and build information systems. Specific information systems of interest here are businesses information systems and educational courses.

‘Understandings’ is used to refer to worldviews and interpretations, these being communicated and shared through discussion and analysis of worldviews within in a social setting or through literature.

‘Critical’ is being used here in two senses, firstly in the common dictionary usage way that indicates ‘finding fault’ and ‘involving skilful judgment as to truth, merit etc’ and secondly in a way that refers to the notions of democracy and emancipation.

‘Reflexive’ is being used to signal three self-referent situations that form the core of this thesis. Firstly, the author, as a practicing teacher, is part of the subject and processes being studied and as such is engaged in both reflection on action and reflection in action in their teaching role. Secondly the educational course at the centre of the thesis has as its focus information systems development methodologies and is itself an information system that went through a development process. Finally reflexivity, or self-awareness, occurs at those points where the researcher/educator reflects upon how his position, presence, worldview, or characteristics might be influencing the research process.

‘Practice’ refers to the practice of systems development and the practice of teaching.

‘Curriculum’ refers to both the content of an educational course and to the way that content is interpreted and enacted.

1.14 Thesis structure

The key themes and their related chapters are shown diagrammatically in Figure 1-4. The arrows on the diagram indicate the threads of ‘philosophies’ and ‘tools and techniques’ that run through the chapters relating to ISDMs, education and to the research approach.

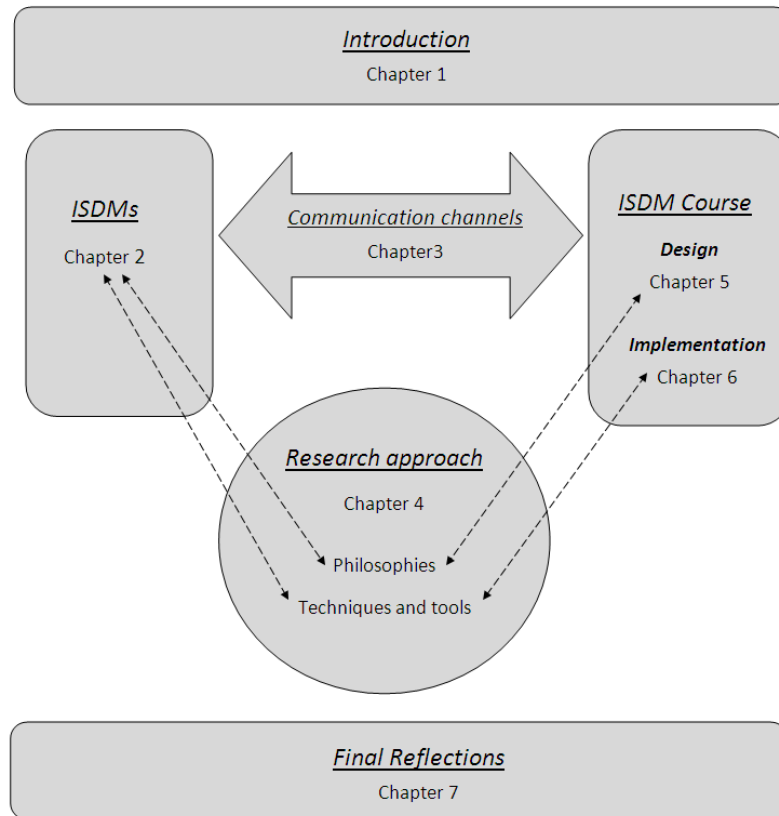


Figure 1-4: Thesis structure

Chapter 1: This chapter provides a general overview of the subject of the thesis and identifies the key themes and areas to be explored in the thesis. The key themes identified are ISDMs, education and communication.

Chapter 2 The language used to describe ISDMs is explored with an emphasis on the ambiguities that are present in the literature. The historical background that may help explain how some of this ambiguity arose is considered, using Avison and Fitzgerald’s (1995) popular characterisation of a number of developmental eras as a framework for consideration. The philosophical and practical aspects of ISDMs are identified as signifying elements and finally ways of comparing ISDMs using these two aspects are introduced.

Chapter 3 identifies the problems of distortion in the communication of ISDMs from originator to eventual user through a number of different types of channel, again noting the way that differential distortions apply to the philosophical and practical content of the

messages. The chapter uses basic data communication systems to introduce the key issues and then applies those issues to the communication of ISDMs through a variety of channels.

Chapter 4 examines issues relating to research methodology, drawing parallels between the difficulty of selecting ISDMs and the problems in selecting research methodologies. The themes of underlying philosophy and supporting tools and techniques identified in Chapter 2 are extended into the research methodology area.

Chapter 5 revolves around the design of an ISDM Masters course. The chapter introduces the environment within which it was developed and considers the impact of the educator's philosophical considerations upon course design. Issues relating to reflection in learning are explored as is the importance of praxis. Interpretations of the word 'failure' are explored and a ternary view is developed that accommodates the ambiguity attached to this word. The initial teaching and learning framework and core tools arising from the philosophical position are identified and explained.

Chapter 6 extends the previous chapter material into the practical (tools, techniques and practice) development and delivery of the course and is presented as a series of iterations over a number of years, punctuated by reflections on each delivery. The rationale for the progressive introduction of new literature, tools and techniques is identified and critiqued. The growing concerns about the increasingly liberal nature of the course direction are raised and the response that started to lead it in a more positivist direction is critically examined.

Chapter 7 reviews the history of the course and traces the changes in emphasis from a starting point firmly grounded in an interpretive and constructivist position through to serious concerns about this position. Future directions for such courses are identified as are future research directions. The chapter also reflects upon the journey that was the PhD itself and considers the lessons learned.

1.15 Publication activities associated with the research

This research did not take place in a vacuum and as part of the overall reflective process that forms a central theme in this thesis a number of papers exploring relevant areas were published during the development process. Four key publication areas were Education, ISDM, Interpretation and Practice and these publications provided an ideal opportunity to present ideas to a wider range of international colleagues and to benefit from their questions and suggestions. The peer-reviewed papers were presented at conferences or have been published in journals or as book chapters. Table 1, below, shows where these

papers, listed in order of publication date, have directly or indirectly contributed to the four key areas that exist within this thesis:

Paper	Education	ISDM	Interpretation	Practice
[P1]		X		X
[P2]		X		X
[P3]	X	X	X	
[P4]	X		X	
[P5]	X	X	X	
[P6]			X	X
[P7]			X	X
[P8]	X		X	
[P9]	X	X		
[P10]	X		X	
[P11]	X	X		
[P12]				X
[P13]		X		X
[P14]	X	X	X	
[P15]	X	X		
[P16]	X		X	
[P17]				X

Table 1: Peer reviewed published papers relating to this thesis

P1: Banks, D. A. 1999, Who Needs Methodologies? A Case Study of the Development of a Web-Based Information System, *Australasian Conference on Information System, (ACIS99)* Wellington, New Zealand, December

P2: East C. and Banks D. A. 2000, Development Strategies for Information Systems in Rapidly Changing Environments: A Novel Developmental Approach for a Council System, *Australasian Conference on Information Systems (ACIS2000)*, Brisbane, December

P3: Banks, D. A. 2001, A Multi Perspective Approach to Learning About Information Systems Development Methodologies, Systems in Management, *7th Annual ANZSYS Conference*, Perth, November

P4: Banks, D. A. 2001, Reflections on Interpretivist Teaching with Positivist Students, *Informing Science Conference*, Krakow, Poland, June

P5: Banks, D. A. 2002, Mapping Student Interpretations of Information Systems Development Methodologies, *8th Annual ANZSYS conference*, 'Management Approaches in Complex Systems', Mooloolaba, December

- P6:** Banks, D. A. and Monday A. 2002, Interpretation as a Factor in the Development of Flawed Spreadsheets, *European Spreadsheet Risks Interest group, EuSpRIG 2002 conference: 'Spreadsheet Roulette: the hidden corporate gamble'*, Cardiff, UK, July
- P7:** Banks, D. A. 2002, Making Sense of Future Knowledge Bases: Interpreting the Interpretation, *International Conference on Decision Making and Decision Support in the Internet Age, (DSIAge)*, Cork, July
- P8:** Banks, D. A. 2002, Structured Inquiry for Masters Students: A 'Philosophical' Approach, *Informing Science + IT Education Conference*, Cork, Ireland, June
- P9:** Banks, D. A. 2002, Developing an Argumentative Approach to Teaching Information Systems Development, *Information Resources Management Conference (IRMA 2002)*, Seattle, May
- P10:** Banks, D. A. 2003, Misinformation as a Starting Point for Critical Thinking, *Informing Science + IT Education Conference (InSITE)*, Pori, Finland, June
- P11:** Banks, D. A. 2003, Belief, Inquiry, Argument and Reflection as Significant Issues in Learning about Information Systems Development Methodologies, Chapter 1 in *"Current Issues in IT Education"*, ed Tanya McGill, IRM Press, ISBN 18003454332
- P12:** Banks, D. A. and Wheeler, S. 2003, Ethically Assessing a Complex IS Dilemma, *7th World Multiconference on Systemics, Cybernetics and Informatics (SCI 2003)*, Orlando, USA, July 2003
- P13:** Gokhale, G. B. and Banks, D. A. 2004, Organisational Information Security: A Viable System Perspective, *The 2nd Australian Information Security Management Conference, (InfoSec04)*
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1.16 Chapter Summary

Information systems are a significant feature of most modern businesses. Despite the existence of the large number of information systems development methodologies that have emerged over the past two or three decades the level of what is typically described as 'failure' has remained significantly high.

For an educator dealing with this subject area a number of issues arise, particularly exactly what should be taught in the face of a concern that we run the risk of teaching inappropriate or irrelevant ISDMs to future practitioners.

At the core of the thesis is a critical examination of one approach (constructivism) that was adopted to try to help the students appreciate issues relating to ISDMs in a more liberal than technical light.

CHAPTER 2: ISDMs: HISTORY, DEFINITIONS AND COMPARISON

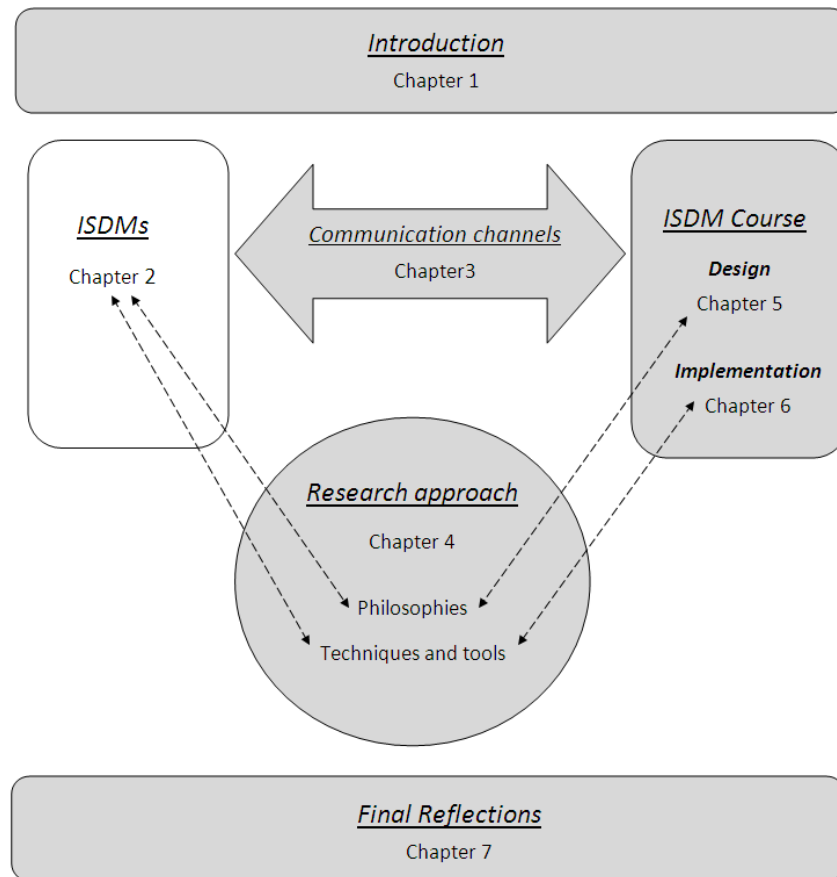


Figure 2-1: Chapter focus - ISDMs

2.1 Introduction

Three key interrelated themes central to the thesis were identified in the opening chapter, namely information systems development methodologies (ISDMs), information systems education and communication. Literature relating to the communications and educational themes is considered more fully later in the thesis as indicated in later chapters where they can be placed in context.

This chapter explores some of the issues that students and practitioners encounter when they try to gain an understanding of ISDMs. Questions about what they are, why they are used, how they are described, where they came from and how they can be distinguished from one other are examined. These questions are considered in the light of the tension

between the availability of a large number of ISDMs and the reported high level of failure of systems development projects.

2.2 What are they and Why are they used

Computer-based information systems comprise hardware, software, people and processes that, together, form key elements to support the operational, tactical and strategic functions of many contemporary organizations. For these organizations information systems are seen as a key component of their business model and are thus crucial to the overall growth or survival of the organization. Information systems are becoming increasingly complex as they connect globally, providing opportunities for round the clock business and for new collaborative models of operation. Developers of these systems are faced with development environments that may be complex and challenging, posing a mixture of technical and human elements that need to be carefully managed.

It would be entirely possible for a developer to simply talk with a client, gain an understanding of what they are seeking and then build a system to suit their needs on an impromptu basis. However, such impromptu or trial and error approaches may be wasteful of time (and therefore money in a commercial setting) if misunderstandings in requirements occur. Learning from mistakes may be problematic if no clear development path has been mapped out against which to check plans with actuality. Equally, successful outcomes could be attributed as much to luck as to any actions undertaken. Finally, explaining the rationale and processes underpinning their personal practice to others, including clients and subcontractors, who do not share the same background or experiences may also prove to be difficult. In defence of impromptu approaches it can be argued that for simple, small, short-time scale, low resource development projects with a small number of stakeholders they may prove to be appropriate. Such projects in the business environment, however, are the exception rather than the rule, many systems development projects having features of multiple and complexly linked components, a dynamic environment that can demand change, multiple stakeholders, medium to long time scales and high resource requirements.

Business information systems are therefore typically developed using some kind of guiding principles or frameworks that are typically referred to as information systems development methodologies (ISDMs). An ISDM can be regarded as representing individual and collective understandings, often represented in documentary form, whose purpose is to facilitate the use of consistent and repeatable patterns of action against which there is an opportunity to reflect so that lessons can be learned to inform future endeavours. Two key

reasons advocated for the use of formally documented ISDMs are that they provide a learning mechanism for capturing collective knowledge and experience (Stolterman, 1992) and they provide a common vocabulary for information exchange (Fitzgerald, 1998). Capturing collective knowledge within a professional field is clearly beneficial to those within the field, but only where it is communicated effectively. The notion of a common vocabulary is equally valuable but, as will be indicated later in this chapter, is problematic in practice. One would anticipate that the collection of relevant materials would be located in an easily accessible location, a BOK perhaps, and would be expressed in language that is unambiguous. However, ISDM-related literature is scattered rather than centralised, can be written with technical or business perspectives and language and so has the potential for ambiguity. Gaining an understanding of the range of ISDMs as a prelude to comparison and choice of ISDMs thus may become problematic.

2.3 How effective are they?

There is a large number of artefacts formally described as ISDMs which have the intended purpose of providing a practitioner with guidelines or frameworks along with techniques and tools to help them undertake the development process in a structured and timely way. Avison and Fitzgerald (1995) suggest that there are possibly several thousand ISDMs within the 'methodological jungle' (Avison and Fitzgerald, 1995).

Although there is a wealth of literature describing and advocating ISDMs there is an equally large body of readily available literature indicating that systems development projects suffer from a high failure rate. Many systems development projects do not meet some or all of the prescribed targets of time, cost and functionality. On this quantitative basis the projects can be regarded as failures. In other cases the technological infrastructure may be provided to specification but the broader needs of the business may not be met. Despite the clearly significant role that information systems play, and will continue to play, in business they have proved to be difficult to develop and implement in practice. If the success of information systems development is evaluated by the principal criteria of time, cost and functionality it is difficult to avoid the conclusion that very many information systems can only be described as failures. This litany of failures represents billions, and arguably trillions, of pounds/dollars wasted across the globe annually and may place organizations or people at risk. Some of these failures affect critical national support services, with examples in the United Kingdom including delays to an online hospital booking application (Arnott, 2004a), failures in the delivery and operation of the national firearms database (Nash, 2004) and severe problems with the implementation of a secure

national radio system for ambulance and fire service. (Arnott, 2004b). In the broader business community a well-known supermarket chain reported a £260 million write-off associated with IT and supply chain systems (Knights 2004).

In any given year in the USA there are approximately 175,000 computer-based information systems projects, with large projects typically costing several million dollars each (Standish Group, 2003). One survey of over 13,000 IT Projects (Standish Group, 2003) estimated that US corporations spent more than \$255 billion per year on software development projects of which \$55 billion was wasted on failed projects. Project success rate was just 34%, while the project failure rate was 15%, with 51% of projects suffering from cost overruns, time overruns, or a reduction in the features and functions delivered. The Standish Group (1995) reported that \$81 billion was spent on failed projects in 1995 with an additional \$59 billion spent on over-budget projects. Jones (1994) suggested that the average US cancelled project had consumed 200% of its anticipated budget at the time of cancellation. In more recent times the Standish Group (1998) reported that over one quarter of projects failed in 1998 at a cost of \$75 billion.

There are many possible explanations for these failures, including overly-ambitious and ill-advised projects that are disconnected from business objectives, poor initial risk assessment, overly-complex designs, lack of systems integration, poor management, mid-project changes in organizational goals or loss of funding due to external environmental effects. In a study of over 2000 computer-based information systems in sixteen organizations Lucas (1975, cited in Bostrom and Heinen, 1977) concluded that most of the failures could be attributed to disregard for the impact of organizational behaviour factors in the design and operation of the systems.

The often reported high levels of failure are, however, questioned by Sauer, Gemino and Reich (2007) who suggest that the situation may not be as severe as some claim. Their research in the UK appears to contradict the often-cited Standish group CHAOS Reports. Their findings, based on a sample of 412 experienced project managers, revealed 13% over-shoot in budget, 20% overshoot on duration and 7% undelivered scope. This is in contrast with their 2002 finding that showed 43% budget over-shoot, 82% duration overshoot and 48% under-delivery of scope. Of particular interest in their findings is that although 9% of projects were abandoned, 7% were able to not only meet, but also surpass targets with a further 60% performing well. They identified five performance categories; 'Abandoned' (9%), 'Budget Challenged' (5%), 'Schedule Challenged' (18%), 'Good Performers' (60%) and 'Star Performers' (7%). These findings represent a much more

positive view of IT project performance but leave open the question of why they vary so much from the Standish Group figures. Sauer et al suggest that this may be the result of their sample containing mainly experienced project managers but there may be other factors at work here including project size, cost, sector and so on. They note, for example, that the best performances were associated with organizations that assign their best project managers to the projects with the largest budgets, but they do note that more investigation is warranted. In addition to differences in sampling, another plausible explanation for conflicting interpretations is that of the rather ambiguous nature of some of the definitions used and in the way that relative performances are reported. The language used to describe project outcomes may also be problematic. For many years only the poles of success and failure were used although more recently the word 'challenged' has been adopted (for example by the Standish Group) in the literature. This may be an attempt to move away from the emotive connections attached to 'failure' and to recognise that there are many shades of grey between the two stark poles of success and failure. It may also reflect increasing acknowledgement of the complex and multi-perspective judgement that is typically applied to systems development outcomes. The next section identifies some of the broader ways that failure can be characterised.

2.4 Characterising failure

Ewusi-Mensah and Przasnyski (1991) suggest that project failure and project abandonment share many similarities, with failure a result of decreasing expectations of the implemented system while abandonment is more a result of perceived failure prior to implementation. They identify two types of abandonment, the first referring to the temporary or permanent discontinuation of a project under development (project abandonment) and the second to systems that have become functional but are subsequently discontinued or retired (system abandonment).

Lyytinen and Hirschheim (1987) identify four main types of failure: correspondence failure, process failure, interaction failure and expectation failure. Correspondence failure applies when a system fails to meet specified design objective. Process failure arises as a result of either failure to produce a system at all, or failure to meet cost and time requirements. Interaction failure relates to levels of usage of the system and is characterized by users choosing to ignore or under-use certain features because they offer no perceived value. These can also be regarded as 'Type 1' failure' in the Fortune and Peters (1995) descriptive categories. Lyytinen and Hirschheim define expectation failure as signifying 'a gap between some existing situation and a desired situation for members of a

particular stakeholder group' (p261). They see the likelihood of expectation failures as being particularly relevant in situations where there are multiple interests that may vary over time and where the satisfaction of the expectations is achieved by a process of bargaining and negotiation.

Sauer offers the view that although expectation failure appears to be rooted in the 'apparently politically equitable stance of total pluralism' (1993, p24) this position does not acknowledge three significant practical concerns. Firstly, some expectations may be more reasonable than others, secondly that there needs to be a specific intention on the part of a stakeholder and thirdly that the power of stakeholders to interact with the development process is often unequal. The suggestion of ongoing negotiation to resolve the concerns would appear to locate such problematic systems in an ambiguous position for some time until a final judgment can eventually be made concerning the final outcome. Sauer (1993) suggests that information systems development will continue to be problematic and systems development projects will continue to fail. His note of caution is that the political nature of the development process requires that judgments about success and failure are not made too early and that ongoing negotiation is a necessary part of the process of achieving some measure of success.

'Failure' is thus a value-laden, relative and subjective term, depending very much on the perspective of an individual making a judgement about the outcome of a systems development project. As part of the development of the ISDM course at the heart of this thesis a broader way of describing the possible outcomes, including uncertainty, was developed to provide students with a framework for obtaining a broader multi-perspective view of success and failure. The ternary rather than binary framework builds upon the broader views of failure discussed above and was inspired by the authors previous work with electronic logic circuits. The framework became one of the key thinking tools in the ISDM course design and is explained in Chapter 5.

2.5 Chronicling ISDMs

Understanding some of the historical background of ISDMs can help to explain how the ambiguities in their descriptions have come about as they emerged from their roots in programming and, later, business analysis domains.

ISDMs have grown prolifically since the introduction of computer technology. The word 'prolific' is being used here in two senses of that word. In the common usage of the word ISDMs can be described as being 'abundant, profuse, teeming' but the other sense of the word that relates to 'offspring' that are a result of 'reproduction by continued cell division

or budding' is also appropriate. It can be argued that although a very large number of artefacts labeled as ISDMs can be identified some of them share common ancestry and can be regarded as variations on original themes rather than as truly different objects.

Program development, that is the generation of the code that provides the functional realization of computer-based information systems, has similarities with, but also differences from, the history of ISDMs. In terms of similarities, both the areas of program development and ISDMs can be shown to have changed over time both incrementally and sometimes in discontinuous ways in response to the environments within which they are enacted. The development of some programming approaches can be traced through both continuous refinement but also, more recently in abrupt changes which may be regarded as paradigm shifts. For example, structural and linguistic links can be found between and within programming 'families' as they have slowly evolved and been refined over a period of time, but there are also new approaches that do not strictly follow the evolutionary line. For example many display the linear developmental phases that suggest their origins lie in the Systems Development Life Cycle while others exhibit regular feedback loops and prototyping approaches that imply all altogether different origin. ISDMs have also changed in response to the increasingly complex and dynamic business environment within which they have been enacted and have increasingly appreciated the need to emphasize the socio-technical aspects of the development environment. Agile and object-oriented programming approaches with multiple feedback loops from programmer to client have also had a significant impact upon the thinking that drives the systems development process and many regard this emergence as representing a paradigm shift. It is possible to argue that the broader systems development process has sometimes lagged behind and sometimes led the associated concomitant programming process but the direction that both appear to be taking is characterized by such words as flexible, object-oriented, re-usable, light weight and value-driven, all echoing the needs of modern adaptive organizations that have to balance the tensions between dynamic business environments and a need for overall governance.

Although programming and the development of ISDMs share some common paths they also exhibit differences. Although any programming language can probably be used to carry out any prescribed task they typically originated with some specific application in mind. For example, Fortran was developed in 1954 with scientific purposes in mind, COBOL (1959) for business purposes, Fortran (1970) to drive telescopes, Lisp (1958) to manage artificial intelligence environments, BASIC (1964), initially at least, as a

'beginners' language, JAVA/Java (1995) for web applications and Scala (2006) for object oriented work. ISDMs appear to have grown along a different path, with very few ISDMs being originally developed for such specific purposes. The next section chronicles some of the historical growth of ISDMs.

It is not intended to present a complete history of systems and programming development environments but rather to provide a background that indicates the types of changes that have taken place and some of the reasons behind those changes.

2.6 The eras of ISDM development

Avison and Fitzgerald (1995) produced the most widely used characterisation of the historical background to ISDMs. They identify four stages, or eras, in the history of ISDMs, namely pre-methodology (1960s and 1970s), early methodology (1970s and early 1980s), methodology era (mid to late 1980s through to mid to late 1990s) and the post methodology era, (late 1990s onwards), which they also describe as the era of methodology reassessment. (Avison and Fitzgerald, 2006). The following sections of the chapter use the Avison and Fitzgerald eras as the basic framework with expansion from the work of other commentators. All efforts to place temporal boundaries on history are open to debate and this issue, in the form of a discussion of periodisation, will be addressed in chapter 5. For the purposes of this section the Avison and Fitzgerald characterisation is followed.

2.6.1 *The pre-methodology era: 1960s and 1970s*

The main emphasis during this period was upon the technical and programming aspects of the process and was carried out mainly by staff who were technically well qualified but who had a more limited understanding of business environments. Weinberg (1998, p.69) comments that common (and worst) practice in the 1970s was to "... hire a horde of trainees and put them to work under pressure and without supervision." The approach has been described as the 'Mongolian Hordes' approach in which large numbers of programmers were given a tight deadline and then left largely to their own devices. This software development approach echoed the early days of computer operating system development. Kidder (1981) captures the frenetic environment that newly graduated student developers entered as they worked on the code for new computers:

"... before you've learned to find your way to work without a road map, you're sitting in a tiny cubicle, or even worse ... in an office ... along with three other new recruits, your knees practically touching theirs; and although lacking all privacy and quiet, though it's a job you've never really done before, you are told that you have almost no time at all in which to master a virtual encyclopedia of technical detail and to start producing crucial pieces of a crucial new machine." (Kidder, 1981, p60)

Even though this was a demanding working environment the employees were given considerable freedom in terms of attendance times, dress code and, even more importantly, the opportunity to work on what they knew to be the leading edge of computing. The sense of history and glory seems to have compensated for the long working hours in a high-pressure environment. Kidder reports that new recruits were told that they would have to work with ‘a bunch of cynics and egotists’ and that it would be hard to keep up with them. The recruits would typically reply that all they wanted to do was: “... get in on the ground floor of a new architecture. I want to do a big machine. I want to be where the action is.” (Kidder, 1981, p65). It would appear that in the early days of computer development the motivational drive was to have freedom, to be recognized for specific technical skills or expertise and to focus on building functional software as quickly as possible. A specific cultural milieu was being developed where technical competence was seen as having a particularly high value in the field and individuals had considerable freedom to work in ways that suited them.

From a broader managerial position Silver and Silver (1989, p51) argued that from the early days of information systems development the ‘scientific method’ to problem solving was used, based on the input, store, process and output (IPSO) model and framed within a Tayloristic industrial revolution management perspective. Taylor’s philosophy of management was described by Koontz and O’Donnell (1964, p16) as “a philosophy under which management would take more responsibility for planning and supervision and for reducing the knowledge of labour and machine techniques to rules, laws, and formulas, thereby ‘immensely’ helping employees to work at lower cost to the employer and with higher returns to themselves”. Another management theory contemporary with Taylorism was developed by Henri Fayol and this identified six principal activities for business: managerial, technical, commercial, financial, security and accounting. These management perspectives provide the business backdrop against which the early computer-based information systems developed and go some way to explaining why the approaches adopted in the field emerged. Silver and Silver (1989) list the attributes of the scientific method as:

- Reproducibility of results

- Accuracy of results

- Efficient expenditure of time and effort

- Plan of action

- Transferability of results (Silver and Silver, 1989, p47)

These business attributes appear to be in some tension with the group of technical developers whose main aim to this point had been to create a working solution in whatever way suited their own individual approach. This may mark the start of the technical versus broader business divide that grew in the 1970s. Newer roles in the information systems field began to emerge, including those charged with undertaking more formal analysis and documentation of business needs as part of system specification. Silver and Silver (1989) note that the scientific method became increasingly difficult to implement as businesses were forced to engage in solving more complex and interrelated business problems. Management perspectives also were changing and embracing problem-based and decision-centred approaches driven by Herbert Simon and others. The task of textually describing all inputs, outputs, processing steps, and contacts with vendors, customers, programmers, managers, and others, using only flowcharts and textual narratives, proved to be increasingly difficult. The emergence of Structured Systems Analysis using more diagrams and flowlines can be regarded as the evolutionary response to the increasingly complex environment within which information systems were being developed.

Hoffer, George and Valacich (1994) suggest that alarm bells started to ring in the 1970s as it was observed that many IS development project either failed to reach fruition, missed significant deadlines, or failed to live up to their promises. It was recognised that failures at the initial analysis stage led to time-consuming, and therefore costly, remedial work (mainly by the programmers) at the end of the project. These concerns demanded re-thinking of the approaches taken to systems analysis and design.

Weaver (1993) supports this view, and notes that in the 1960s and 1970s individual developers would devise their own ways of working through the life cycle “often influenced by hardware and software considerations, but always driven by personal likes and dislikes” (p3). He states that this idiosyncratic behaviour led to poor communication of ideas between all parties involved in the processes and produced errors and omissions as a result of the lack of rigour. Code produced through this approach was clear to the programmer but often incomprehensible to those who had to debug or maintain the product. Appendix 1 shows an example of this problem. Structured programming methods helped to reduce this problem, but although the code itself was improved there still remained the even greater problem of systems that did not meet the needs of the business. It was still recognised that projects typically went wrong during the early analysis phase and subsequent actions to correct these problems usually led to extension of time scales and consequential costs. (Yeates and Wakefield, 2004)

Hoffer, George and Valacich (1994) report that it was felt that what was needed was an approach that would offer:

“Greater formality of approach that would bring systems development nearer to the scientific methods or to an engineering discipline than had been common in IS projects

More clarity of stated requirements by using graphical representation as well as text

Less scope for ambiguity and misunderstanding

A greater focus on identifying and then satisfying business needs

More traceability, to enable business requirements to be followed through from initial analysis, into the business level specification and finally into technical design

More flexible designs of system, not unduly tied into the technical design

Much more user involvement at all stages of the development” (Hoffer et al, p24)

The response to seeking to address these requirements was to move from the previous techno-centric and ego-centric position where most of the effort was concentrated upon coding and testing of the actual software towards a structured approach that paid more attention to the analysis and human factors issues. At the same time the thinking behind structured programming approaches was extended into structured systems development methods.

Approaches that began to emerge during this period included those based on the work of Yourdon, Jackson (JSD), James Martin (Information Engineering, IE), the Learmonth and Burchett Management Systems development method (known as Structured Systems Analysis and Design Method, SSADM) aimed at UK government projects, and the French-led European initiatives that eventually led to MERISE and Euromethod.

In summary, the prevailing ‘philosophy’ in the early stages of this era could be characterized as being the creation of workable code and systems in the shortest possible time and at the lowest possible cost by technical experts working very much in their own ways. Towards the latter part of the era more structured approaches that could be controlled, audited and managed as part of an engineering approach began to be sought.

2.6.2 Early methodology era: 1970s and 1980s

Avison and Fitzgerald (1995) suggest that the next era in the history of ISDMs was the period between the late 1970s and early 1980s. This era progressively formalized the description of the processes that software and systems development followed, that is the systems development life cycle (SDLC). The number of steps in the SDLC varies from author to author but typically follows the formal and systematic (‘high ceremony’) pattern of Planning, Analysis, Design, Development and Implementation. Although SDLC is often

referred to as a methodology it can probably be more accurately referred to as a descriptive model. There is an underlying philosophy in the sense that it describes a sequence of events that still overlays a rational scientific approach to problem solving. Early approaches were based around defining reports (forms) and required screens followed by working backward from these output requirements to determine what data was required, what calculations were required, and what inputs were required. (Brown 2002). This approach worked well when forms changed infrequently but proved to require high levels of modification and maintenance when forms become more complex and inter-related as the business environment became more sophisticated. SDLC gradually placed more emphasis upon the analysis stage in recognition that later modifications were costly in terms of both time and money and approaches. Brown (2002) notes that of all errors made in constructing information systems, 56% occurred at the early stage when determining users requirements. In terms of effort, and therefore real dollars, correcting these errors required 80% of the total project budget. However, this move from emphasis on coding to emphasis on defining the task required more time to be devoted to this phase and this disconcerted some managers who felt that the sign of progress with development was in the production of tangible code.

2.6.3 Methodology era: mid to late 1980s through to mid to late 1990s

Avison and Fitzgerald (1995) regard this era as the one where the term ‘methodology’ gained greater currency and, at the same time, the number of methodologies expanded considerably. This was driven by a need to achieve better end products in shorter times by the use of standardized development processes and with less re-working or failure. The methodologies that emerged in this period are classified by Avison and Fitzgerald as Structured, Data-oriented, Prototyping, Object Oriented, Participative, Strategic and Systems oriented. Brown (2002) regards the move from Data-oriented to Object oriented as having such a profound effect on the systems development community that he classes it as a paradigm shift that led to radically new ways of viewing the development world. Object-oriented modeling languages increased from less than ten in 1989 to more than fifty by 1994. (Booch, Rumbaugh and Jacobson, 1999). Booch et al note that each claimed to be a complete method and each had its strengths and weaknesses, for example the Booch method was most appropriate at the design and construction stages, Object-Oriented Software Engineering was particularly appropriate in requirements capture and the Object Modeling Technique (OMT-2) provided support for analysis and data-intensive systems. The management science origin of SDLC was still clearly identifiable as SSADM

developed alongside the management ‘fad’ of TQM, producing a methodology that incorporated frequent audits, probably in an attempt to identify potential deviations in plan before the expensive re-engineering phase. A problem here is that quality has many faces and compliance with specification may still fail to produce a fitness-for-purpose quality outcome.

2.6.4 Post methodology era: late 1990s to early 2000s

Avison and Fitzgerald (1995) also label the post methodology era as the ‘Era of methodology reassessment’. They suggest that serious questions have been asked about the value of ISDMs and, despite the long history of ISDMs, there were still concerns that they have not matured sufficiently as artefacts that offer consistently predictable outcomes for developers. It was still not clear what approaches, if any, fit particular circumstances and the position was still no closer to the elusive ‘silver bullet’ ISDM (Brooks 1995), that would deliver guaranteed successful outcomes that meet time, cost and quality criteria. Despite the availability of large numbers of ISDMs many systems development projects still continued to exhibit high levels of failure. If proprietary methodologies were adopted they brought with them costs in training and proved to be complex and cumbersome in use. ISDMs developed for large organizations provided staged processes with embedded quality but their size meant that they only appealed to larger organizations and even then they did not confer any guarantee of success, as many government development projects demonstrated. In those that were highly detailed there was a tendency to adhere to them in a rote fashion that reduced creativity, leading to individuals complying with mandated procedures rather than identifying and remedying immediate problems. Another risk in the use of high ceremony rote approaches was the danger of simply attributing any failures to the methodology rather than learning from the process. (Wastell 1996):

2.6.5 Contemporary approaches – the rise of agility

In recent years newer methodologies have arisen that have been described as ‘agile’, ‘extreme’, and ‘lightweight’ and continue to build on the Capability Maturity Model, project management and collaborative approaches. They can be seen to flow from thinking about rapid applications development (RAD) style approaches that are designed to respond to complex and dynamic environments, changing hardware and software. This situation is approached not by creating large and equally complex management systems but by working to a ‘bare minimum level’ (Highsmith, 2002) with short and frequent feedback loops to the client.

These more recent methodologies are classified by Highsmith (2002) as;

“ ... agile methodologies, or agile software development ecosystems (ASDES). ... The core set of these includes lean development (LD), ASD, Scrum eXtreme Programming (XP), Crystal methods, FDD, and DSDM.” (Highsmith, 2002, p.4)

Highsmith, (2002) in advocating the move towards agile approaches, suggests that no battlefield commander would take an approach to planning that would take as its focus the idea of eliminating change early in the process by use of an arduous planning process that is then followed to the letter irrespective of events. Instead, he suggests, they would recognize that battlefields are messy, turbulent environments full of uncertainty and sudden change. Responding appropriately and rapidly to immediate and ongoing change while preserving the overall intent of the mission is a more appropriate way to defeat the enemy and complete the mission. Highsmith's (2002) characterization of the development environment as messy, uncertain and subject to unanticipated change does appear to form a sound background against which the recent growth and value of agile approaches to systems development can be seen. If we remain with the analogy it would seem that although the military may see the benefits of agility the older regimes have not been substantially displaced and this may also be the case with ISDMs.

In summary, the impact of the strongly coupled areas of programming, project management, and general management upon the history of the artefacts that we label as ISDMs has introduced a range of language into the way that these artefacts are described. This is a potential source of confusion as the same words may have different meaning depending on history and context. The next section considers some of the problems raised by this linguistic aspect.

2.7 Describing ISDMS

“Don't stand chattering to yourself like that,” Humpty Dumpty said, looking at her for the first time, “but tell me your name and business.”
“My name is Alice, but –
“It's a stupid name enough!” Humpty Dumpty interrupted impatiently. “What does it mean?”
“Must a name mean something?” Alice asked doubtfully.
“Of course it must,” Humpty Dumpty said with a short laugh: “my name means the shape I am – and a good handsome shape it is too. With a name like yours, you might be any shape, almost”
(Carroll, L. 1941, page 106)

In Carroll's story 'Through the Looking Glass', Humpty Dumpty puts forward a very particular view of the value and purpose of names, that is, associating a specific name with both a shape and a value system. For Alice her appellation was a convenient label to denote her as an object without any thought that the name should carry any greater detail. Humpty Dumpty recognized that words carry meaning beyond the word itself and his linking of a word to a shape could be taken as implying that he had a good grasp of semiotics, that is

the study of signs and symbols. Humpty Dumpty has been used to introduce this chapter not as a prelude to a detailed semiotic de-construction of the language used in the naming of ISDMs, but rather to signal the broad significance of language in the description and communication of ideas within the ISDM, and indeed the broader IS/IT field. Bacon and Fitzgerald (2001), for example, suggest that although the broad range of names and acronyms used in the field, including MIS, IM, IRM, BITM, IS, IT, TBIT, ICT, IST etc, may share ‘information’ as a common term their profusion and inter-changeability simply cause confusion to those not significantly immersed in the field.

It will be argued in this section that terms within the ISDM literature such as ‘systemic’ and ‘systematic’ and ‘method’ and ‘methodology’, along with ‘paradigm’ and ‘approach’ are often either used loosely or with a meaning that is specific to a narrow part of the overall IS community. Practitioners and researchers are likely to respond quite differently to ambiguity in language as highlighted by Gill and Bhattacharjee (2009) who identify differences between those who research in the IS field and those who practice within it. (Table 2)

Stickiness Characteristic	Research Criteria	Practitioner Criteria
Simplicity	Research employs and references an existing body of theory that is familiar to the researcher, making it instantly recognizable. Write-up is in the form of a familiar pattern.	MIS theory, on the behavior side, tends to be complex in structure owing to all the contingencies involved. Empirical analyses typically involve a whole range of complex tests that are unfamiliar to the practitioner. Researchers also tend to be very precise in their definitions and often—justifiably—find multiple meanings in terms that seem to be simple, such as success (e.g., characterized in seven ways; DeLone and McLean 2003). To the practitioner, who may have in mind a single definition—one that will, naturally, differ from practitioner to practitioner—it appears as if researchers are over-complicating the situation.

Table 2: Research and Practice views, from Gill and Bhattacharjee (2009)

Without some understanding of the motivations and languages used by the various parties communicating during the systems development process, accompanied by shared language during the systems development process, there is a risk of a potentially alienating gulf opening between researchers and practitioners. This is not simply a case of pedantry. If we are to discuss and compare ISDM, evaluate their relative efficacies or justify the choice and use of an ISDM it is important that when we identify an object as ‘Methodology X’ we have an agreed understanding of what that methodology actually is. If two individuals are discussing Methodology X but each has a totally different understanding of the characteristics or application of that methodology then clearly the discussion is unlikely to lead to shared understanding or form the basis for informed decisions to be made about the

value of the methodology. If one developer has used Methodology Y in the mistaken belief that it is Methodology X, then, again, there is probably little to be gained from discussion unless the interpretive discrepancies can be identified and clarified. To add even more complexity to the situation, even if both did follow a commonly documented methodology they may well have applied it differently to quite different systems and will most probably have used it in very different development environments. If two individuals have reasonably shared worldviews and have close and regular communication the risk of misunderstanding may be relatively low. However, in situations where the distance, be it physical, temporal or linguistic, between individuals is greater or where worldviews are dissonant, as signalled in Table 2, there will be a high likelihood of a variety of distortions, both deliberate and accidental, that degrade the fidelity from one end of the communication channel to the other.

In instances where multiple parties are involved in the communication chain the various distortions, both deliberate and accidental, will magnify the overall end-to-end distortion and also at the intermediate nodes in the communication paths. It is through the social process of communication that particular realities are negotiated and renegotiated to construct shared realities that form identifiable areas of interest for specific communities. This ongoing renegotiation and redefinition of ideas within the field of Information Systems can be seen as a positive attribute in terms of helping to more clearly define and refine the field but unless the communication process is transparent and uses agreed language there is a risk of lack of overall coherence. From the earliest days of information systems anthropomorphic terms or metaphors such as ‘memory’ have created an ambiguity and various factions within IS have retained much of this early language and resisted the negotiation of common language (Checkland, 1988). Chapter 3 will examine the potential distortions in communication channels in greater depth. The next section explores specific use of language.

2.7.1 ‘Method’ and ‘Methodology’

In order that the relative efficacies of the artefacts labeled as ‘ISDMs’ can be evaluated there is a need for an appropriate mechanism for comparing them but, prior to comparison there is a need consider what is actually being compared. As noted earlier, the terms ‘method’, ‘methodology’, ‘approach’ and ‘paradigm’ are often used interchangeably in the literature. This leads to a situation reported in the FRISCO report (FRISCO, 1998) where ‘too many fuzzy or ill-defined concepts’ can be found in the information systems area. The use of the same term in different ways by different parties’ creates ambiguity that can

impact negatively on the communication process between the parties. The differences in use of terminology can vary between countries, Iivari, Hirschheim and Klein (1995), for example, noting that the use of the terms “method” and “methodology” are used differently in Europe and North America, with North Americans using “methodology” in the way that Europeans use “method”. Even within a single document it is not unusual to find the words ‘method’ and ‘methodology’ being used interchangeably. For example, Silver and Silver (1989, p51), referring to Structured Systems Analysis first of all suggest that it is “A new *method* for solving system problems and describing their solutions ...” and in the next sentence refer to “This *methodology*, known as structured systems analysis ...” (my italics for emphasis).

Marakas (2001) suggests that the importance of a “sound methodology” cannot be understated and that “good” methodology:

“... ensures that a *consistent and reproducible approach* is applied to the determination and design of business solutions. In addition, a *rigorous* methodology serves to minimise or eliminate many of the risks and pitfalls commonly associated with taking shortcuts or making common errors. Last, but not least, a *sensible* methodology results in a consistent and comprehensive documentation of the project such that the knowledge gained from one project can quickly and easily be retrieved by those working on the next.” (Marakas, 2001, p4, italics added for emphasis)

Within a single paragraph he thus applies the words “sound”, “good”, “consistent”, “rigorous” and “sensible” to the idea of a methodology. All of these words, although useful, lack precision and create opportunities for interpretation by the reader thus allowing each individual to arrive at a different rather than a shared understanding.

Benson and Standing (2002) suggest that the classic Systems Development Life Cycle (SDLC) is a just a ‘basic descriptive framework’ that can be regarded as a ‘general approach’ and that in order that it can become useful to organisations it requires ‘an extra slice of formality’ (p184). They see this formality as a standardised set of rules and procedures for developers to follow. They see an ISDM as varying from ‘a series of steps used in solving a problem, or it can even be a philosophical approach’, defining it as ‘a collection of philosophies, phases, procedures, rules, techniques, tools, documentation, management and training for developers of information systems’ (p184). The use of the word ‘even’ in relation to philosophy is interesting as it could be interpreted as suggesting that this may be an exceptional rather than integral feature.

Some writers appear to have little problem with the interchangeability of words, Flynn (1992), for example, suggests that the terms development method and systems

development are 'equivalent', as is the term 'approach', although commenting that "an approach may not be so well defined as a method". Commenting on the terms 'development method', 'systems development method' and 'approach' he remarks that "The distinction is wholly academic ...". It may be that the term 'academic' is being used here in a pejorative sense that implies a lack of any concern about the usage in practical settings. Flynn (1992) appears to be comfortable with the flexible use of the words and sees this as a product of linguistic history, putting forward the view that "The term methodology was popular for a time in the 1980s and was used because it means the study of method, the implication being that a method would contain instructions for adapting it to fit a given situation" (Flynn, 1992, p212).

Other writers emphasise the problems inherent in the misuse of certain words but imply that the battle to preserve their meanings has been lost or is futile. Schach (2002) notes that the words "paradigm" and "methodology" are sometimes used in the same sense of "a collection of techniques for carrying out the complete lifecycle" and recognises the potential tensions in the use of language, commenting in a rather resigned voice that:

"This usage offends language purists; after all, methodology means the science of methods and a paradigm is a model or a pattern. Notwithstanding the best efforts of the author and others to encourage software engineers to use the words correctly, the practice is so widespread that, in the interests of clarity, both words are used in this book in the sense of a collection of techniques. Erudite readers offended by this corruption of the English language are warmly invited to take up the cudgels on linguistic accuracy on the author's behalf; he is tired of tilting at windmills." (Schach, 2002, p22)

Jackson (1983) shares the concern about the loose use of 'method' and 'methodology' and adheres to the traditional use of 'methodology' as being the study of method, with method being 'a way of doing something'. He argues that the outcome of this substitution is that undue emphasis is placed on method to the disadvantage of the deeper understanding that is implied by methodology. As with Schach this is clearly an emotive issue for Jackson and is also demonstrated through his use of language when he comments that the word 'methodology' has been 'stolen' and, more broadly, that:

"The subject of computer system development is excessively disadvantaged by infatuation with destructively polysyllabic terminology. One of the most notable examples is the almost universal substitution of the word 'methodology' for the word 'method'. A method is a way of doing something; methodology is, or should be, the study and science of method. The penalty paid for the substitution is, arguably, that we discuss methodology less than we should because its name has been stolen". (Jackson, 1983, p368)

Truex, Baskerville and Travis (2000) echo this sense of 'high-jacking' of terms and comment that the terms "information system development" and "information system

development method” have, in effect, been merged, giving *method* an artificially elevated position in the literature.

Oliga, (1988) also recognising that the terms “methodology” and “method” are typically used interchangeably, considers ‘method’ to refer to a clearly stated procedure for getting something done, whereas a methodology is a higher-level construct which provides a basis for choosing between different methods (Oliga, 1988). Jackson (1983) argues that one way to characterise a method is by the structure it imposes on development decisions and that it is the questions that are asked in the decision making process, such as “What is the subject matter? Is it about the real world, or about the system being developed?” He puts forward the view that the process of asking these questions “is to suggest some principles of methodology, and some criteria for evaluating alternative methods”. He identifies Jackson System Development (JSD) as a “sound development method”, and states that its underlying methodological thinking about the decision making process forms the basis for a methodological underpinning. He sees the real world as ‘a given, a fixed starting point’ but then suggests that only a selective part of that real world is considered relevant. He does not regard choosing economic policies for stock replenishment or negotiations with labour unions as having any part in JSD, rather that the aim is to ‘reflect the real world as it is’ and to provide the functions specified by the user. This ‘real world’ is modelled as the first step in JSD, with Jackson defining a model as “a model of reality outside the system which is being developed”. He describes the modelling process as, first, making an abstract description of the world, and, second, transforming this into a concrete realization in the computer. There is clearly a philosophical position at the heart of JSD but it is difficult to identify.

Dewitz (1996 p13), comparing traditional systems development with object-oriented systems development, suggests that they are similar development paradigms that both offer a problem-solving methodology and a set of techniques and tools to help analyze and design a system.” She defines methodology as a “systematic description of the sequence of activities required to solve a problem” and notes that a methodology also “provides a set of techniques” and that these techniques are often “formal graphical languages used to model a system”. For Dewitz a model is a simplified representation of the world and would typically include the categories of enterprise model, process model, data model and object model.

Marakas (2001) sees systems analysis and design as being different from generalised problem solving by virtue of reliance on “a formalized set of elements and its focus on a

particular way of viewing the problem domain.” (p3). He cites Bouldings’ systems approach (1956) to explain the approach to viewing the problem domain:

“The systems approach is a way of thinking about the job of managing. It provides a framework for visualizing internal and external environmental factors as an integrated whole. It allows for the recognition of subsystems, as well as complex suprasystems within which the organisation must operate” (Boulding, 1956, p.197)

Marakas then defines a methodology in an instrumental way as a

“ ... multistep approach to the analysis, design and delivery of an IS. In most cases the SAD methodology employed by an organization reflects the management style and culture of that organization. Regardless of the methodology chosen (and there are many to choose from), all will reflect a certain degree of formally specified actions and processes by which the analysis of business problems and operationalization of their solutions occur” (p4)

The comment about aligning the methodology with the prevailing management style and the underlying instrumentality associated with the word methodology is echoed by Hoffer, George and Valacich (2005, p.4) who note that “methodologies are comprehensive, multi-step approaches to system development that will guide your work and influence the quality of your final product – the information systems. A methodology adopted by an organization will be consistent with its general management style (eg an organization’s orientation towards consensus management will influence its choice of systems development methodology).

Satzinger, Jackson and Burd (2000, p64) consider that a methodology provides “guidelines to follow for completing every activity in the systems development life cycle, including specific models, tools, techniques...” Reynolds, (1995) describes a methodology as “... a collection of postulates, rules, and guidelines that provides a standard, proven process for the practitioner to follow” and goes on to make the bold claim that “... By following these directions (methodology), the user is assured of satisfactory results. However, if certain steps are omitted or done in the wrong sequence, the results may be very poor!”

This section of the chapter has identified the confusion of language that described methodologies, some writers trying to maintain a ‘purist’ view of the term, others more comfortable with flexibility. The question to be asked at this point is, given this complex and ambiguous linguistic situation, how are we to go about differentiating between all of the different artefacts that are described as ISDMs? A mechanism is needed to more clearly describe aspects of ISDMs in such a way that meaningful comparisons can be made between them to support the process of choosing one that may be appropriate for specific circumstances. Before considering how ISDMs may be meaningfully compared the justification for considered choice rather than random selection will be explored.

2.8 Motivation for comparison and choice

Given the abundance of ISDMs to choose from and their apparent lack of guarantee of success one could argue that an idiosyncratic approach could be adopted by a developer to serve as an experiential framework that, through practice and reflection, would eventually evolve into an approach that would serve the needs of that individual.

Despite the difficulty faced in comparing ISDMs as a prelude to choice, the comparison of methodologies is undertaken by various parties. The Object Agency (1995), referring specifically to Object-Oriented (OO) methodologies, offer three overlapping groupings of those interested in OO methodology comparisons. The first group includes those interested in knowing what 'object-oriented' means, what methodologies are available and how they relate to one another. The Object Agency suggests that the range of interests exhibited by this group will be from academic (faculty, students and media) through to practitioners responsible for the evaluation and selection of methodologies for use within organisational settings. The Object Agency notes that all of these groups may have limited time and resources available to support the decision process and that the quality of the outcome will correspond with the quality of the comparison process. They suggest that unless individuals are actively involved with the use of OO methodologies and therefore have some general appreciation of them they would be limited to a rather limited mechanistic approach to comparison. This may imply that the surrounding philosophy is a necessary part of gaining understanding of OO methodologies because they differ significantly from other more traditional approaches.

The second group identified by The Object Agency are those currently using OO approaches and who are seeking to confirm that their choice was sound or to identify and consider alternative methodologies.

The third group are those who wish to demonstrate that their current approach is viable and so avoid the need to change practice. The Object Agency suggests that this group approaches the comparison approach by "digging up dirt" to demonstrate that the approach is not yet sufficiently mature, or is not appropriate for their particular environment.

The approaches to comparison adopted by the three groups could be regarded as neutral inquiry for the first group, affirmation-seeking for the second with the third group adopting a defensive stance that seeks to undermine possibilities that may challenge their current practice. These approaches reflect quite different underlying worldviews between the parties and The Object Agency also identifies two further groups within the overall OO community that further support this situation. The first group they characterise as having a

focus almost entirely upon programming languages and view their development world through a lens coloured by the syntax and semantics of their favoured language. They tend to take an intuitive approach to dealing with clients rather than have well-defined analysis techniques and their use of the terms ‘analysis’ and ‘design’ is somewhat loose. For example analysis may be seen as a quite general process of listening to the client and then offering them prototypes with design referring to the technical aspects of code design. The second group take an engineering approach that exhibits rigour and formality with higher levels of structure being used accompanied by measures that are more quantitative than qualitative.

The Object Agency comments that:

“As you might guess, there are significant cultural differences between these two groups of object-oriented people. For example, some of those who emphasize rigor and formality view the programming language people as chaotic, overly error prone, wasteful, and largely unpredictable. On the other hand, some of the programming language people consider “formality” and “rigor” to be mere window dressing — at best adding nothing to the quality of the final product, and at worst increasing the cost of development while simultaneously delaying the delivery and lowering the quality of the resulting software product” (The Object Agency, 1995, p.2)

Object Oriented methodologies are only a small part of the ‘methodological jungle’ but even so the multiple worldviews represented here indicate that philosophies, language and general approaches will be highly variable. This applies to the broader realm of ISDMs and will be developed further, but before considering these issues in relation to ISDMs comparison the next section focuses upon a more general discussion of choice.

2.8.1 Sources of ISDMs

Brown (2002, p86) identifies three possible sources of methodologies. (He uses as his definition of a methodology “a set or system of methods, principles and rules, for regulating a certain discipline [in this case, the discipline of information systems (IS) development, or management information systems (MIS)]”):

- Proprietary Methodologies: Each has been developed, copyrighted and marketed as a product, supported with extra-cost training and consulting
- In-house Methodologies: developed by large corporations for their own internal use.
- Authors’ Methodologies, or Guru Methodologies from the literature

Given the ISBSG (1995) data, noted earlier, indicating that 30% of those surveyed did not use a methodology a fourth option “No methodology” needs to be added.

The level of detail offered by proprietary and in-house methodologies varies considerably. Satzinger, Jackson and Burd (2000) comment that while some proprietary and some in-house methodologies contain a considerable volume of documentation detailing management reports and sample documents covering every point in the life cycle, other methodologies are more sparse and informal, consisting only of general guidelines. Proprietary methodologies are, of course, commercial products and may be expensive to purchase or possibly only offered as part of a consultancy service, thus making them out of reach of many smaller developers. Flood (1995) is critical of motives of consultants, who, he suggests, may be simply focused upon marketing their own services that may be somewhat cynically tailored to areas of novelty, the most recent management fad and so on, rather than upon the actual efficacy of the product. Commercially developed ISDMs may be promoted through the use of 'white papers' on web sites or they may be classed as proprietary in which case they are only available for purchase or through the hiring of consultants who use that particular product. All of this can make it difficult for practitioners to obtain clear, unbiased information that they can use in their day-to-day development activities.

More commonly available are those described by Brown (2002) as "Authors' Methodologies, or Guru Methodologies" which can be found in a wide range of literature. Sources for these methodologies, and comments about them, can typically be located in books, journals, conference papers and so on. Most of this material will be from academic sources and may be difficult to comprehend easily unless one has sufficient time to devote to the language used to report this type of research. If the available information is expressed in 'academic language', including such terms as epistemology, viable systems, interpretivist paradigms and so on this may also appear to be an unattractive route to gaining understanding of alternate systems development processes. Much of the literature relating to ISDMs found in academic literature may therefore be appropriate for academic circles but perhaps not for everyday use. Academic sources may also be grounded more in the ideal world of theory than in the cut and thrust of practical and competitive systems development arenas. Flood (1995) is equally scathing about some academic methodologies and comments that although many academics genuinely believe in their ideas they may not have the available time or the experience of commercial environments to put those ideas into practice, or at least not on a regular basis. He suggests that should a venture into the commercial environment prove to be successful the academic will be able to 'talk and write for years about how his/her ideas were actually used (once?) in practice' (Flood, 1995, p79). He also suggests that the more confident academic may be convinced that their

approach is correct and may publish extensively to this effect, but in so doing may project a ‘dogmatic and patronising’ view that may have the effect of alienating readers rather than engaging them. Flood is also critical of academics who are too isolated from the manager’s world and suggests that this isolation may lead to over-theorising or a wish to ‘prevent precious theories from being sullied through the pollutive exercise of using them and evolving them in this way’. (Flood, 1995, p79). The view presented by Flood could be regarded as an extreme position, predicated upon worst-case examples. There can be no doubt that self-serving, ‘ivory tower’ academics do exist but there is also evidence that approaches such as SSM, Multiview, ETHICS and so on do offer practical and ethical support for developers and have been extensively used and continue to be critically tested in the field.

A systems developer who wishes to gain a deeper understanding of ISDMs thus faces a number of difficulties, including access to information, the language used to express the information and the motivation behind an ISDM. Given that most individuals work in time-constrained settings it is unlikely that they will be able to carry out a detailed and rational process for choosing an ISDM. They are thus most likely to rely broadly on the approaches they have previously used and these may have been initially developed during their time as students and modified in the light of experience.

2.9 Choice

The Object Agency notes that effective comparison, and ultimately choice, cannot be achieved without an understanding of the culture underlying a particular development approach, but there is also a need to appreciate the limiting factor of the choice mechanism itself.

In some organizations there is no freedom of choice of ISDM available to developers, one or more being mandated by their organisation. In the case of some UK and US government development projects, for example, Structured Systems Analysis and Design Methodology (SSADM) may be a stated requirement before the contract can be secured. The rationale here is that such a highly structured approach can be communicated using agreed language and, in theory, any problems detected and corrected at the earliest opportunity through rigorous scrutiny of the various development stages. For other organizations different internally developed ISDMs may be adopted as the mandated propriety approach again on the basis that all users within the organization will share common language, techniques and tools.

For other developers where free choice may be an option, as indicated earlier, the problem of choosing one or more artefacts labelled as ISDMs from possibly several thousand can be problematic. A truly rational approach to choosing an optimal ISDM would require a structured and objective decision process that involved examination of all available ISDMs, consideration, within the context of the specific development project, of the characteristics of the various ISDMs, their relative strengths and weaknesses, the level of supporting documentation available, licensing issues, how well they perform in practice and so on. Such an approach would therefore need to be based upon an informed and rational decision process where all of the relevant evidence is available, accurate, clear and intelligible, and where there is a reliable mechanism for comparison of attributes of the various ISDMs. In practice, the world is far from ideal and thus the notion of rational decision behaviour has proved to be elusive. Many problems, particularly those that involve technology and people, are complex and dynamic and cannot be reduced to easily managed quantitative or formulaic forms. The requirement that every possible piece of data and every possible alternative solution path is identified and examined is, as Simon (1969) noted, simply not feasible within typical business constraints of time and resources. Even if all available data could be made available and time constraints overcome the limited cognitive ability of humans to deal with the processes would lead to them being overwhelmed. For these reasons Simon proposed the idea of satisficing:

“As an alternative, [to true rationality] one could postulate that the decision maker had formed some aspiration as to how good an alternative he should find. As soon as he discovered an alternative for choice meeting his level of aspiration, he would terminate the search and choose that alternative. I called this mode of selection satisficing”. (Simon, 1979, p.503)

Simon suggests that in practice those involved in choice will not attempt to consider all possible solutions but will search within a bounded set of possibilities and choose one that appears to be appropriate. Further searching is terminated at this point even though it is appreciated that there may be a stronger option available. In the context of choosing an ISDM one significant issue is the way that individuals draw boundaries within the overall search space that contains all possibilities. It is likely that those with a computer science background would set the boundaries differently to those with a sociological view of the world. Choice is thus very much a personal process driven by the value systems of the individuals concerned rather than fully rational, again reinforcing the role of personal and cultural attributes in the comparison and selection processes.

2.10 Comparing ISDMs

It is not the goal of this section to carry out a detailed comparison of existing frameworks for comparison but rather to establish, in common with the underlying theme of the thesis, that practitioners are faced with a multitude of potentially confusing options when comparing ISDMs. The availability of these frameworks compounds the already difficult task facing practitioners in the selection of ISDMs. Methodologies have arisen from a range of perspectives and to serve a range of purposes and the same could be said of the frameworks for comparison. Despite the problems in attempting to compare both ISDMs and the comparison frameworks it is regarded as an essential task to be undertaken by both researchers and practitioners. Researchers need to better understand the nature and relative efficacy of ISDMs in order that potential for improvements can be identified. Classification and comparison of ISDMs are essential approaches to aid the development of that understanding. Practitioners are seeking more pragmatic outcomes from comparisons as they seek to find practical solutions that will help them to improve the development process and outcomes. ISDM originators may also have an interest in comparing their approaches with those of others to assess the relative merits of the various approaches and to either adjust their own approach or identify situations where it may provide most value. Since no one ISDM appears to suit all situations there is thus a need for all parties to identify when to use and when not to use a specific ISDM (Siau and Rossi, 1998)

An earlier section of this chapter identified multiple interpretations of the terms 'method' and 'methodology' and this semantic ambiguity has to be taken into account when attempting to compare ISDMs. Two key constitutive components of ISDMs did differ broadly from the discussion in the previous section. Firstly, the distinctive ideas, beliefs and theories that underpin the existence of a specific approach and, secondly, the practical methods that can be employed to implement development within those prevailing philosophies. This section of the chapter elucidates this difference and then identifies a number of frameworks that can provide the basis for comparison of each of these two key components.

2.11 The 'Philosophical' aspects of ISDMs

The most commonly agreed difference between a method and a methodology by many commentators is that a methodology is more than the collection of tools and techniques: it has a guiding philosophy. Maddison (1983), for example, describes a methodology as 'a recommended collection of philosophies, phases, procedures, rules, techniques, tools, documentation, management and training for developers of information systems'. Avison and Fitzgerald (1995) suggest that in addition to indicating stages, phases, steps and so on:

“... we believe that a methodology should also specifically address the critical issue of ‘philosophy’. We mean by this the underlying theories and assumptions that the authors of the methodology believe in, and that have shaped the development of the methodology.” (p. 419)

Jackson (2003) also stresses the need for identification of underlying philosophies, which he describes as methodologies. He sees these as being inseparable from the methods that allow the methodology to be put into practice. Jayaratna (1994) regards a methodology as a reflection of particular perspectives of reality that emerges within a particular philosophical paradigm. It is represented in the form of an explicit expression of the steps need to be taken to achieve the desired goal but has to be seen as being enacted within a broader appreciation of underlying reasons why those particular steps are identified and sequenced. Wood-Harper, Antill and Avison (1985) also see a methodology as more than just a set of methods for tackling the different problems involved, suggesting that the analyst should understand why a particular approach can be used in a particular situation. For Checkland (1981) a philosophy needs to be supported by techniques to give a firmer guide for the developer, that is where a technique tells you ‘how’ and a philosophy tells you ‘what’, a methodology should contain elements of both ‘what’ and ‘how’”.

Jayaratna (1994) comments that a philosophy attempts to identify why a particular course of action is taken and that it fundamentally defines the sense of reality that led to the creation of that specific set of actions. He illustrates his argument by differentiating between positivist and interpretive views of the world. The positivistic philosophy takes as its foundation the view that a single reality exists and that a logical process of enquiry will be able to uncover the facts and rules upon which ‘reality’ is based”. This contrasts with a position that views reality as being socially constructed and that each individual will construct an interpretation of observed phenomena and that will become reality for them. Checkland and Holwell (1998) describe this as a process in which meaning is attributed to the observed activity by relating it to an internally generated larger image of the world. This contextualisation of the observed activity suggests that it only has meaning when located in a particular image of the world, or *Weltanschauungen*, which an individual takes for granted. Jayaratna (1994) also regards methodologies as reflecting the unique worldview of their creators. He gives Mumford’s ETHICS as an example where the creator’s underlying concerns are for the welfare of the people who will be the eventual users of the system. This view takes into account the idea that the eventual users of a system can be either beneficiaries or victims of the development process and that social action should underpin the development process to acknowledge and mitigate and negative outcomes. Iivari, Hirschheim and Klein (2000) echo this view of the significance of the

philosophical aspect of ISDMs when they contend that it is the characteristics of the paradigm within which methodologies are conceived that represent their true nature.

The above discussion suggests that methodologies are collections of methods, techniques and tools associated with a described methodology, with the vital differentiation point between different methodologies being located in the *raison d'être* or underlying philosophy. Jackson (2003, p43) uses the term 'systems approach' to broadly encompass the historical background and originators declared philosophy or theory. Jackson uses the term "according to its originators" when referring to the philosophy/theory of the originator, emphasizing the key role of the values, beliefs, worldview, paradigm and other features that describe the unique view of a specific ISDM originator and are inseparably linked with the overall ISDM itself. The Object Agency similarly notes the importance of appreciating the cultures of the various communities interested in comparing methodologies within the programming domain:

“Without understanding the culture underlying a particular development approach, effective **comparison** cannot be achieved. Explicitly acknowledging the diverse culture of the object-oriented community is a first step in better understanding the methodologies presented by this community.” (The Object Agency, 1995, p.3)

2.12 Comparing philosophical aspects of ISDMs

At the higher level of philosophical abstraction the paradigmatic aspects of methodologies can be broadly compared by using a number of broad 'four quadrant' frameworks. At the broadest level of interpretation these are essentially mapping approaches that use two axes against which to plot aspects of a range of methodologies. For example, Lewis (1994) uses a simple map (Figure 2-2, below). This provides a useful set of perspectives for gaining understanding or interpretations of the epistemological and ontological aspects of the underlying philosophies of methodologies

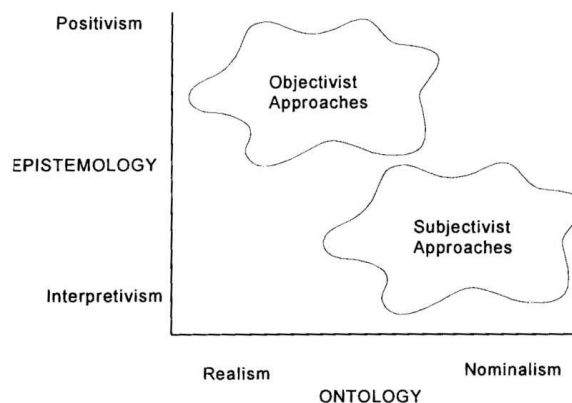


Figure 2-2: Ontological and epistemological axes (Lewis, 1994)

Hirschheim and Klein (1989), also offer a basic matrix, based on the work of Burrell and Morgan (Figure 2-3). Hirschheim and Klein note that the four paradigms represented in this map are ‘deeply rooted in the web of common-sense beliefs and background knowledge which serve as implicit theories of action’.

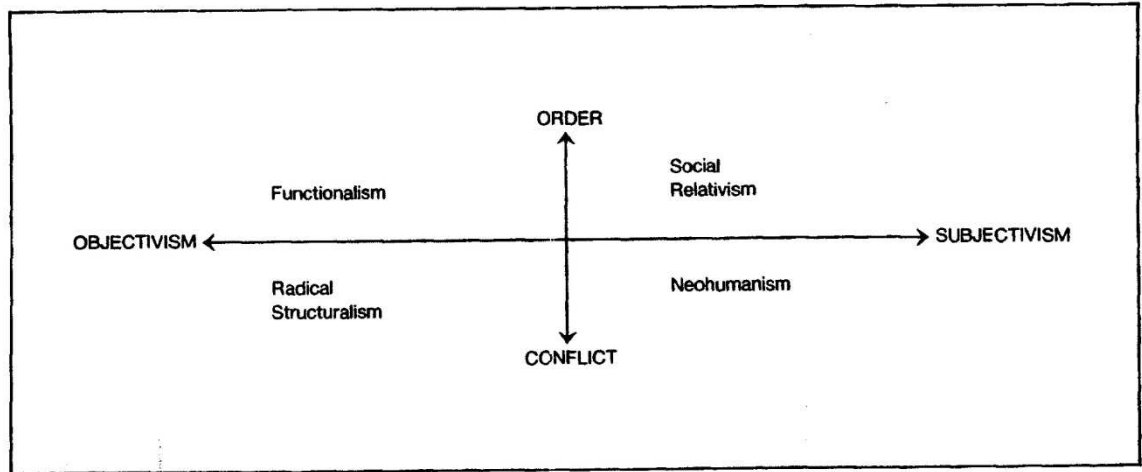


Figure 2-3: Information Systems Paradigms, adapted by Hirschheim and Klein from Burrell and Morgan

Bell and Wood-Harper (1998) also use a pair of, different, axes that can be applied to gain practical insight to other aspects of methodologies. The Bell and Wood-Harper matrix (Figure 2-4) lends itself to a practical interpretation of the philosophical underpinnings and will be discussed further in the Course Design chapter where it was adopted as an accessible focus for students to start to work with.

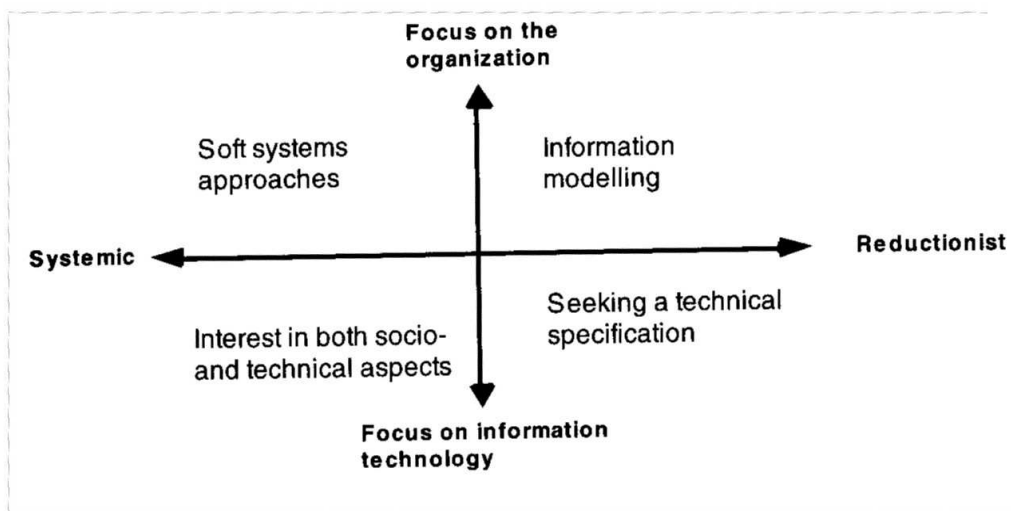


Figure 2-4: Bell and Wood-Harper axes

What emerges from the literature is that an ISDM can be viewed as a number of components that can be identified and related to each other to facilitate comparison at a finer grain of detail than the approaches so far identified. Using Jackson's (2003) terminology the highest order of term is an 'Information Systems Development Approach' (ISDA) which has an associated Methodology (philosophy, value, beliefs etc that describe the originator) and has access to a range of implementation Methods (tools and techniques) that are held in a common pool. An interpretation of Jackson's hierarchy is shown diagrammatically in Figure 2-5.

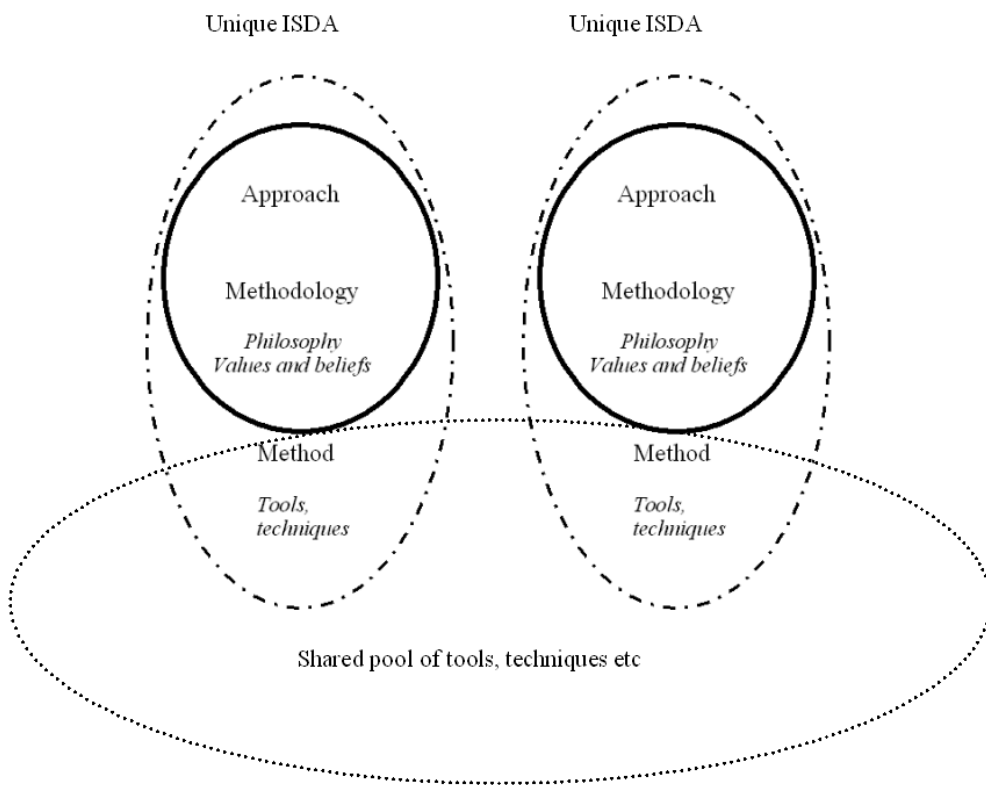


Figure 2-5: Components of Approaches, based on Jackson (2003)

Iivari, Hirschheim and Klein (1999) present a similar, although differently detailed, view to Jackson, suggesting that a key problem in the comparison of specific ISDMs occurred when the whole of the methodology was being used as the unit of analysis and that this unit was too large and complex to permit sensible comparison. They proposed a more granular way of grouping ISDMs such that they can be arranged as familial collections with paradigms as the highest order and tools as the lowest (Figure 2-6). An Information Systems Development (ISD) approach can thus be regarded as a class of specific ISDMs that have a set of related features. They argue that ISDs form prototypical classes of objects that share a number of common features and that this broad classificatory scheme permits

comparison of not only existing ISDMs but also supports the incorporation of newly emerging ISDMs within that overall scheme.

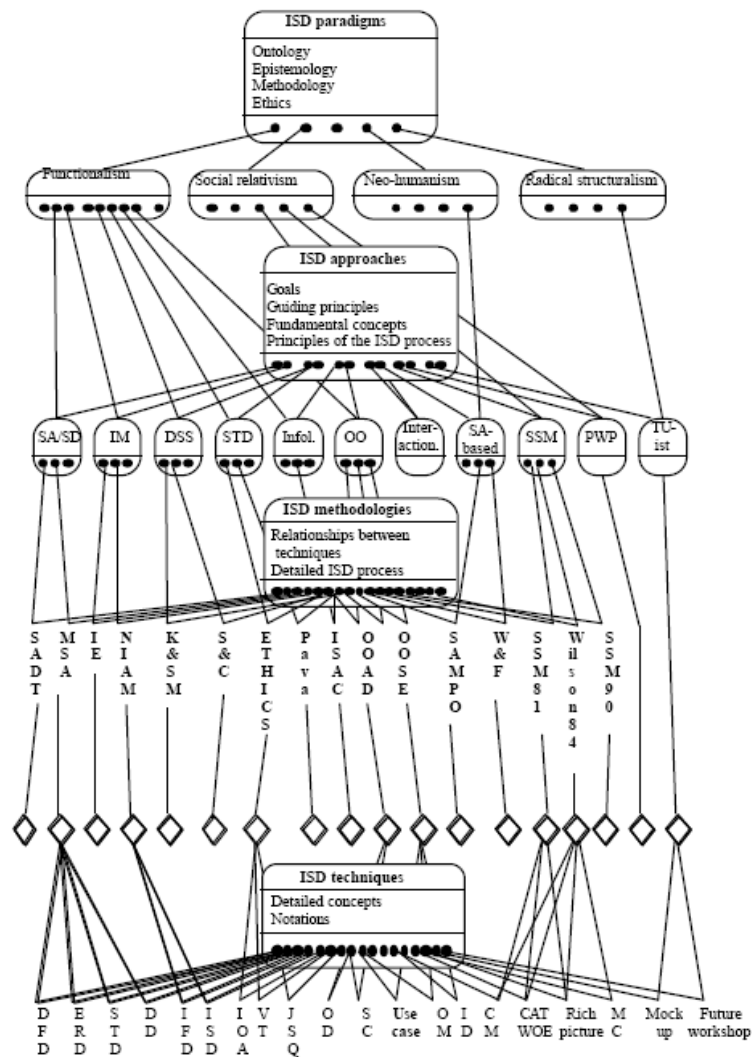


Figure 2-6: The hierarchy of ISD paradigms, approaches, methodologies and techniques (Iivari, Hirschheim and Klein)

In later work Iivari, Hirschheim and Klein (2000) developed a four-tiered framework to try to address the inconsistent use in the literature of the terms “technique”, “methodology”, “approach” and “paradigm”. This model attempts to group ISDMs that share a number of common features or paradigmatic assumptions. This four-tiered approach provides a framework for comparisons by considering how ISDMs may be classified as practical representations of more general abstract classes defined by paradigmatic assumption. A central rationale was to remind interested parties that when mixing techniques and tools from a range of ISDMs they need to be acutely aware of the underlying assumptions (philosophies, paradigms) that frame each individual ISDM. Below this level of abstraction they introduce Information Systems Development Approaches (ISDAs) which inherit the

fundamental assumptions from one or more dominant paradigms. ISDMs form another (lower) tier where they instantiate the features of ISDAs and add extra detail. At the lowest level of the model are the techniques and tools that apply to an ISDM.

This four-tier model provides a strong basis for development, even though it introduces the term “Approach”, which, it could be argued, adds to an already potentially confusing set of terms. In addition to offering an opportunity for formal analysis of existing methodologies it has a mechanism for introducing new ISDMs or ISDAs to the overall structure. The mechanism is not deterministic, requiring the use of human judgment, particularly in the areas of ‘goals, guiding principles, fundamental goals and principles of the ISD process’. In this sense it is similar, in rationale, to Jayaratnas Normative Information Model-based Systems Analysis and Design (NIMSAD) which is summarised by Nielsen (1990) as a ‘framework that is intended to guide the systems developer all the way through a project by providing opportunity ‘at a conscious level of concern’ to (re-)evaluate and (re-)select methodologies.’

Figure 2-7 shows how this pattern can be populated with actual Approaches, Methodologies and techniques from the repertoire of total ISDMs thereby reducing the classification of hundreds of ISDMs to a small number of ISDAs.

Approaches			
SA/SD	Structured approach	Interact.	Interactionist approach
IM	Information Modelling approach	SA-based	Speech Act-based approach
DSS	Decision Support Systems approach	SSM	Soft Systems Methodology approach
STD	Socio-Technical Design approach	PWP	Professional Work Practice approach
Infol.	Infological approach	TU-ist	Trade Unionist approach
OO	Object-Oriented approach		

Methodologies			
SADT	Structured Analysis and Design Technique	ISAC	Information Systems work and Analysis of Changes
MSA	Modern Structured Analysis	OOAD	Object Oriented Analysis and Design
IE	Information Engineering	OOSE	Object Oriented Software Engineering
NIAM	Nijssen's Information Analysis Method	SAMPO	Speech Act-based information analysis Methodology with computer-aided tools
K&SM	Keen and Scott Morton's (1978) methodology		
S&C	Sprague and Carlson's (1982) methodology	W&F	Winograd and Flores' (1986) methodology
ETHICS	Effective Technical and Human Implementation of Computer-based Systems	SSM81	Checkland's (1980) methodology
Pava	Pava's (1983) methodology	Wilson84	Wilson's (1984) methodology
		SSM90	Checkland and Scholes' (1990) methodology

Techniques			
DFD	Data Flow Diagram	OM	Object Model
ERD	Entity Relationship Diagram	ID	Interaction Diagram
STD	State Transition Diagram	CM	Conceptual Model
IFD	Information Flow Diagram	CATWOE	Customers, Actors, Transformation, Weltanschauung, Owner(s), Environmental constraints
ISD	Information Structure Diagram		
IOA	Input/Output Analysis diagram		
VT	Variance Table	-	Rich Picture
	Job Satisfaction Questionnaire	MC	Maltese Cross
JSQ	Object Diagram	-	Mock up
OC	Service Chart	-	Future Workshop
SC	Use case	-	

Figure 2-7 Example of ISDMs in Iivari, Hirschheim and Klein hierarchy

In summary, ISDMs can be seen as having two major components, namely a framing principle or philosophy (also described as worldview, paradigm, rationale, or raison d'être) and a set of tools and techniques. The next section briefly considers tools and techniques.

2.13 Tools, techniques and users

Once again language raises some issues in the use of the terms tools and techniques. Many of the items listed in the 'Techniques' section of Figure 2-6 could equally be interpreted as being tools. Rich pictures, for example, can be seen as a tool that helps interested parties visualise some aspects of the system under consideration, with the use of the tool as part of a clarification and idea sharing process perhaps being appropriately classed as a technique. It is not the intention of this thesis to attempt to clarify such detail but to highlight the potential for linguistic ambiguity that can cloud attempts by interested parties to understand ISDMs.

Systems developers are able to draw from a wide range of tools to support their activities. Tools will include hand drawn graphs, charts, pictures and decision trees, along with word processing, spreadsheet and database software packages. They may also make use of project management tools including time and resource management software. Table 3 shows the way that some commentators view tools and techniques.

Source	Tools	Techniques
Marakas (2001)	Ishikawa chart, DFD, ERD, structured English and decision trees	the various processes and procedures typically employed by an analyst to ensure that the analysis is accurate, comprehensive, and comprehensible to others. Techniques include data gathering, requirements determination, project planning and feasibility analysis
Hoffer et al (2005)	Typically computer programs that make it easy to follow the guidelines of the overall development methodology.	... particular processes that you ... will follow to help ensure that your work is well thought out, complete, and comprehensible to others on your project team
Satzinger et al	Software support that	A collection of step-by-step instructions or

(2000)	helps create models or other components required in the project. May be simple drawing programs, database applications, project management software	more general system development guidelines that help the analyst complete activity or task. Examples include data-modelling techniques, software-testing techniques, user interviewing and relational database techniques
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Table 3: Tools and Techniques

The word ‘tool’ carries artisan and craft connotations and this, in turn, suggests skill, practice and eventual experience in using tools in the most effective way. Different individuals have varying abilities to utilise the same set of tools and it may be the way that they are used, that is, the technique, that differentiates a successful developer from a less successful one. Some developers may use a very limited tool set leading to the situation neatly summarised by Maslow (1966) when he commented that if the only tool available is a hammer there is a temptation to treat everything as if it were a nail. Equally there will be some individuals who have the ability to select any tool, even one that may be regarded as the ‘wrong’ tool by others, and use it in a creative way that allows it to perform the task. The facility to select an appropriate tool and use it in an appropriate way may be a personal product of imagination and experience as much as through some comparison and selection mechanism.

As an example of tools and techniques Checkland advocates the use of rich pictures, noting that:

“A characteristic of fluent users of SSM is that they will be observed throughout the work drawing pictures and diagrams as well as taking notes and writing prose. The reason for this is that human affairs reveal a rich moving pageant of relationships, and pictures are a better means for recording relationships and connections than is linear prose” (Checkland and Scholes, 1990, p.45)

The usually hand-drawn pictures are used to represent structures, processes, concerns, aims and so on. Checkland and Scholes (1990) note that there is ‘no formal technique or classic form for rich pictures and that skill in drawing, although desirable, is not a hindrance. However the process of drawing may be seen by some parties as less than ‘professional’. One student of mine took the idea of rich pictures back to his workplace where it was discounted by a group of his colleagues as ‘finger painting’. In this case the tool, although valuable, can negatively change the perceptions of the parties involved in the process and part of the technique in using the tool should probably involve ways of dealing with such negative reactions. Rich pictures also have more meaning for those involved with the

process of producing them than with external parties who may be bemused by apparently childish ‘finger painting’. The relationship between tools and techniques is therefore, as was suggested at the start of this section, such that the users of the tools and techniques may be more significant than the actual tools and techniques chosen.

2.14 Summary

The aim of this chapter was to highlight the inherent complexity and ambiguity that faces those interested in gaining an understanding of ISDMs. At the heart of the chapter is the tension between the availability of a plethora of guidelines and frameworks identified as ISDMs and the evidence that suggests whatever ISDM is chosen the most likely outcome of a systems development initiative will be failure. Failure is itself a complex word and lends itself to multiple interpretations depending on who is making the judgement and the emotive aspect needs to be tempered by consideration of the motivation of the observers making the judgments.

Although the historical roots of ISDMs are located in a number of paradigms their branches intertwine to form the more visible canopy of the methodological jungle. The jungle is still actively growing with new approaches integrating with the overall structure rather than displacing any extant species. Within the jungle are various camps, inhabited by groups who have different ways of working, different value systems and different aspirations, leading to cultural cliques. The different groups attach different meanings to some common words and this leads to potential ambiguity for external observers.

Two fundamental aspects of ISDMs emerge – firstly an underlying philosophy and secondly collections of tools and techniques that are used to enact the processes within the guiding philosophy. These two aspects can also be identified in approaches to research and in the design of educational courses. The next chapter examines the research approach developed for this thesis.

CHAPTER 3: COMMUNICATING ISDMs

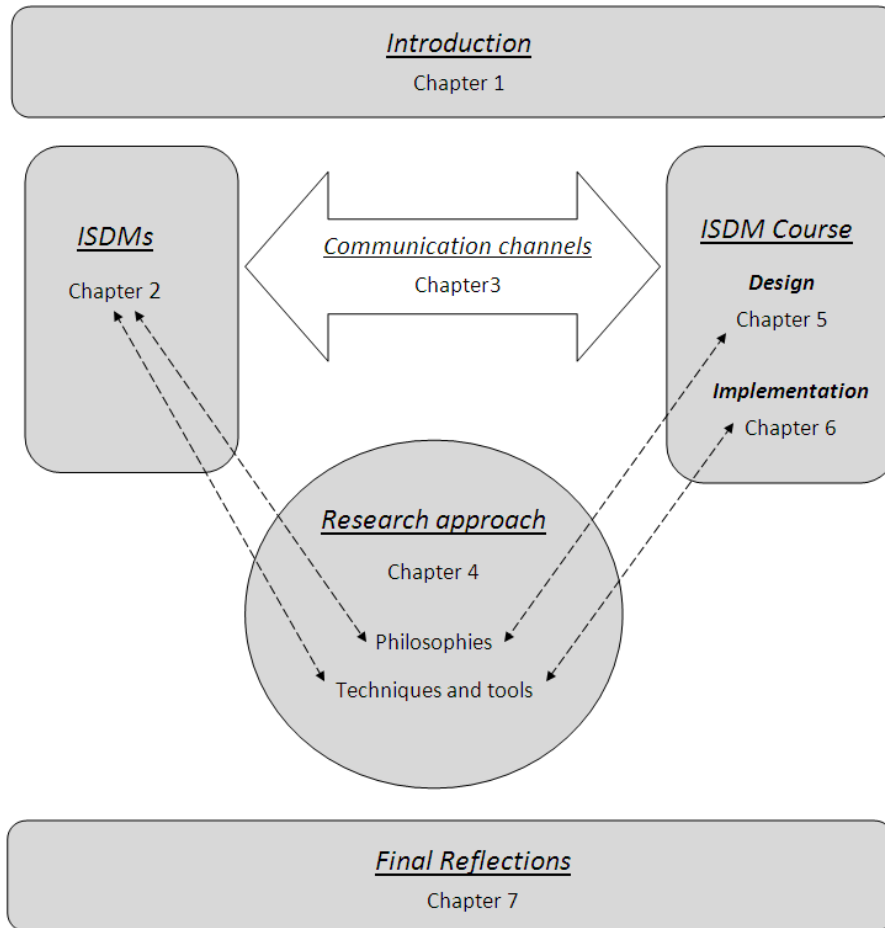


Figure 3-1: Chapter focus - Communication

3.1 Introduction

The sharing of understandings of ISDMs requires a communications channel between the various interested parties. ‘Communications channel’ in the context of this chapter refers to any form of spoken or written communication that is carried out between two or more parties who share a common interest in ISDMs.

This chapter considers the important process of communicating an ISDM from originator to user, a process neatly stated by Lasswell (1948) as “Who says what, in what channel, to whom, and with what effects?” For the semiotic artefact that is labeled as an ISDM to be shared within a community there is a need for an effective communication process to be established between interested parties.

The relevance of this topic to the thesis as a whole is that it forms the binding connection between ISDMs and the educational course at the heart of the thesis (Figure 3-1). For faculty and students access to the world of ISDMs is often only through the literature and distortions, omissions or errors in the literature can clearly lead to misunderstandings. For the practitioner such communication channel problems can lead to an inability to understand and compare ISDMs or misapplication of an ISDM in practice.

The transmission path of data and meaning from source to destination will ideally be transparent and not affect the fidelity of the signal between the two end points. However, it has already been identified that the language used within the ISDM domain is open to interpretation and thus can lead to ambiguity that can impact upon and diminish efforts to share understanding. This chapter explores a range of other communication channel features that can have a distorting effect on all or parts of the communication channel.

The chapter opens with a consideration of the broad area of IS, within which ISDMs reside, and with the problems inherent in a field of interest that is itself quite ambiguous. The chapter then moves on to examine a number of specific problems that can occur in human communication channels. An electronic data communication analogy is employed as a vehicle for this examination.

3.2 Communication within the IS field: a broad view

The IS community could be usefully regarded as a ‘Community of Practice’ (CoP), a term coined by Lave and Wenger (1991) to refer to a community that acts as a living curriculum for the apprentice. The term ‘apprentice’ seems to sit reasonably comfortably with the idea of IS as a community of interested parties in which both theory and practice are transferred from, for example, ISDM originator to eventual practitioner through some kind of active communication process that involves the sharing of cases, techniques and tools.

The illustrative model that will be used to explore the communication issues surrounding ISDMs will be that developed by Checkland and Holwell (1998, p.32) as part of their own exploration of the confusion that exists within the field of IS (Figure 3-2). They note the difficulties of describing IS, commenting that:

“It is easier to describe a cup and saucer than a briar patch ... we find the IS field not unlike the confused tangle of intertwined strands which characterize a briar patch: both boundary and content are unclear’ (Checkland and Scholes, 1998, p.61)

Figure 3-2 effectively outlines the idealised communication paths and processes which exist within a community of parties that includes practitioners, students, faculty and researchers. Implicit in Figure 3-2 is that the community has an interest in an identifiably

bounded intellectual area (which Checkland and Scholes view as problematic), shares a common language (which also appears to be problematic), has some shared perceptions and there are communication channels and feedback mechanisms that connect the community. The diagram also identifies a Body of Knowledge (BOK) through which the research and development is collected and communicated.

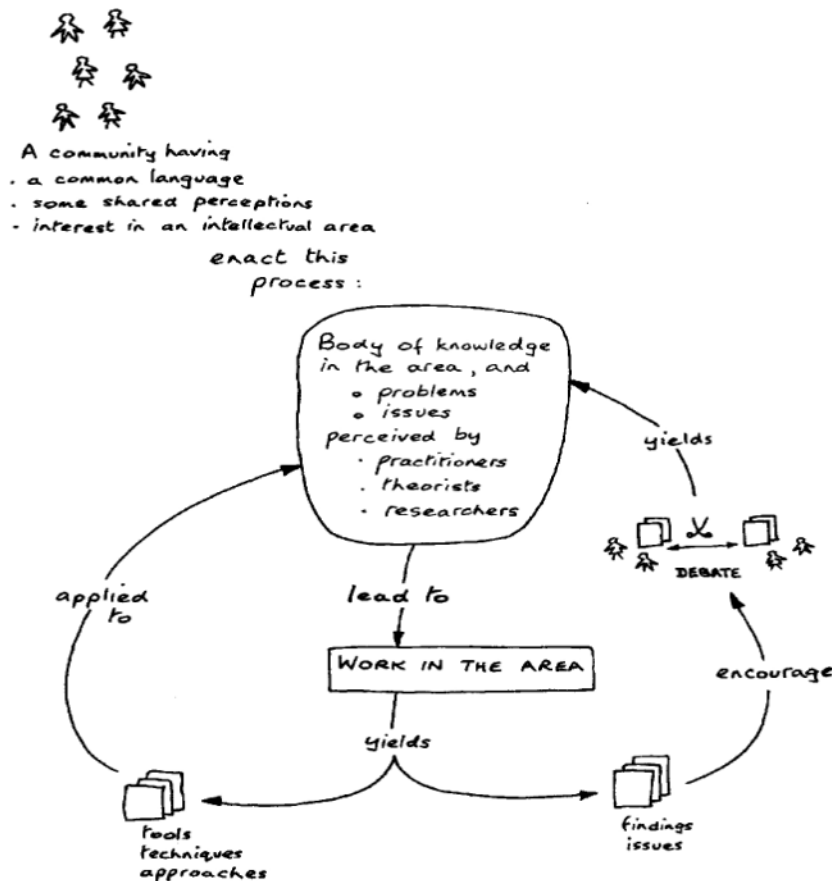


Figure 3-2: The intellectual field of IS (Checkland and Holwell, 1998, p.32)

3.2.1 The intellectual area of IS

If communicating parties could share a common language, culture and understandings of the way the world is viewed then their understanding and experience may be mutually shared and reinforced through the communication process. If a commonly agreed collection of principles, theories, practice or shared perspectives begins to aggregate and strengthen within a community of interested parties in language that is unambiguous then that field may eventually come to be recognized as a discipline. The area of 'information systems' is somewhat ambiguous and could currently probably be regarded more as a field rather than a discipline. The range of areas that can be considered to be associated with 'information systems' is broad and is the product of dynamic interaction between a wide

range of other fields and disciplines. In some ways IS may be regarded as derivative or as an emergent property of the existing disciplines that range from engineering through to general business.

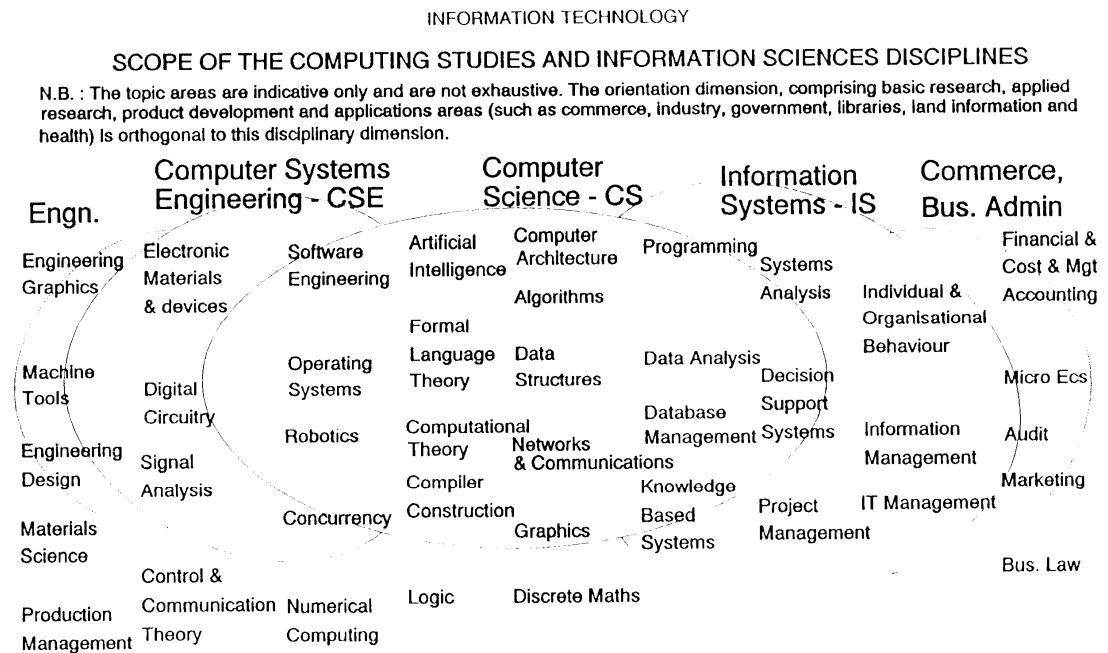


Figure 3-3: Scope of Computing and IS (Source: ACS Discipline Review, 1992)

Figure 3-3 shows the range of areas, including IS, identified in the Report of the Australian Computer Society (ACS) Discipline Review of Computing Studies and Information Sciences Education (ACS, 1992, p13). The report notes that many of the terms identified as being ‘in common use’ have different interpretations for different parties and that this diversity of interpretation is ongoing as the ‘underlying technology, methodology and fashions evolve’ (p9). The report also identifies the profusion of terms used to describe IT courses and comments that although these terms tend to be used interchangeably they can carry ‘different meanings, or shades of meaning, in different application areas’. They were able to define three ‘discipline groups or subject clusters’ (p11) as a basis for their work, these being Computer Systems Engineering, Computer Science and Information Systems. These are presented as clusters that show considerable overlap and the ACS indicates that they should not be regarded as discrete entities. They further take care to point out that the horizontal axis of the figure does not represent a ‘development’ to ‘application’ structure but can be viewed in terms of ‘hard’ or ‘engineering’ essence at the left and ‘soft’ or ‘human involvement’ at the right. It would appear that the linguistic and definitional problems identified in the earlier section describing ISDMs are also to be found in curriculum documents. It is not surprising that the individuals who teach within the computing and IS areas define their courses on the basis of their own experiences within

the various fields of overlapping practice in the same way that ISDM observers and users do. The relationships between the various areas with what may be regarded as the IS field can be interpreted in many ways by different observers based upon a variety of approaches that allow boundaries to be drawn. For example Schlögl (2005) used a bibliometric analysis to construct a map of relationships within the information management field (Figure 3-4). Using data from two citation indices Schlögl produced a map that he felt represented the intellectual structure of information management. The vertical axis identifies the extent to which the authors worked on the information management topic with the horizontal axis indicating the different subject dimensions. Schlögl notes that the center of the map is not populated and suggests that what can be inferred from this space is that information management is not an interdisciplinary topic, but instead may better be described as multidisciplinary in nature. He notes that Ellis, Allen and Wilson (1999) arrived at a similar conclusion after having analysed the literature on information retrieval and user studies, concluding that there is a 'lack of contact' between these two disciplines.

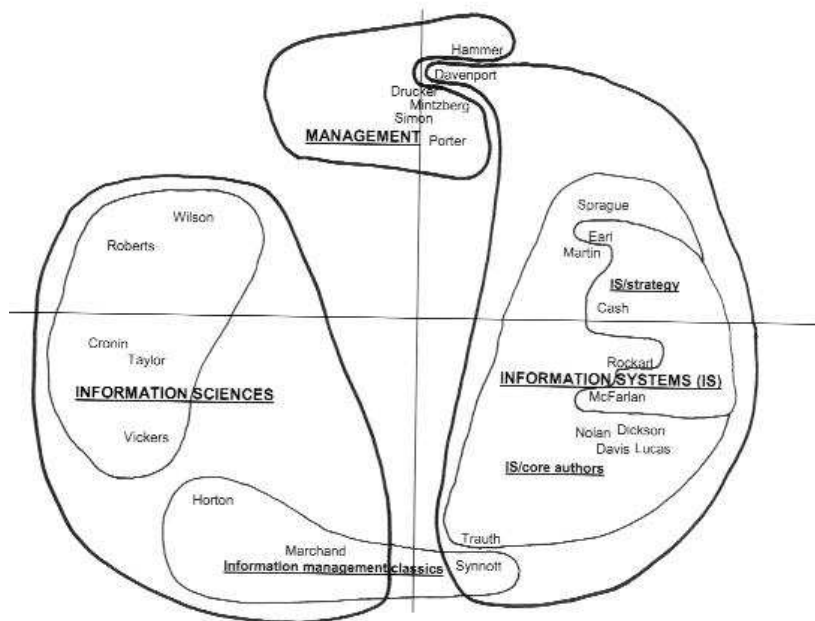


Figure 3-4: A view of Information Management (Schlögl, 2005)

Learners may even have difficulty deciding what the general subject of IS is about – it could be systems development, or strategic systems planning, decision making, competitive or collaborative use of technology for business, e-commerce (or perhaps m-commerce, or c-commerce depending on the flavour of the moment), or perhaps contemporary issues. For both students and practitioners alike this ambiguity of terms and existence of fuzzy boundaries and different worldviews within the broad field can create

confusion. Bacon and Fitzgerald (2001) referring specifically to MBA students, (although their comments would be equally applicable to all students and practitioners) comment that the lack of clear theories and models in the area of IS can be a source of confusion. They suggest that without such underpinnings it is difficult for learners to make connections between the various topic areas that comprise IS. Bacon and Fitzgerald note that the names and acronyms used within IS are equally diverse, and include MIS, IM, IRM, BITM, IS, IT, TBIT, ICT, IST, and although they all share the common word 'information' within them they are a potential source of confusion.

If it is not clear exactly how the field of IS is defined it would seem reasonable to assume that there will be communication problems arising from this situation. In effect this fuzziness of boundaries and confusing use of language represents a form of 'noise', or signal impairment, in the communication process from individual to individual. A collection of agreed ideas, tools, techniques, theory and practice easily accessible and expressed in understandable language – that is, an IS BOK - would clearly offer opportunities for the IS community to begin to debate the broad issues in the field. The next section considers BOKs.

3.2.2 Body of Knowledge?

Figure 3-2 suggests that the activities of the interested community are enacted around a Body of Knowledge (BOK). The term Body of Knowledge is typically applied to the collection of theories, knowledge and agreed practice that is pertinent to a specific domain of interest. Checkland and Holwell (1998) suggest that as a BOK emerges it will act as a focus for debate among members of the interested community and conferences, courses and journals will emerge to act as vehicles for sharing problems, solutions, tools, techniques, theory and practice.

In some areas of the IT/IS domain BOKs appear in the form of readily available publication normally built around International Standards and typically linked to a professional body. For example the Guide to the Software Engineering Body of Knowledge (SWEBOK) notes that software engineering is an emerging discipline and that there is a Body of Knowledge that should be mastered by practicing software engineers. (IEEE, 2004, p. xix). The purpose of the SWEBOK is stated as 'to provide a consensually validated characterization of the bounds of the software engineering discipline and to provide a topical access to the Body of Knowledge supporting that discipline.' (IEEE, 2004, p. xix) More specifically the aims of the SWEBOK are stated as:

- “To promote a consistent view of software engineering worldwide
- To clarify the place—and set the boundary—of software engineering with respect to other disciplines such as computer science, project management, computer engineering, and mathematics
- To characterize the contents of the software engineering discipline
- To provide a topical access to the Software Engineering Body of Knowledge
- To provide a foundation for curriculum development and for individual certification and licensing material” (IEEE, 2004, p. 1)

This list, along with other parts of the SWEBOK provides clearly articulated links between practice and curriculum and this issue will be returned to in Chapter 5 of this thesis when MIS-related curriculum documents are explored.

The ‘topical’ aspect in the SWEBOK definition is achieved by means of regular updates to the BOK. The SWEBOK also places a boundary, albeit rather soft, around its scope, stating that:

“In browsing the Guide, readers will note that the content is markedly different from Computer Science. Just as electrical engineering is based upon the science of physics, software engineering should be based, among others, upon computer science. In both cases, though, the emphasis is necessarily different. Scientists extend our knowledge of the laws of nature while engineers apply those laws of nature to build useful artifacts, under a number of constraints. Therefore, the emphasis of the Guide is placed upon the construction of useful software artifacts.” (IEEE, 2004, p xix).

There is no claim that the SWEBOK provides complete or definitive ‘instructions’ nor that there is some ‘silver bullet’ to be found within the document. Instead it takes a view that the content is ‘generally accepted’ and defines that position as one where:

“... the knowledge and practices described are applicable to most projects most of the time, and that there is widespread consensus about their value and usefulness.” (IEEE, 2004, B-2)

Despite promoting the value of the collective wisdom and practices represented in the SWEBOK a caveat follows the above paragraph providing a warning that the practitioner should recognize that each project will have some unique characteristics and thus the contents of the SWEBOK should be seen as a guide rather than as uniform practice.

Project management also has its BOK (PMBOK), or rather it has a number of BOKs each with a different purpose and content. As with the SWEBOK, Maylor (2003) notes that the PMBOK is supported by institutions concerned with developing, capturing and sharing professional practice, with the PMBOK being the vehicle to achieve this aim. Kerzner (2001) notes that as far back as 1956 Boulding identified issues with the various languages used by practitioners in the IS area during systems integration and stressed that all

subsystem specialists should speak a common language. Kerzner suggests that the PMBOK satisfies this need within the project management area.

In addition to Software Engineering and Project Management some specific development steps or phases have had specific areas devoted to them, for example the requirements stage being expanded into the area known as Requirements Engineering. At an early stage in the development of an information systems there is a need to understand the high level needs of the business and to represent this Requirements Engineering has been located at the start of the overall development process and is defined by Verner, Cox, Bleistein and Cerpa (2005) as:

‘Requirements engineering (RE) can be simply described as identifying a problem’s context, locating the customer’s requirements within that context and delivering a specification that meets customer needs within that context.’ (Verner, J., Cox, K., Bleistein, S. and Cerpa, N. 2005, p.225)

We can view the scope of ISDMs as including the Software Engineering and Project Management bodies of knowledge along with details of expanded details of specific phases such as Requirements Engineering. The relationships between these areas is complex and open to interpretation, but Figure 3-5 was developed by the author as an attempt to broadly bring them together for the ISDM students in a single diagram that shows the underlying business as initially triggering and later assessing the whole information systems development process.

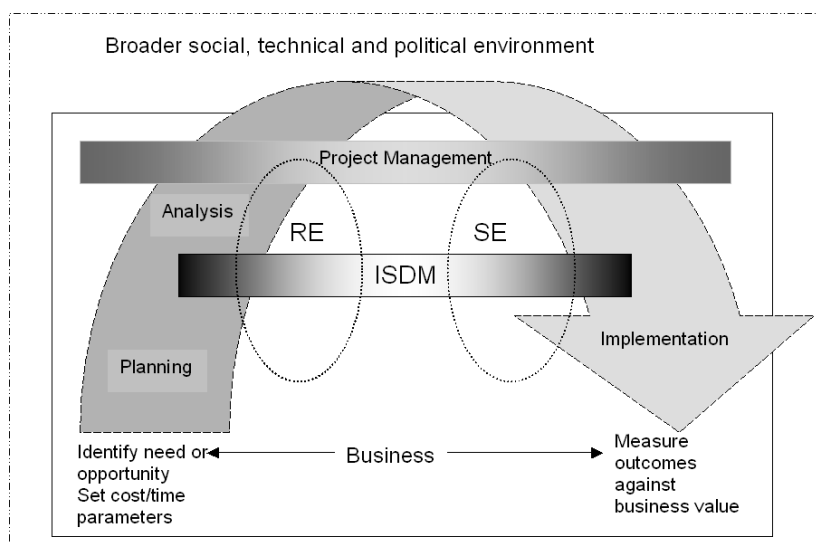


Figure 3-5: ISDM, RE, SE, Business and the Environment

The large arrow connecting the needs identification process at the business level through to the measurement of eventual outcomes contains the overall series of sequential steps that are described in the Systems Development Lifecycle. Requirements Engineering has been

located at the early part of this process and is supported in many ISDMs. Software Engineering, the construction of the coded aspects, is located later in the diagram and can also be interpreted as part of the ISDM landscape, although the engineering basis of SE means that language and philosophies may differ markedly from that found in the more business oriented aspects of systems development. Project management is the over-arching set of processes, tools and techniques that support the overall development process and again can be regarded as having clear ties with ISDMs. The central part of the large arrow passes through the broader environment, indicating that the process can be affected by these external influences and part of the point of the arrow also connects with the external environment to suggest that the outcomes of a project can also influence that external environment. This indicates the open nature of the systems under consideration.

It has already been demonstrated that ambiguity of terminology and differing perspectival positions in the IS field are common and abiding features and this would appear to suggest a rationale for the existence of a unifying ISBOK. Hirschheim and Klein (2003) see great potential value in a BOK for IS and echo Boulding's view that there is a need for shared language, commenting that "Without such a language, it is difficult to arrive at a consensual core body of knowledge or even to begin framing the issue of coding such a shared BOK for the discipline as a whole" (Hirschheim and Klein, 2003, p. 244) In the light of their comments about language and ambiguity it is interesting to observe that they refer to IS as 'field' but also as a 'discipline' within the same document. For a common BOK to be developed in the IS field there is first a need for agreement among the parties that comprise the field about the nature of the field itself, that is for the sharing of understandings.

3.2.3 *Shared perceptions?*

Figure 3-2 refers to 'shared perceptions' (although the modifier 'some' is used) and the existence of shared perceptions is questionable in practice in the IS field as a whole and for ISDMs in particular. A previous chapter has demonstrated that IS has emerged from a variety of discipline areas and that its history is deeply interwoven with those other areas even though it professes to have its own unique identity. Avison, Fitzgerald and Powell (2001) suggest that applied psychology, computer science, economics, ergonomics, ethics, linguistics, mathematics, semiotics, sociology and systems thinking could be regarded as the primary, but not the only, foundation disciplines of IS. Hirschheim and Klein (2003) also comment that the history of IS has led it to a space that borders upon engineering, computing, business, finance, sociology, and psychology, to identify but a few, and see this

eclecticism as having generated rich diversity but at the cost of a lack of unifying perspective. Each of the many intersecting points on the soft borders of the IS space shown in Figure 3-3 allow for the drawing in of ideas, theories, cases and so on which can then be re-contextualised and possibly returned to their original source or retained within the IS field. I would argue that there are more borders than those shown in Figure 3-3 and would suggest that art, architecture, music and psychology could be legitimately considered as having overlap with the IS field. I can offer an anecdote here to illustrate the fluid nature of the boundaries in practice. At an IS conference a group were taking coffee and the discussion ranged across systems dynamics, e-commerce, trust and ethics and a variety of other areas. As the meeting broke up to return to the conference sessions the individual who had been sitting next to me commented that he was a psychologist by profession and had had some doubts about presenting a paper at an IS conference. He commented that “Although I thought I was a psychologist, I now think I’m fundamentally an IS person with a specific interest in the relationship between psychology and technology’. This dynamic interaction between the adjacent areas that form the virtual boundary of the IS field provides it with possibly one of the richest opportunities of any field of study for bridging and integrating many areas of study. The potential negative aspect of this situation where IS could be regarded simply as the emergent property of a set of other domains of interest is that it may possibly be unable to establish a distinct identity of its own. The associations across the various boundaries can lead to localized interpretations of common processes with the IS space that generate a growing number of subgroups within the broad umbrella of ‘IS’. Thus an engineering perspective on systems development may be essentially techno-centric with little regard for the recipients of developed systems, an emancipatory perspective will seek to ensure that the recipients are empowered, while others will seek to negotiate the development with an essentially amoral view that the recipients may be victims or beneficiaries. Equally the thinking of researchers and practitioners within the field of IS may be located in positivist, critical or interpretive paradigms, may be concerned with quantitative or qualitative approaches to understanding the field, may consider IT to be the fundamental nature of the field, or conversely they may see IT as the servant of IS. This is not to criticize any particular standpoint, but rather to indicate that within the field of IS there are multiple interpretations or perceptions of that field rather than a single shared perception.

My own position is that eclecticism is a highly desirable and important feature of the IS field. In an area of theory and practice as complex as the connection of technologies with human activities in a dynamic environment we need the richest and most diverse set of

views possible to deal with all of the possibilities that the dynamic socio-technical world generates. Nevertheless, the very richness of thoughts, beliefs and practices can also perversely lead to disconnections and factionalism within the overall field and this, in turn, can lead to a perception of IS by outside parties as being confused and lacking internal cohesion and identity.

3.3 Communication channels

Of specific interest in this section of the chapter are the forms of distortion that modify the signal as it travels through the various available communication channels. The communication of any set of ideas that include beliefs, values, ideology and so on will be potentially subject to distortions at the point where the original ideas are translated in communicable form, in the communication channel and at the point where the ideas are ultimately received and placed within the context of the receiver. It is argued that these distortions, combined with weak feedback mechanisms, in the communication of ISDMs from originator to user pose a significant obstacle for learners because the distortions can disguise or selectively diminish significant aspects of the ISDM.

The potential distortions that may arise in the transmission and reception of ideas through a communications channel are not unique to the information systems field. For example, Huckfeldt, Beck, Dalton, Levine and Morgan (1998), examining political dialogue, note that uncertainty and ambiguity in the communication process can produce distortions in the clarity of political signals with resulting impact upon the accuracy of perception of the transmitted signals. These distortions are attributed to issues relating to the message originator, message receiver and the environment within which the received signal is interpreted. Huckfeldt et al suggest that in the presence of ambiguous political messages individuals are likely to adopt contextually based shortcuts in their evaluation of socially communicated information and note that selective perception allows individuals to avoid, disregard, and transform messages that do not agree with their own preconceptions and viewpoints. It appears likely that the same effect may occur in other subject domains, including those relevant to ISDMs.

Signs, symbols, values and beliefs collectively form the signals that describe the artefacts labelled as ISDMs and all of these signals need to be communicated from ISDM developer to potential user for full understanding to be achieved. Before considering the potential distortions that may affect a communications channel carrying these complex signals the next section of the chapter introduces basic electronic communication systems which deal only with raw data. Identification of the basic characteristics of a basic communications

channel and of the way that signals may be impaired as they transit the channel provides a foundation for analysis of more complex human communication systems.

Much of the material relating to the early part of this section is drawn from the practical telecommunications and electronics background of the author. The material developed here assumes that the channel deals with a flow of analogue data rather than digital data. (An analogue signal can take any of a number of values at any moment in time whereas a digital signal is either 'on' or 'off', that is, the digital signal is binary in form.)

3.4 General communication process model

At the most basic level the process of communication is concerned with the transfer of raw data from a source at one end of a communication channel to a destination at the other end of the channel. This can be described as a linear data transfer model such as that identified by Shannon and Weaver (1949). Mattleart and Mattleart (1998) describe the Shannon and Weaver model as being based upon a chain of elements in which an information source is encoded into a form of signals that are suitable for transmission, after which it is transmitted along a physical channel.

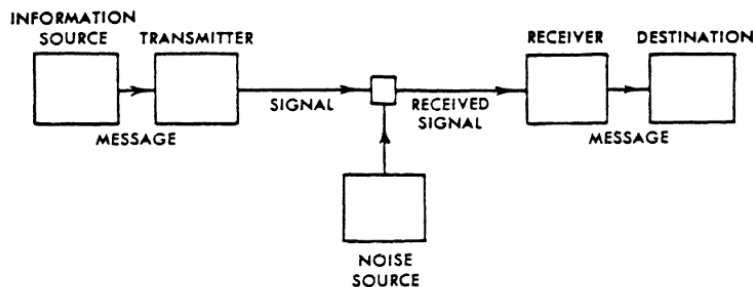


Figure 3-6: General communication process (Shannon and Weaver, 1949, p34)

At the receiving end of the communication path the signal is decoded and presented to the destination. Figure 3-6 illustrates the model developed by Shannon and Weaver and shows the relationship between the various elements. It should be noted that this model is built from an engineering perspective and although building upon 'information theory' is essentially a data, rather than information, transfer model. It is concerned with the raw data and does not attempt to take account of the meaning of the message (to receive a message is not necessarily to understand it) and in fact Weaver later recognized this as a major concern.

3.4.1 Noise

The box representing 'Noise' in Figure 3-6 indicates that there is an additional, unwanted, source of energy associated with the communication path and this has the potential to act in

such a way that the signal is degraded as it transfers from source to destination. Although identified as a single point source of interference in the diagram, in practice the noise may be generated at any part, or indeed at multiple parts, of the overall system. Noise is additive and in the most extreme case the overall energy generated as noise may become greater than that of the desired signal with the result that the desired signal is lost.

In publication paths where there are strongly supported paradigms represented in the published material, papers that strengthen the prevailing views will form a strong signal against which outlying views will be perceived as noise. For the outlier the strong signals may be viewed as noise that drown their own signal, in which case they may simply move to a publishing venue where a more acceptable signal to noise ratio can be obtained.

3.4.2 Filtering

Other distortions that can occur during the transmission process would include uneven attenuation of various parts of the signal spectrum that are a product of the physical and electrical characteristics of the channel being used. The combination of physical line characteristics lead to the channel taking on the form of a filter, that is some parts of the signal spectrum are differentially modified. Filters can be described in four main categories; low pass, high pass, band-pass and band-stop. Each of these condition the signal in different ways, for example band-pass filters allow a prescribed portion of the overall spectrum to pass unimpeded with all signals outside the prescribed pass-band being attenuated. Similar filtering effects can be found in academic literature communication channels.

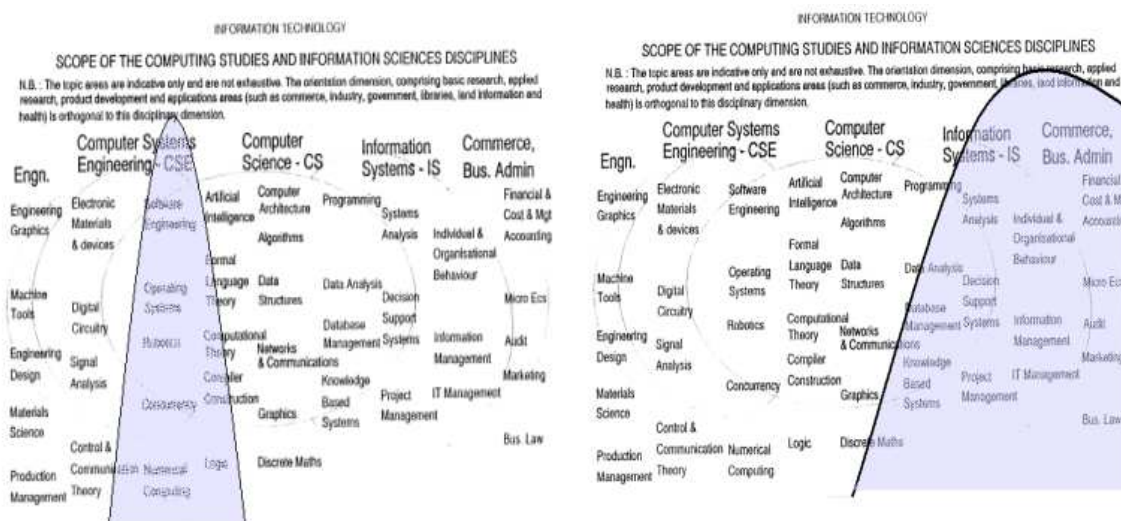


Figure 3-7: Effects of filters on acceptance of areas for publication

Figure 3-7 shows the effect of applying two different ‘publication filters’ to the broad range of areas identified earlier in Figure 3-3. In the left hand diagram the equivalent of a narrow pass-band filter has been created such that only the topic areas within the shaded section would be acceptable for a specific publication. The steep sides of the filter lead to a clear and bounded area within the overall spectrum being defined. In the right hand diagram the equivalent of a high-pass filter is shown, again with only the topic areas in the shaded area being able to pass through the filter for specific publications. This filter shape provides a gentle ‘roll-off’ rather than a sharp cut-off and allows for the inclusion of a broader, but still well defined, range of topics to be accepted.

The filter characteristics of specific publication paths are not normally hidden and can be found by examination of the editorial guidelines. If an author wishes to ‘target’ a particular publication they will be aware of the characteristics of the paradigmatic or cognitive filters and may feel the need to re-frame their ideas in order for them to pass through the paradigmatic filters to ensure that they are accepted by the publisher. For example, a journal that has a predominantly quantitative or positivist frame may reject papers that are strongly framed in qualitative or interpretive language. Pragmatic authors driven by the ‘Publish or Perish’ aspects of academia may therefore be inclined to modify their presented content or language to ensure that they fit the acceptable characteristics of the particular filter shape that represents specific publications. They may emphasise particular phrases or concepts that are most likely to pass through the journal filters in the same way that signals are pre-emphasised in electrical signal systems. This re-framing may subtly alter the message that is carried through the filtered path and will thus introduce distortion. Similarly, readers of specific journals will have paradigmatic frames, or filters, which shape their expectations of materials that appear in that particular publication and thus be influenced by a pre-set interpretive stance or schema.

3.4.3 Pre-emphasis and post-emphasis

If the characteristics of the line system are known it is possible to alter the shape of the signal prior to transmission to balance out the effects of the line characteristics. This is often known as pre-emphasis or pre-equalisation. Similarly it is possible to post-equalise a received signal by selectively amplifying or attenuating parts of the received signal spectrum to provide a modified output that suits the requirements of the receiver. An example of these processes can be found in older hi-fi music systems where the signal laid down on vinyl disk is pre-emphasised to compensate for the recording medium characteristics and where the listener can use bass and treble controls to tailor the sounds to

meet their particular preference. This represents a deliberate distortion of the signal to suit the preference of an individual receiver.

In the academic writing community it is equally possible to assume that writers will carefully research the available publication routes and gain an understanding of the characteristics of the various paths. Once this is known it should be possible to pre-emphasise some aspects of submitted papers so that the message can still be passed to target readers through the editorial distortions that define specific journals. Editors may request that authors modify their submissions in various ways to make them more attractive to the readership of specific journals and this acts, in effect, a set of controls that adjust the output to the assumed sensitivities of the readers.

3.4.4 Feedback

The purpose of an electronic data transmission (communication) system is to provide faithful delivery to the destination of the data that was transmitted by the source. If the source transmits the data “% ^#9bFFF” this must be exactly what appears at the destination. It is important to emphasise again that what is being dealt with in this model is purely data, not meaning. The most basic transmission system assumes that once a signal has been transmitted it will arrive at the far end of the communication channel and is sometimes referred to as a ‘fire-and-forget’ system. In practice the various effects that impinge upon the transmitted signal produce distortions (errors) that demand that effective communication systems include a feedback loop from destination to source to indicate the status of the received data. Such error-detecting protocols permit the system to test received data and to then generate a feedback signal to the source confirming successful receipt or requesting a re-transmission of a faulty data set. In purely data transmission terms it is thus possible to have systems that can ensure that data is transferred from source to destination through noisy and distortion-prone systems in such a way that the received data can be recovered as an exact facsimile of that transmitted. It is important to note that if data is incorrectly coded at the source the data communication system will accurately preserve that incorrect data and faithfully deliver it to the destination. It is therefore purely a *data transfer system* rather than one that conveys meaning.

In the case of traditional human publishing systems the transmission mechanism equates more to the fire-and-forget system than those that have error-detection protocols. Human readers of literature know that there are editorial processes that have checked published material and therefore have to assume that the publication channel has not introduced significant distortions. When it is felt that errors may have occurred there may be some

limited opportunities to request clarification but the feedback process is likely to be slow. The rise of electronic publishing paths may lead to improvements in error detection and correction but many traditional publications currently do not seem to favour the e-publication path and it may be some time before we have communication systems that allow a reader to directly and publicly interrogate an author to seek clarification.

One way that electronic systems deal with possible channel problems is to transmit the signal along a number of paths with an intelligent receiving device selecting the most error-free path from moment to moment. These are known as multiple diversity systems and human readers can replicate this approach by referring to multiple publications that lie in the same area of interest. Comparison of a number of sources may allow the reader to identify errors and also possibly to correct them.

3.4.5 Encoding, decoding and fields of experience

Although the Shannon and Weaver data-oriented model in Figure 3-6 was a significant model for considering data transmission systems communication from a mathematical perspective it was recognized that it had some limitations when applied to broader human communication processes. For human communication there is a need to consider how the signals may express the desired meaning of the transmitter in a way that accommodates the contexts of both transmitter and receiver. The purely engineering communication model was therefore later developed into a more suitable form that appreciated the human communication processes. For example, Berlo's (1960) SMCR model of communication, shown in Figure 3-8, places the linear transfer model of Shannon and Weaver into the context of the human communication process. This model acknowledges the role of all five human sensory capabilities and thus offers maximum utilization of human communication capacities.

SOURCE	<i>Encodes</i>	MESSAGE	CHANNEL	<i>Decodes</i>	RECEIVER
Communication skills		Content	Hearing		Communication skills
Attitudes		Elements	Seeing		Attitudes
Knowledge		Treatment	Touching		Knowledge
Social system		Structure	Smelling		Social system
Culture			Tasting		Culture

Figure 3-8: Berlo's SMCR model of human communication

Schramm (1954) also extended the Shannon and Weaver model to deal with the “communication, reception and interpretation of meaningful symbols” and introduced the idea that both source and destination were embedded in human fields of experience (Figure 3-9). It was argued that the fields of experience of the sender and receiver must overlap and that there must be a feedback process to establish and maintain effective communication. These fields of experience provide the context that encapsulate the communication process and thus allow for the sharing of meaning.

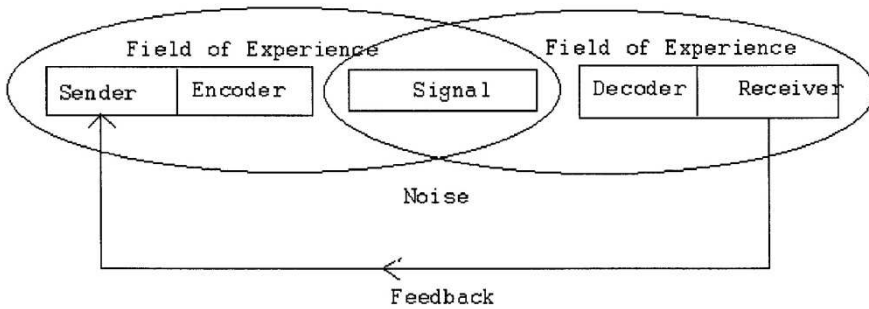


Figure 3-9: Shannon and Weaver model, as modified by Schramm

A slightly different view, again from Schramm (1954), is shown in Figure 3-10 and this diagram more overtly includes the idea of messages and interpretation.

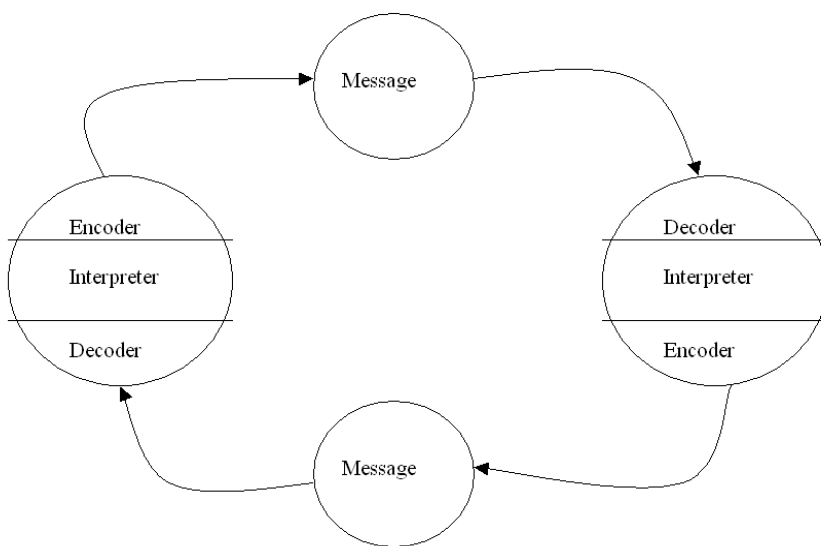


Figure 3-10 Feedback, messages and interpretation

The model is still quite basic and only shows two parties involved in the communication process but captures the idea of interpretation and circular ‘conversations’ rather than just transmission of a single message from party to party. ‘Message’ can be seen as a value neutral word, having the same sense as ‘data’ in the Shannon and Weaver model, in which case ‘interpretation’ becomes the differentiating factor between the two models.

Interpretation is the process of placing the data into a recipients frame of reference where some meaning can be derived from the utterances of the sender. Interpretation may, or may not, lead to the meaning decoded from the message being the same as that held or intended by the sender. If there is a mismatch between the intended meaning of the sender and the receiver’s interpretation we can argue that this represents a distortion of the signal, in other words interpretation in human communication systems can be regarded in the same light as noise in electronic data transmission systems. Other distortions that may occur will be due to the ability of the receiver to correctly perceive the signal, personal bias, limitations in one or more components of the channel, linguistic ambiguity, the effects of political or intellectual power distance between sender and receiver, and so on. These will be considered in more detail later in this section where they will be considered from the point of view of cognitive filters, analogues of the electrical filters discussed earlier.

3.5 Communication and Knowledge Management

Two constitutive elements were identified for ISDMs, namely the underlying philosophy and the associated tools and techniques. For understanding of the totality of an ISDM to be achieved both elements have to be communicated from originator to other members of the interested community and this can be viewed from a knowledge management perspective.

Nonaka, Toyama and Konno (2000) indicate that overall knowledge within a community will be generated through a spiral process that moves through four key stages. These stages are illustrated in their SECI model (Figure 3-11) where they are labeled as Socialisation (from tacit to tacit), Externalisation (from tacit to explicit), Combination (explicit to explicit) and Internalisation (explicit to tacit).

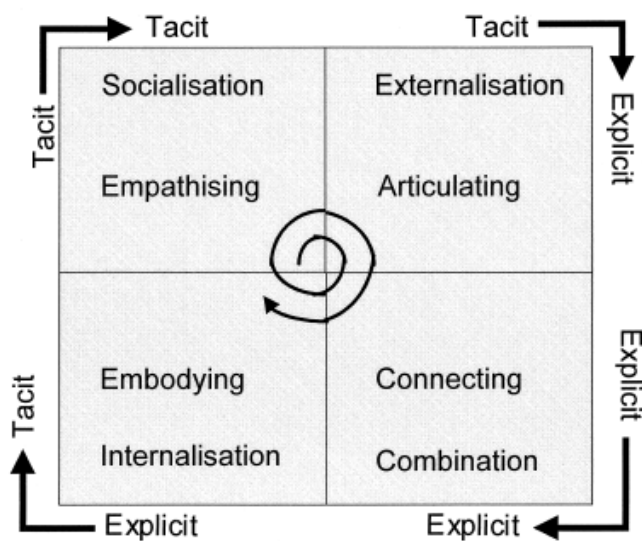


Figure 3-11 SECI model (Nonaka, Toyama and Konno, 2000, p.12)

Nonaka et al view the movement through the four stages as a spiral rather than as a circle because the dynamics within the knowledge sharing and creation process lead to increasing interaction, or amplification, between the tacit and explicit components.

3.5.1 *Explicit*

Nonaka et al suggest that explicit knowledge can be expressed in ‘formal and systematic language and shared in the form of data, scientific formulae, specifications, manuals and such like’ and as such can be managed relatively easily. In the case of ISDMs the explicit elements can be regarded as representing the ‘how’ aspects of the ISDM which would include formal methods, tools and technique. The tools and techniques can be disseminated by the ISDM originator through a process of externalisation and articulation (tacit to explicit) and then communicated to the target audience via formal publication channels (explicit to explicit). The recipient then internalises the material (explicit to tacit). There is a risk that the externalisation and internalisation phases may introduce distortions through linguistic issues or that the explicit to explicit connecting part of the channel may introduce distortions but the material relating to tools and techniques materials should remain largely intact.

3.5.2 *Tacit*

The tacit elements, or the ‘Why’ aspects of the ISDM are more difficult to communicate because they are derived from the personal characteristics of the individual and would include their belief system, worldview and so on. Nonaka et al state that tacit knowledge:

“... is highly personal and hard to formalise. Subjective insights, intuitions and hunches fall into this category of knowledge. Tacit knowledge is deeply rooted in action, procedures, routines, commitment, ideals, values and emotions. It ‘indwells’ in a comprehensive cognisance of the human mind and body. It is difficult to communicate tacit knowledge to others, since it is an analogue process that requires a kind of ‘simultaneous processing’.” (Nonaka et al, 2000, p.7)

The tacit aspect of individual ISDMs can be viewed as representing the philosophy or worldview within which the overall methodology was developed (the ‘Why’ component) and would be likely to be represented more strongly more broadly articulated in the ‘findings, issues’ and ‘debate’ feedback path. Busch, Richards and Dampney (2001) further reduce tacit knowledge to that which is articulable and that which is not. They used graphical content analysis software to subjectively analyse 64 primary text documents and generate a large wordlist from the document markup process (Table 4).

In their view articulable knowledge includes the following key words: *process, routine, tasks, rule, procedure, rule of thumb, practical know how, technique, way things are done,*

understanding of categories, justified true belief, methods, complex multiconditional rules, prescriptive knowledge and script. These words would appear to have a strong affinity with the ‘method’ aspect of ISDMs. These concepts can be expressed by a developer in the sense that they can be taken from the tacit representations of ISDMs in their particular worldview and made public.

Some of the inarticulable aspects identified by Busch et al include: *experience, intuition, knowing, sub-conscious, Weltanschauung, background knowledge, idiosyncratic, ingrained, knowledge possessed by itself, holistic in nature, out of the corner of the eye, paradigms, personality, practice wisdom, reflection in action, reflection upon reflection and thinking in practice.* These words reflect a more internalized and embedded set of concepts that are likely to be considerably more difficult to articulate, that is to make explicit.

Articulable Tacit Knowledge	Inarticulable Tacit Knowledge
{Know how, Culture, Externalisation, Understanding, Process, Practice, Behaviour, Beliefs, Face to face transfer, Goal attainment, Maxims, Perceptions, Procedural in nature, Routine, Subjectivity, Tasks, Technology, Values, Common sense, Decision making, Information, Judgement, Everyday situations, Interaction, Job knowledge, Riding a bicycle, Rule, Schema, Wisdom, Abstraction, Access constraints, Competitive advantage, Ideals, Meaning, Observation, Performance, Procedures, Rules of thumb, Semantics, Convincing people, Crafts, Customs, Data, Expectations, Hunches, Imitation, Innovation, Knowledge of designs, Negotiation, Perspectives, Practical know how, Reproduction, Stories, Swimming, Technique, Tradition, Tricks, Way things are done, All purpose algorithms, Analogies, Aphorisms, Artistic vision, Assumptions, Business knowledge, Understanding of categories, Concepts, Constructs, Content, Contradiction, Customer's attitudes, Descriptors, Discussion, Examples can be articulated, Grammatical rules, Gut feel, Habits, Heuristics, Impressions, Justified true belief, Knowledge base that enables us to face the everyday world, Logical rules, Information placed in meaningful context - eg. Message, Methods, Complex multiconditional rules, Abstract high level plans, Political correctness, Prescriptive knowledge, Principles, Private knowledge, Proverbs, Ritual, Script/Scripted, Shop lore, Task management, Team coordination, Theories, Trial and error} ∈ aTK	{Skill, Experience, Intuition, Action, Expertise, Knowing, Sub-consciousness, Mental models, Abilities, Management, Society, Inferences, Learning by doing, Non awareness, Pattern recognition, Implicit, Implied, No idea, Unconscious, Know more than we can tell, Physical control, Touch sensitivity, Awareness, Emotions, Focal awareness, Insight, Motor skills, Practical intelligence, Selective comparison, Sense perception, Accomplishment, Action oriented know how, Adaptation, Automatic, Between the lines, Lip service, Rooted, Semiconscious, Short term, Weltanschauung, See as' rather than see, Accidental, Action slips, Ad hoc, After the fact, Analysis, Application, Attention, Automatic knowledge, Background knowledge, Body language, Charisma, Concentration, Coordination, Diagnostic closure, Executive commitment, Exists, Force/tension required, Gaining promotion, Gaining respect, Getting one's feet wet, Hands on teaching, Have a feeling, Here and now, Hidden, High level goals, How to seek out, create and enjoy challenges, Idiosyncratic, Immutable, Indeterminacy, Informating, Ingrained, Inspiration, Instinctive reaction, Intangibility, Intimacy, Involuntary, Know why, Knowledge possessed by itself, Learning the ropes, Managing relationships, Managing subordinates, Manual dexterity, Meaning requires tacit component, Mediation, Metacognitive understanding, Motivation, Inferred from actions/statements, Networking, Noiseless, Holistic in nature, Non focus on parts, Orientation, Way things ought to be, Out of the corner of the eye, Paradigms, Personality, Place, Possessed, Power, Practice wisdom, Preciousness, Presuppositions, Principles, Product of process, Proximal knowledge, Psychomotor skills, Recognition, Reflection in action, Reflection upon reflection, Relativity, Residual category, Second hand, Second nature, Smell, Socialisation, Spatial awareness, Spontaneity, Thinking in practice, Tool, Recognition of musical note, Unanalysed, Vision, Vivid, Wholeness} ∈ iTK

Table 4: Articulable and Inarticulable knowledge (Busch, Richards and Dampney, 2001, p.3)

In the case of ISDMs Both the explicit and the tacit have to transferred from the originator through the communication channel to the intended audience as completely as possible to ensure that the methods etc are placed in the context of the underlying philosophy

Two explicit and tacit feedback paths can be added to Figure 3-2 and these are highlighted in Figure 3-12. The solid feedback arrow at the left of the figure relates to tools and techniques whilst the broken arrow at the left of the figure can be regarded as relating to the more philosophical aspects ISDMs.

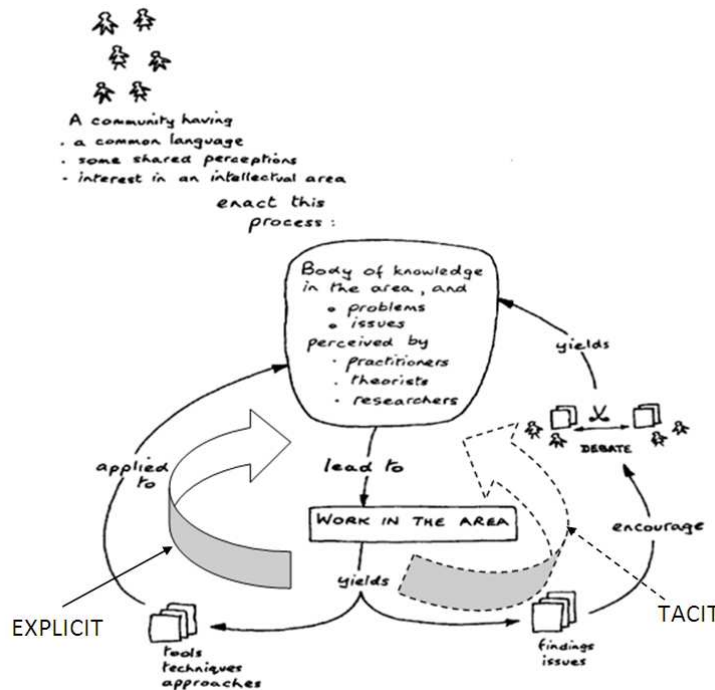


Figure 3-12: Explicit and tacit feedback paths

3.6 Communication paths

The next section explores some of the issues surrounding communication between ISDM originators and potential users based on the typical ways in which ISDMs are communicated through different paths. These include face-to-face settings, conferences and presentations (essentially sustained face-to-face situations but with limited temporal opportunities) and publication-only routes.

3.6.1 Sustained face-to-face

Two variations of this mode are considered here, namely long term and short-term discursive relationships. The first mode is face-to-face over an extended period of time. In the most extreme example of this mode the span of communication would be one-to-one with the opportunity for regular feedback opportunities and where utilization of the total human channel capacity is available. Examples of this situation would include ongoing formal and informal relationships between co-located individuals within institutional groupings (ie a tertiary educational provider or an organisation engaged in systems development) or between an ISDM developer and an acolyte. An example of the latter case would be between an academic (or an academic/practitioner) who has developed an ISDM

and a research student. These actors will typically work closely together over a number of years, testing or further refining the ISDM, and this close working relationship typically tends to lead to shared cognitive and behavioural similarities that result from the communicative process (Leenders, 1995). In the most extreme case the acolyte works with the ISDM developer in their 'natural habitat', that is, in a situation that may draw upon not only academic exploration of the explicit details of the ISDM itself but also upon the underlying social values and beliefs of the individuals. Through this process of personal discussion and writing all of the steps within the SECI matrix can be achieved, with both the explicit (method, or 'How') and the tacit (philosophy, or 'Why') aspects of the overall ISDM becoming visible and being shared. The extent of that visibility and sharing will, of course, depend upon a variety of social characteristics of the individuals, including the actual or perceived power distances, the personal traits and sensitivities of the individuals concerned and so on. The key point here is that all of the various elements of Berlo's (1960) SMCR communication model are present and thus the full bandwidth of the communication process can be utilized, with closely coupled feedback allowing for ongoing and immediate clarification of any areas of doubt. This is therefore the richest communication setting for individuals to work in.

3.6.2 Limited face-to-face: Conferences and presentations

A second face-to-face mode would be situations where shorter or irregular meetings occur. An example of this would be a conference where the presenter can be seen in action, can be asked questions in the formal session and where there may also be opportunities for extended conversations outside the formal session but still within the duration of the conference. This again provides full human bandwidth opportunities but the limited availability for close or extended contact reduces and limits the opportunities for deeper understandings to be acquired. The performance agenda and style of the presenter may also mask the deeper values of the individual. The audience may only be familiar with the work of the presenter through their publications and they may therefore arrive at the session with a pre-formed view that may or may not be open to influence. In this situation the method and perhaps some of the underpinning philosophy may become visible through the presentation of cases but at an abridged level when compared with the extended face-to-face communication mode. The quadrants of the SECI matrix that are active will vary depending upon the intent of the presenter. A pure presentation of technique or case study may fall very much within the explicit to explicit quadrant for those unfamiliar with the material or within the explicit to tacit quadrant for those who have some prior

understanding. Opportunities to ask questions at the end of the session may move the presenter briefly into the tacit to explicit quadrant and extended conversations during breaks may open the tacit to tacit sector. For most participants however only a limited number of the quadrants will be accessible, limiting the opportunities for deeper learning to take place.

We also have to recognize that some conferences accept papers that are not reviewed, leading to the publication of hoax papers such as the Stribling, Aguayo and Krohn (2005) “*Router: A Methodology for the Typical Unification of Access Points and Redundancy*” paper generated by SCIgen software and accepted by a large US based conference. SCIgen is a program designed to generate random Computer Science research papers, including graphs, figures, and citations. There are many other reports of fake abstracts and papers being submitted to conferences where they have been accepted for publication. For a practitioner or student there would be no way of knowing that such papers were hoaxes unless every paper is treated as suspicious and the credibility of its origins determined.

3.6.3 Journals

Journals are both the means by which a field or discipline certifies additions to its body of accepted knowledge and also the means by which authors of journal papers compete for recognition (Campanario and Acedo, 2004). A key path for the dissemination of ideas from an ISDM originator to a potential user of that ISDM will be that of formal publication. The publication process supports the externalisation, connection and, potentially, internalisation phases of the SECI model. The electronic data transmission analogies used in the opening of this section of the chapter can be usefully revisited here. The transmission of intellectual ideas through various publication paths leads to distortions that result from the transmission process in broadly the same way that the various devices involved in electronic communication introduce distortions. Journals are the equivalent of filters in electronic communication systems and will act in such a way that some parts of the overall story are blocked, or emphasised, more than others. This is not to suggest that journals have some sinister or hidden agenda. A journal operates in a market place and has to have a clearly recognizable brand and flavour that will appeal to specific sectors of the overall market and this automatically leads to the existence of cognitive filters that have the effect of modifying the transmission characteristics of the publication channel. Schramm (1955) makes the same observation about newspapers when he questions why large newspapers, on the average, use only around half of the freedom they have to draw upon a wide range of news sources. He suggests that the main explanation for this is “simply that this is the

editors' definition of what their clientele want, and can absorb, and should have, and can be given within the bounds of physical limits and customs.”(p.139)

The characteristics of the editorial filters are thus created by the paradigmatic preferences of specific publications and serve to selectively screen or modify the semantic and syntactic flow of the information through the channel. In common with electronic filters these operate by only allowing the passage of information that fits within the favoured paradigms and are the equivalent of electrical band stop or band pass filters. For example they may only accept cases that are based in specific continents, or may only accept quantitative papers and discourage qualitative ones or vice versa. Kassirer (1992) notes that the editors of the New England Journal of Medicine state that rejection of submitted papers is motivated by “the paper’s lack of originality, the dubious scientific precision, style or appeal to readers”. Originality and scientific precision would appear to be reasonably amenable to objective judgement but style and ‘appeal’ seem to be more subjective and open to greater latitude of interpretation. Other researchers suggest that bias, negligence, and favouritism in the peer review process may also play a role and suggest that there are major flaws when there is evidence that rejected papers eventually earn Nobel prizes for their authors (Campanario, 1998, Part 1). He argues that the reasons for such rejections may be that the papers did not fit the common or prevailing paradigms leading to some skepticism on the part of the reviewers. This can be viewed as the outcome of the application of a specific ‘filter’ to the editorial process. One example of this is cited by Revans (1983) who published his views of the issues relating to work and morale in large and small coalmining communities. In 1953 his views challenged conventional thinking at that time and he remarks:

“As in all innovation that touches the world of academic ideas, the tract was ridiculed, since the economists were doing well on their theories of "scale", exploited by the management consultants to restructure most of our corporations, from the Bank of England downwards, with a concentration of executive power in the hands of expert camarillas. Not until this dose of management science had almost killed the patient did the gospel of *Small is Beautiful* burst upon the universe ...” (Revans, 1983, p.4)

There are also distortions that have emerged as a result of a focus on publication citation indices. Gray (2009) posted a message to the AISWORLD Information Systems World Listserv (ISWorld) on February 13th 2009 seeking comments on a communication he had received from a Springer journal on whose editorial board he served. The message to Gray from the journal owner stated that: “... henceforth all articles that are accepted for publication to <journal x> should cite at least five <journal x> articles. This is common

practice for all top journals”. The three questions he posed to the ISWorld community were; “Is this practice common?”, “Is it appropriate?” and “Is it ethical?” Gray received 126 responses with 31 indicating that they felt that this was common, with 18 respondents describing experiences in which they were asked to add journal self references. Many respondents considered that journals acting in this way could be considered as being unethical.

The growth in the number of journals and conferences has led to a growing need for reviewers to satisfy the need for papers to be seen to be peer reviewed. Campanario and Acedo (2004), commenting on scientific journals, note that manuscript quality rests on the pre-publication selection process, that is, upon a peer review system where, typically, two or more reviewers assess “the soundness of a manuscripts ideas and results, its methodological and conceptual viewpoint, its quality, and its potential impact on the world of science” (p60). Peer review is thus perceived as a cornerstone of credibility in academic publishing.

LaFollette (1983) comments that:

“There exists an assumption that review by referees and journal editors ensures some degree of reliability. Once a paper has cleared peer review, we all want to believe (and take it for granted) that the ideas expressed in the manuscript are valid, and that the technical aspects of the methodology are satisfactory. Readers and users of journals seek some form of virtue and sincerity without the need to check up on their colleagues to assure that work is authentic.” (LaFollette, 1983, p.3)

In an ISWorld discussion Kaschek (2009) commented that:

“Unfortunately editors of conference proceedings often do not take the time to validate the quality of reviews and base their decisions on whatever they get delivered from the reviewers. The consequence is that often the taste of the reviewers is the decision criteria for publication rather than the merits of the paper.”

Much published academic material avoids first-person writing and thus the values and other personal elements that reflect the worldview of the author are potentially less obvious than the more subject-related aspects of the writing. The combined effect of each filter, especially where there are particularly strong paradigmatic boundaries, upon this less robust element may be to seriously attenuate the philosophical (Tacit, or ‘Why’) components more than the raw data that represents the Explicit (‘How’) components from the overall message.

The Explicit path which carries information relating to tools, and techniques, (or the ‘Method’) may be relatively uncorrupted during transmission and any distortion may be more attributed to translation errors than interpretive errors. The Tacit path, representing

the philosophical aspects of the overall ISDM may suffer either loss or distortion as it passes through the various interpretive layers in the communication channel.

3.7 Feedback

In typical paper-based publications the opportunity for feedback, in the form of open public discussion is rather limited although there are examples of extended ‘conversations’ to be found in some publications. Collected papers in special editions form an ideal way to present an argument within the field, but more often the conversation will be spread over a number of issues and may be difficult to track. In 2006 the Scandinavian Journal of Information Systems presented a discussion in the form of a special edition based on an extended series of papers based around Wyssusek’s (Wyssuek, 2006) critical review of the Bunge-Wand-Weber (BWW) modeling ontology and its philosophical foundations. The papers presented critical views of the work of Wyssuek and included a response from Wyssuek to those critiques, representing a useful in-text public dialogue for the community who subscribe to that journal. This leads to the discussion being paced by the publication schedule and thus the overall conversation may extend over a period of at least months and possibly years. However, even these discussion in reputable journals can introduce distortions. For example, a 1999 paper by Seddon, Staples, Patnayakuni and Bowtell titled “Dimensions of Information Systems Success” in the Communications of the Association for Information Systems was subsequently responded to by Alter who opens by referring to their paper “Dimensions in Information System Effectiveness”. The paper bears the correct name in the reference section of the Alter paper. Seddon et al then reinforce the distortion in a response, in the same journal, to Alter, opening with “Alter’s critique of our “Dimensions of IS Effectiveness” paper ...”, although, again, their reference section contains the correct name of the paper. They may, of course, have been too polite to correct Alter (although this should perhaps have been the role of the journal editor) and it is interesting that they refer to their paper simply as the “Dimensions” paper in their response. In their response paper Seddon et al note that “As indicated by Alter’s letter and our response, there is potential for confusion when the meaning of terms can be interpreted in different ways by different authors and readers”. The Seddon, Staples, Patnayakuni and Bowtell paper was concerned with effectiveness but even so one would expect that the title would be correctly cited by Alter (2000). This may be a case where he was looking at the paper through an ‘effectiveness’ filter (or schema) and this was in his mind when he incorrectly cited the paper. If such obvious distortions as the title of a paper go uncorrected then one would need to be cognisant of the potential for deeper errors to pass unnoticed through the communication channel.

3.7.1 *Back channels*

Publicly available conversations may be the only visible part of broader narratives because the parties engaged in their debate in a public space may well have a ‘back channel’ that is used between published responses. The term back channel is being used here to describe a private channel used by the participants only, for example email or private face-to-face meetings. The term is typically used in the context of ‘back channel negotiation’ in political settings where they are described as “official negotiations conducted in secret between the parties in a dispute” (Wanis-St. John, 2006, p120) and operated in parallel with official channels (“front channels”). Wanis-St. John also describes them as “black markets” that provide separate negotiation spaces where bargaining takes place “in the shadows”. Interestingly the term back channel is now finding currency as a description of the sub-communication channels that can be found at some academic conferences where participants arrange meetings, exchange comments about the sessions they have attended and so on without the need to distract the speaker (McCarthy and Boyd, 2005, p.1641). These appear to be built upon the back channels that are found in some online collaborative systems. The consequence of a back channel is that some readers of journals or participants in conferences who only have access to the publicly available channel will miss parts of the overall conversation or even feel that the ‘real’ debate is taking place behind closed doors, possibly leading to the alienation of those readers.

3.7.2 *‘Front channels’*

For many people in the IS field the opportunities to engage in an extended face-to-face conversation with the developer of an ISDM are limited, and consequently the opportunities to gain detailed insight to both the method and philosophical components of the total ISDM are limited. One obvious limitation is that the ISDM originator has to be alive, and this will not always be the case. Assuming that ISDM originators are alive and do choose to attend conferences it may still be difficult for interested parties to also attend given the time and resource constraints that act upon many people and certainly upon those in educational organizations. Given such constraints other channels have to be considered and practically these are restricted to email or telephonic conversations or, more likely, to published resources. Email and telephonic routes assume that the ISDM originator is both willing and has the time to engage in such conversations and one would anticipate that these communication paths would be utilized primarily amongst parties who already know each other, or at the very least are familiar with, and value the work of, the parties seeking such communications. This leaves publications, in the form of books, journals, conference

papers and so on, as the primary resource for most people who are seeking to gain an understanding of a specific ISDM.

When an ISDM originator attempts to capture their own thoughts and express them in a particular way, ie for publication in a specific document the encoding process takes the form of presenting an interpretation of actual and perceived events using signs and symbols that are appropriate for the chosen transmission media. What is encoded may not necessarily be a true representation of what actually happened. Argyris and Schön (1989) suggests that individuals have theories and actions that actually take place as well as espoused views of what occurred. The espoused views, or views of what the individual thought had occurred, may represent an interpretation that re-frames the events in the light of an intended theory or planned set of actions. This is not, of course, falsification or an intent to mislead as the transmitted material represents justified true belief.

3.8 Multiple node communication paths

When the communication path includes multiple stages of decoding, interpretation and re-coding for onward transmission any distortions may be magnified and the potential for errors across the channel as a whole is significantly increased.

The recipients of the broadcast will each be located within their own fields of experience. The overall field may be that of IS, but, as has already been indicated, there are many 'flavours' of IS, each a product of a particular worldview. At each interpretive node the received material is subjected to some deliberate or accidental interpretive or other process that is predicated upon the worldview of that individual. Each of the individual destinations may, in turn, become sources once the received material has been interpreted and contextualised within their own worldviews. This process may continue through a number of intermediaries with further transmissions, receptions, interpretations, re-contextualisations and so on as illustrated in Figure 3-13.

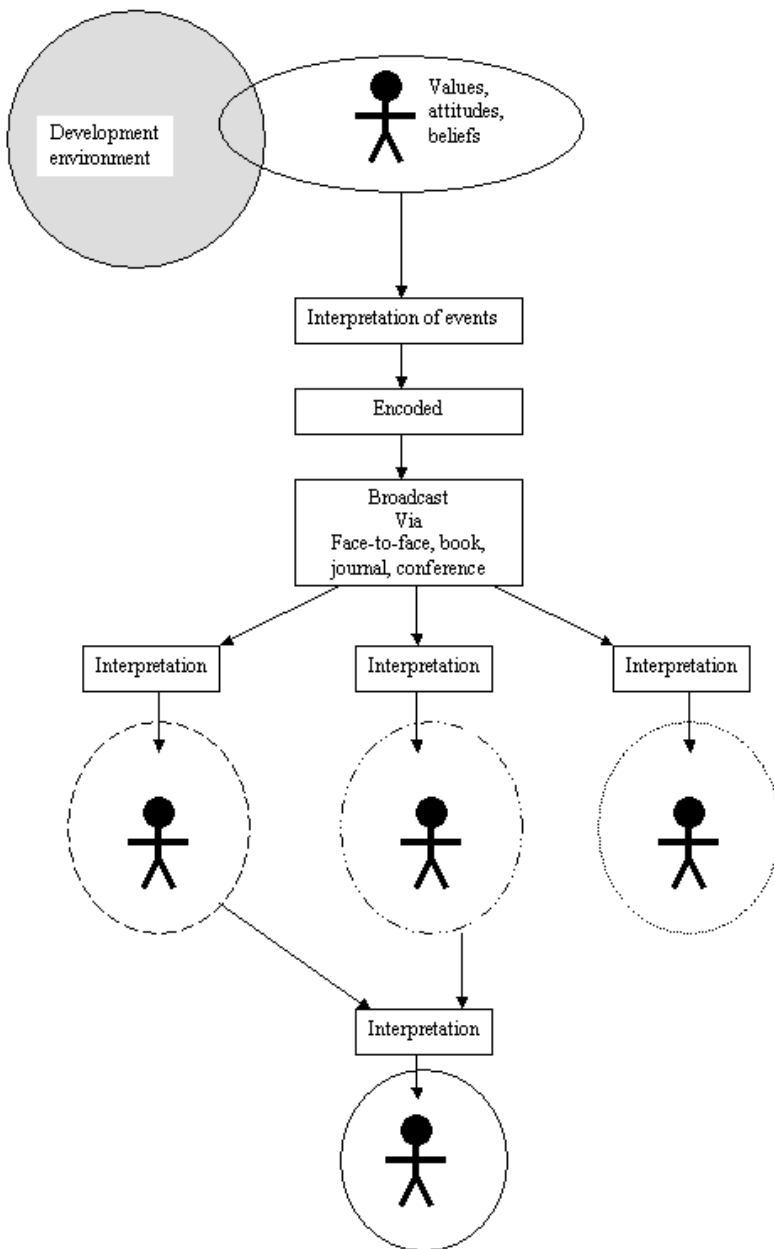


Figure 3-13 Multiple interpretations

Every document referring to an ISDM will therefore have a particular transmission distance from source to destination. As the transmission distance between the ISDM originator and reader increases the number of interpretations grows and consequently the probability of distortion will also increase. Holwell (1997), commenting specifically on Soft Systems Methodology (SSM), notes that in the interpretation of SSM by some authors “concepts and body of knowledge are confused, divergent and not agreed”. She also remarks that “various uses of the same terms combined with a multiplicity of perspectives results in terminological confusion or ‘semantic pollution’”. Holwell (2000) identified a considerable number of errors and misunderstandings in the secondary literature relating to Checkland’s Soft System Methodology (SSM) and came to the conclusion that “For

anyone interested in critical use of the ideas, then these contradictions, gaps, and poor understanding make general use of the secondary literature something of a dubious undertaking” (Holwell,2000, p.792). She comments that the “sheer number of inadequate and/or wrong accounts is important because the secondary literature is becoming more influential: not because it contains new insights but because errors in one secondary source are being repeated in others” (Holwell, 2000, p.781/2). Her concern is that secondary sources are being used more often than primary literature to locate definitions or argument and this all too frequently leads to false understanding of the fundamental, or ‘true’ nature of SSM. She is often quite scathing about some literature, in one case highlighting many errors in a short section of a document before commenting that:

“This account could simply be dismissed as demonstrating an incompetent understanding of Checkland’s work (which it clearly is), but nevertheless, given that it is not untypical, it is relevant; after all, the authors considered “SSM” to be of sufficient importance to include it in their book, however they actually understand it” (Holwell, 2000, p.781).

Holwell was a student of Checkland and has co-written papers and books with him and thus has a deep one-to-one personal understanding of ‘pure’ SSM that can probably only be equalled by others who were also his students. This is a good example of a developer/acolyte relationship. If one believes that methodologies have to be used in the exact way as the originator used them, as Holwell appears to believe, then clearly it is important to have a comprehensive understanding of the constitutive rules that are relevant to that approach. (Although it has to be acknowledged here that Holwell does not regard SSM as an ISDM, despite it being suggested as being one by such authors as Avison and Fitzgerald.) One problem here is that Holwell had close face-to-face contact with Checkland and thus was privileged to have more insight into the totality of Checkland’s thinking. Than most other parties interested in SSM. In many ways this echoes the cellist Casals (Blum, 1977, p.142) who comments that Bach, in common with other composers in his era personally supervised performances of his own music and therefore left little detail in his scores that would help other performers. Casals comments that ‘They always say “play what is written” – but there is *nothing* written!’ and that the fundamental challenge to the interpreter is to ‘find the design’ implied by the contours of the music.

3.8.1 Differential distortion – tacit and explicit

For an ISDM to be fully appreciated both the philosophical and the tools and techniques elements, that is the tacit and the explicit components, need to be communicated.

In the face-to-face environment, particularly in the ISDM/acolyte relationship, there is maximum opportunity for the full SECI process to be completed with the minimum of distortion. Thus both the explicit and tacit elements of the phenomena under consideration are visible.

However in the case of multiple node communication where the communication path is longer and subject to a variety of distortions there is a possibility that selective parts of the overall signal will be lost. Figure 3-14 shows how the two parts of the ISDM signal are carried in a communication channel that includes one intermediary node. In this case the boxes labelled as filters will have all of the characteristics previously considered but will act in different ways upon the two signal paths.

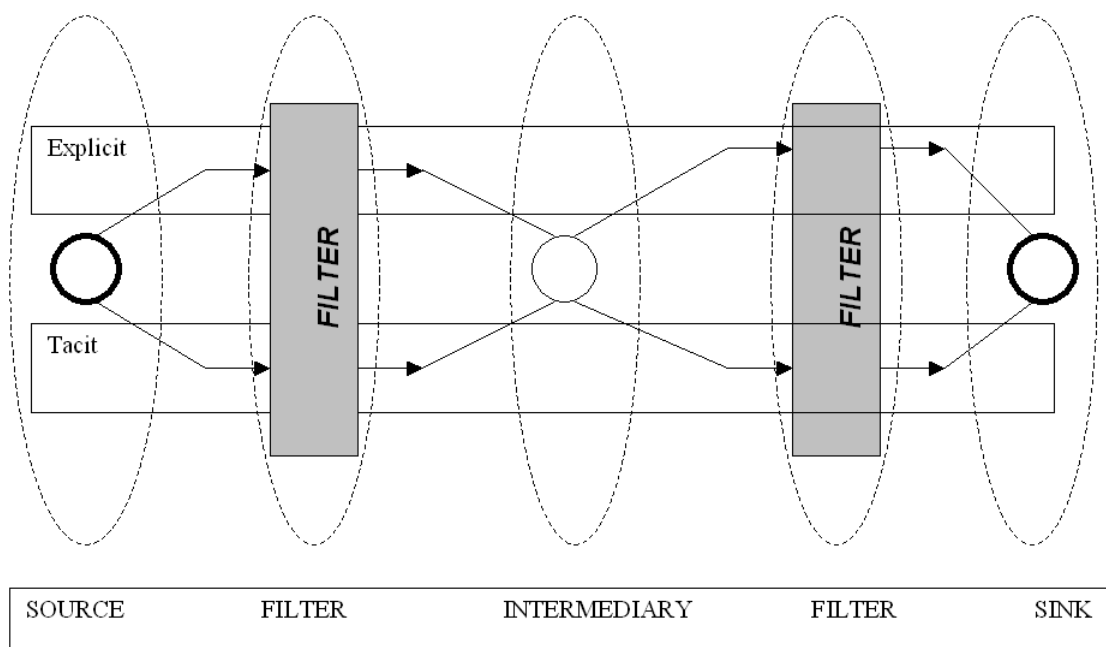


Figure 3-14 Tacit and explicit paths

The Explicit path which carries information relating to tools, and techniques, (or the 'Method') may be relatively uncorrupted during transmission and any distortion may be more attributed to translation errors than interpretive errors. The Tacit path, representing the philosophical aspects of the overall ISDM may suffer either loss or distortion as it passes through the various interpretive layers in the communication channel. What may be lost in this path therefore relates to the belief systems or Weltanschauung of the originator. The only way to partially recover elements of this part of the overall signal is to examine the profile of the originator and attempt to understand their perspectives. This concern formed a key part of the ISDM course design and led to the use of role play based on a

variety of key figures in the systems development and quality arenas. This will be considered in more detail in the chapter that explores the course development.

3.9 Communication with self: Reflection

The final communication system that needs to be considered is that of an individual's internal dialogue, or reflection. This dialogue can take place as action is being performed or can be a more deliberate post-event reflection. Such internal conversations can act to validate previous understanding of ISDMs or can mark the start of revision of existing beliefs. This process of internal debate will be considered in more detail in the course design chapter where it will be considered from the perspectives of both students and practitioners.

3.10 Chapter Summary

Chapter 2 identified the complexity of language used in the ISDM domain and considered how this impacts on approaches to understanding the subject area. This chapter has further added to the complex situation that occurs when attempts are made to communicate already ambiguous ideas about ISDMs from the worldview of an ISDM originator to a broader group of interested parties. Those interested parties may include other ISDM developers, students, faculty and practitioners.

The communication channels that connect ISDM originators to the broader community of interested parties contain a number of sources of distortion that vary in their connection distance between the various communicating parties.

Two constitutive components of ISDMs, namely the philosophical underpinnings and the tools and techniques used in the execution of systems development, were identified and related to tacit and explicit knowledge respectively.

The combined effects of the inherent ambiguity and communicative distortions can lead to a position where there is a lack of clarity about exactly what ISDMs are. The argument submitted here is that unless a full appreciation is held of all of the constituent parts of a methodology it is not possible to compare them and, in turn, to choose one that suits the style of a developer and the needs of the client organisation.

The next chapter explains how the research approach was developed in the light of these issues.

CHAPTER 4: RESEARCH APPROACH

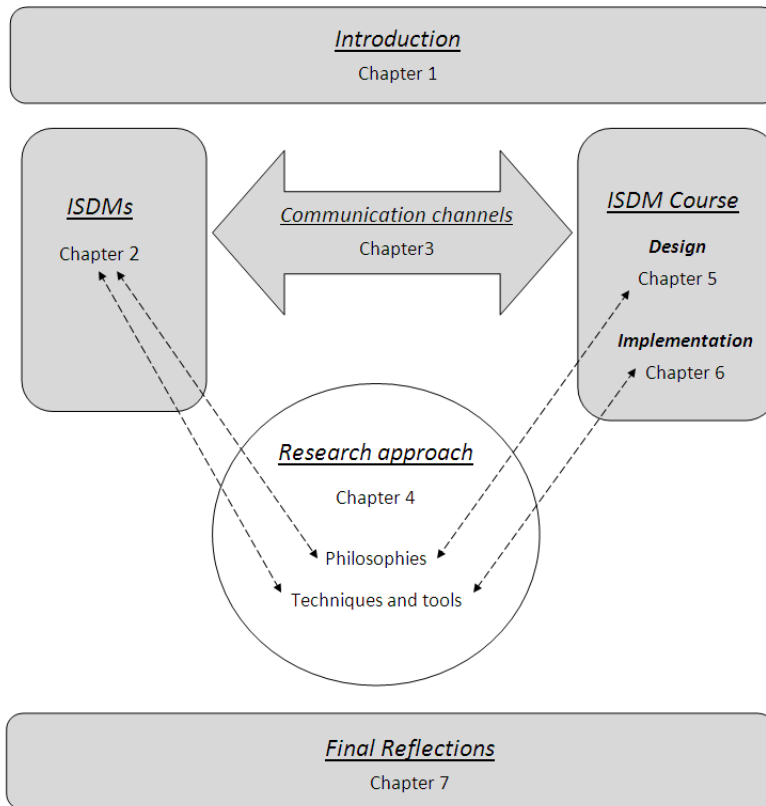


Figure 4-1: Chapter focus - Research Approach

4.1 Introduction

The central issue being explored in this thesis is that of developing an information systems development methodology course that would allow Masters students to confront the complex issue of the tension between an abundant reservoir of material describing how to develop systems contrasted with an equally abundant collection of literature implying that they would be unlikely to succeed in practice. Such a course represents a purposive system that has the goal just described. A member of faculty developing such a system can be regarded as a system designer and is thus subject to the same development tension identified here. Developing a reflexive system that examines systems development becomes a combination of theory and practice, with the reflective developer/educator also needing to be reflective researcher. This intimate weaving of theory and practice in an action-based environment combined with the existing worldview of the researcher/educator frames and guides the approach adopted.

This chapter focuses upon the research methodology that emerged to support the investigation. As with ISDMs the use of the terminology such as ‘theory’ and

‘methodology’ can be regarded as ambiguous in the research literature. Silverman (1993), for example, comments that the term ‘methodology’ in the context of ‘research methodology’ signifies a general approach to studying research topics, whereas ‘method’ signifies ‘a specific research technique’. In common with the ISDM literature the research methodology and research methods literature also uses language and terminology that is sometimes ambiguous in the sense that the same fundamental idea can be described from a number of positions with each position reflecting differing granularity or specific facets of a limited number of actual positions. Equally both ISDMs and research methodologies can be seen as having two constitutive parts, a guiding philosophy and a set of tools and techniques that support enactment.

This chapter has two main parts; a consideration of the underlying philosophy (epistemology and ontology) that explains why the issue was approached in a particular way and identification of the tools and techniques that were adopted to support the research process.

4.2 Methodological Choice

*I keep six honest serving-men
(They taught me all I knew);
Their names are What and Why and When
And How and Where and Who*

Extract from ‘Just So Stories’, Rudyard Kipling, 1993

Kiplings’ (now probably politically incorrect) ‘six honest serving men’ provide a useful starting point for any piece of research. In terms of this specific research, one set of responses would be:

- **What:** What is the research attempting to achieve? It set out to explore ways in which a course could be developed to encourage students to critically question issues related to ISDMs.
- **Why:** Why was the research carried out? In response to the researchers concern that teaching prescriptive approaches to the development of information systems would not equip students for the real-world where the efficacy of ISDMs was questionable and selection is complex.
- **When:** Over an eight year period from 2000 to 2007. (The design phase took place in 1999)
- **Where:** At an Australian university, originally located in a School of Accounting and Information Systems in a Division of Business and Enterprise, later in a School of Computer and Information Science in a Division of IT, Engineering and the Environment.
- **Who:** Masters students, mostly from outside Australia working with a member of faculty.

The remaining question of 'How' is the focus of this chapter. Before embarking on the path of detailed consideration of the various possible directions a researcher can take, the issue of human choice, and the post-rationalisation of reporting the justification for that specific choice, will be discussed.

4.3 Choosing a research approach: the philosophical influence

The previous chapter noted the difficulties facing practitioners and faculty when they set about choosing an ISDM to either use or to teach about. All ISDMs are embedded in a philosophy and exist to help guide the practitioner and provide a reference point against which reflection can be carried out to support practitioner learning processes. Appropriate tools and techniques can be drawn from a large pool of possibilities but ideally should be chosen align with the underlying philosophy. Essentially the same view will be taken of research methodologies, that is that there are a large number to choose from but all fundamentally support the process of seeking understanding about a particular situation in an organised manner, as well as providing frameworks for reflection and learning. In common with ISDMs, research methodologies can be seen as comprising an underlying philosophical position that can be enacted using a variety of tools and techniques. One could argue the case that all available research methodologies should be examined when undertaking research but, as with ISDM selection, as Simon (1979) notes in the context of decision making, this assumes unlimited time and perfect data:

The classical model [of decision making] calls for knowledge of all the alternatives that are open to choice. It calls for complete knowledge of, or ability to compute, the consequences that will follow on each of the alternatives. It calls for certainty in the decision maker's present and future evaluation of these consequences. It calls for the ability to compare consequences, no matter how diverse and heterogeneous, in terms of some consistent measure of utility. (Simon, 1979, p.500)

Simon concludes that decision makers work within a bounded solution space and seek a satisficing rather than optimal solution:

We do know how the information processing system called Man, faced with complexity beyond his ken, uses his information processing capacities to seek out alternatives, to calculate consequences, to resolve uncertainties, and thereby - sometimes, not always - to find ways of action that are sufficient unto the day, that satisfice. (Simon, 1979, p.511)

An alternative, although very similar, explanation of the limitation of human decision making can be found by considering Schema Theory, a concept originally proposed by Bartlett in 1932. Bartlett, a Gestalt psychologist, believed that understanding takes place mainly in the context of past experiences and memories and used the term schema to describe the mental organization of such past experience. His work was developed further

by a number of researchers and led to the view that reading is a constructive process where there is an interaction between the written material and the reader's prior experiences. These experiences frame the reading process within those past experiences and texts that fit best with existing schema will be favoured over those that do not. Kelly (1955) proposed that the world is viewed in terms of constructs that have defined poles such as old and new, rich and poor and so on, and that we set expectations of the basis of internal construct maps that we use in everyday life. Satisficing, schema and construct maps all help simplify decision making but also may act to limit searches beyond the normal life world of an individual.

Rather than attempt to offer an extensive review of all possible research methodologies and then justify a final choice, the approach being used in this chapter is to recognise that individuals have preferences and that these preferences lead to some approaches being favoured more than others. Although the search space is restricted it largely works from the philosophical position of the researcher and therefore the position of this specific researcher is considered to demonstrate how the eventual research methodology emerged from that position. This produces a more realistic account of the actual research process at this reflective end-point, and also demonstrates how the research developed in an organic rather than mechanistic way. This agile approach allowed for the sometimes unanticipated emergent issues to be opportunistically accommodated and the research re-directed as required. The approach has also been adopted to avoid what Parnas and Clements (1985) refer to as 'fake' documentation, ostensibly produced by information systems developers as part of a rational process:

“The reality of the design process is a tortured discovery process, and the faked documentation disguises the way simple truths emerged. Much of the really useful information (like why alternatives were rejected) is not recorded: We will never find a process that allows us to design software in a perfectly rational way. The good news is that we can fake it.... The process is 'faked' by producing the documents that we would have produced if we had done this the ideal way”. (Parnas & Clements, 1985, p. 251)

Two important and discrete aspects of ISDMs have been previously identified as the underlying philosophy and the supporting tools and techniques. These two attributes also form a useful basis for consideration of research methodologies. Research methodologies are developed from underlying philosophical positions that relate to specific views of the world. Individuals engaged in research and educational design also have philosophical positions and I would argue that this is what bounds their search space when seeking a research methodology. The underlying positions are labelled as ontologies and

epistemologies and it is these that explain why particular approaches are favoured more than others by researchers. These preferences provide a framework, or schema, within which certain approaches are seen as more acceptable than others, the choice thus being predicated more upon a more subjective and satisficing process than a detached, objective or rational basis. The philosophy of the individual researcher is thus highly influential in the initial selection of research methodology, tools and techniques, in a way that parallels ISDM selection.

4.4 Ontologies, Epistemologies and methodologies.

It was noted earlier that ISDMs and research methodologies share the common constitutive features of a guiding philosophy that frames the overall thinking and a set of tools and techniques that allow that thinking to be put into practice. Heron and Reason (1997) neatly encapsulate the work of Guba and Lincoln when they state that paradigms of research are predicated on sets of basic beliefs about the nature of reality and how it may be known, that is by a philosophy. They suggest that these beliefs can be articulated through three fundamental and interrelated questions:

“There is the ontological question, 'What is the form and nature of reality and, therefore, what is there than can be known about it?'; the epistemological question, 'What is the relationship between the knower or would-be knower and what can be known'; and the methodological question, 'How can the inquirer... go about finding out whatever he or she believes can be known about?'”. (Heron and Reason, 1997, p2)

Orlikowski and Baroudi (1991) identify three main ontological positions that describe the positions adopted by researchers, namely positivist, interpretivist and critical.

4.4.1 Positivism

Orlikowski and Baroudi (1991) describe the positivist position as being premised on: “the existence of a priori fixed relationships within phenomena which are typically investigated with structured instrumentation” and suggest that research driven by this position seeks to understand and test theory by using direct measurement in an effort to improve predictive understanding of the phenomena under investigation. Evidence that Orlikowski and Baroudi take as indications of positivistic research “formal propositions, quantifiable measures of variables, hypotheses testing, and the drawing of inferences about a phenomenon from the sample to a stated population.”

A positivist approach was considered to be inappropriate for this particular research. Positivist approaches are predicated on the existence of ‘real’ and measurable data and seek to establish testable theories and models, and this did not appear to fit with the more

speculative thinking behind this thesis. No single testable question is involved in this research, the effort being more focused upon developing a learning system that can be characterised in ISDM terms as prototyping, agile and adaptive. No grand theory of learning was established to be tested and validated, the research taking the form of a reflective journey rather than a controlled experiment. The classroom is a learning environment that is characterised as a place of social intercourse rather than as a laboratory. The final reason that a positivist approach was deemed to be inappropriate was that the relationship between the researcher and the subject of research places the researcher in a dominant position. (Orlikowski and Baroudi, 1991)

4.4.2 Postpositivism/Interpretivism

Postpositivism, also labeled by many authors as interpretivism, arose from dissatisfaction with some aspects of the positivist stance. Whereas positivists accept an objective, accessible and concrete reality, postpositivists subscribe to an objective reality that is only imperfectly accessible (Lincoln & Guba, 2000). Ontologically, interpretive information systems research assumes that the social world (that is, social relations, organizations, division of labor) are not "given." (Orlikowski and Baroudi, 1991) The interpretive stance views human intellectual mechanisms as flawed and that life's phenomena are basically obdurate and therefore, can never be fully captured as "true" reality. A key distinction between the positivist views take theory verification as a key objective while the postpositivist views is oriented more towards theory falsification (Lincoln & Guba, 2000, p. 107, in Denzin and Lincoln, eds, 2000). Interpretive researchers "assume that people create and associate their own subjective and intersubjective meanings as they interact with the world around them. Interpretive researchers thus observe situations and attempt to understand phenomena through accessing the meanings that participants assign to them." Hirschheim and Klein (1989), commenting on both ISDMs and research, observe that:

‘reality is not a given immutable ‘out there’, but is socially constructed. It is the product of the human mind. Social relativism is the paradigm adopted for understanding social phenomena and is primarily involved in explaining the social world from the viewpoint of the organisational agents who directly take part in the social process of reality construction’.

This philosophical position actively rejects the idea that any ‘real’ (‘objective’ or ‘factual’) accounts, particularly of the social world, can exist and can only be viewed in relativistic ways. There is no attempt to create models or theories that can then be applied directly to the broader area of study but instead the focus is upon gaining a deeper understanding of the population under study. They do suggest that the findings can be used to inform other similar settings but do not support the building of predictive models.

Denzin and Lincoln (1998), discussing the interpretive approach that can be labelled as 'phenomenological', note that Husserl argued that the relation between perception and its objects was not passive, but that human consciousness actively constitutes the objects of experience. Denzin and Lincoln comment that "This has become foundational for the qualitative study of reality-constituting practices, but has been turned in a variety of directions".

Schutz (1964) further developed the work of Husserl and placed emphasis upon 'the constitutive nature of consciousness and interaction' (in Denzin and Lincoln, 1998). Schutz describes the life world as the world each individual takes for granted and which is produced and experienced by the members of that life world. This equates to the *Weltanschauung* of Checkland's SSM, described by Checkland (1981) as "the unquestioned image or model of the world which makes this particular human activity system (with its particular transformation process) a meaningful one to consider". Systems developers and educators form members of a particular life world but, interestingly, the communication and interpretive processes that connect this life world do not appear to produce common realities about some of its components such as ISDMs. This suggests that although the life world of developers appears to be interpretive there may be an underlying positivistic assumption that there is a single reality that describes an ISDM and this assumption has led to the acceptance of multiple unchallenged representations of realities.

Schutz noted that 'an individual approaches the life world with a *stock of knowledge* composed of common-sense, constructs and categories that are social in origin'. The source of much of this stock of knowledge in the ISDM field will be derived from shared artefacts in the form of documents. Schutz argues that images, theories, ideas, values, and attitudes are applied to aspects of experience, making them meaningful. Thus a developer may take action based upon their interpretation of SSM, find it does or does not 'work' in practice and use that experience to form an opinion about their interpreted version of SSM. Another individual may use the same basic stock of knowledge but within a different interpretive frame and arrive at a different conclusion about the efficacy of SSM. The outcomes of the process would be individual typifications that would relate to individual judgements of SSM, for example, as being either a useful or an inappropriate methodology to use. A discussion between the two individuals about the value of SSM would be based on the common (incomplete) stock of knowledge that apparently render SSM as being in the same realm of understanding but in fact they may be discussing two different realities.

Denzin and Lincoln (1970) remark that Schutz argued that if human consciousness necessarily typifies, then language is the central medium for transmitting typifications and thereby meaning. They suggest that the essential task of language is to convey information, to describe a particular reality with the result that social phenomenology argues that social interaction constructs as much as conveys meaning.

One of the problems inherent in interpretivist approaches is that the researcher engages with the social reality they are studying and reporting that engagement is problematic because the researcher is part of the reality they are studying. The nature of the social interaction with the group being studied will be viewed through the schema that the researcher brings with them, although the reflective aspect of the research may lead to modifications of those schema. This results in difficulties determining clearly what was planned action and what was action that was in response to the situation. Despite these concerns the interpretive approach appeared to offer a good fit with this research.

4.4.3 Critical

The ‘critical’ researchers actively question the situation under study, questioning taken-for-granted assumptions and attempting to expose the ‘contradictory nature of existing social practices’ (Orlikowski and Baroudi, 1991). Another identifying feature of critical research is that it seeks to be emancipatory by critiquing the prevailing social situation and helping reduce barriers to the realisation of human potential. (Hirschheim and Klein 1989). Orlikowski and Baroudi suggest that:

“... the role of critical research is to expose these hidden contradictions and thereby attempt to reframe the basic oppositions, potentially enacting a different social order. Contemporary critical researchers' view of contradiction is thus closely tied to their critique of class-based societies and capitalist forms of production. In this view, contradiction in social relations can only be removed by transforming the basis of society and the forms of organization and production—a state only attainable with the transcendence of capitalism.” (Orlikowski and Baroudi, 1991)

The first part of this quote resonates well with the research intent in this thesis, namely the exposure and discussion of the central contradiction in the apparent failure of ISDMs to deliver successful outcomes despite the number of possible approaches available. However, the latter part of the quote reveals a distinctive part of the critical approach, namely a concern for social transformation. Although education is clearly a transformative process the design of the ISDM course did not include attempts to cause major changes in the educational, systems development or broader social and cultural structures. Thus there is a critical element in this research, but not at the extreme end of that paradigm.

4.5 The researcher's positions

The previous paragraphs have outlined three possible research positions. One way to more clearly determine the ontological and epistemological positions of this researcher is to briefly paint a biographical picture. As a child I enjoyed taking clocks to pieces to see how they worked (rarely managing to put them back together again) and used to spend summer holidays re-building grandfather's 1920's radio (wireless) sets. As I became older I extended this interest into short-wave listening and later amateur radio, building my own radio equipment. In my first career I was an electronics and communications technician with British Telecom, maintaining complex data communications and video systems. These interests could be regarded as implying a positivistic view of the world – 'things' really existed, were tangible and had clear structures and connections that produced consistently repeatable and explicable outcomes if certain actions were undertaken. When I first taught adult education evening classes I shared these understandings with people who had largely similar views of the world, 'largely' because in one session I was helping the students to etch printed circuit boards as part of their projects and one student asked me if the connecting copper had to be so thinly defined on the substrate. I offered the technical position that in some radio frequency applications the amount of copper left on the substrate was critical but for the type of application we were working on it was not an issue. His mind was in a totally different place to mine, as I realised when he remarked that he saw the copper side of the board as a potential piece of functional artwork and this was why he had asked the question. That question was all the more significant for me because it came at a time when I was beginning to realise that the predictable world of electronics was essentially quite boring. Any technical problem can be solved given sufficient time, test equipment, skills, experience, knowledge and so on. What I was beginning to experience in my work, mainly as a result of changes within the telecommunications sector as it became competitive rather than monopolistic, was ambiguity over roles, disputes over parts of systems owned by different parties, ownership of systems, politics and ethics. None of these new areas lent themselves to simple deconstruction to clearly linked constituent parts that could be easily managed. Although not aware of it I was extending my understanding of technical boundaries, complexity, holism and emergent properties into the human domain. The idea of multiple perspectives, each viable in its own right but none necessarily being 'right', began to attract me and I began to test my thinking in adult education classes by moving from practical electronics towards 'technology and society' classes where discussion and appreciation of other people views became more important than the simple transfer of skills and knowledge. My MPhil research, undertaken during

that same personal transition period, was concerned with what people, as individuals, actually used personal computers for when they were in their home environment and this set an ethnographic research orientation in motion for me. Murillo (1999) notes that:

“Ethnographic inquiry is most appropriate when it places events and people in the social, cultural, and political history and contexts in which they are constituted. It can never be innocent nor neutral, since it is embedded in a political and moral process.” (Murillo, 1999, p. 7.)

This quite long description of my personal journey has been included here to lead towards an explanation of where I am positioned in terms of my worldview. I believe that some things are real and can be broken down to predictable components with causal relationships that can be understood. If I show an electronic device or circuit to a like-minded colleague we do not dispute what the circuit will achieve because we share a common understanding of the science of the object and can demonstrate that our belief is real. In that sense I would regard myself as a positivist. However, I also appreciate that other human domains – including ISDMs, teaching, and research for example – do not lend themselves to such approaches. Language is complex and open to interpretation, and worldviews are coloured by experience and beliefs that cannot be directly experienced by another person – that is, they are local constructions in the minds of others and have their own integrity but are not fully shareable. In that sense I would broadly describe myself as having an interpretivist or phenomenological position.

Table 1
Network of Basic Assumptions Characterizing
The Subjective—Objective Debate within Social Science

	Subjectivist Approaches to Social Science				Objectivist Approaches to Social Science	
Core Ontological Assumptions	reality as a projection of human imagination	reality as a social construction	reality as a realm of symbolic discourse	reality as a contextual field of information	reality as a concrete process	reality as a concrete structure
Assumptions About Human Nature	man as pure spirit, consciousness, being	man as a social constructor; the symbol creator	man as an actor; the symbol user	man as an information processor	man as an adaptor	man as a responder
Basic Epistemological Stance	to obtain phenomenological insight, revelation	to understand how social reality is created	to understand patterns of symbolic discourse	to map contexts	to study systems, process, change	to construct a positivist science
Some Favored Metaphors	transcendental	language game, accomplishment, text	theater, culture	cybernetic	organism	machine
Research Methods	exploration of pure subjectivity	hermeneutics	symbolic analysis	contextual analysis of Gestalten	historical analysis	lab experiments, surveys

Figure 4-2: Duality of authors worldview, from Morgan and Smircich, 1980, p.492

Examination of Figure 4-2 suggests that my life experience appears to have allowed me to assume positions almost at opposite ends of the spectrum depending on the situation being considered. As an engineer I feel comfortable with a positivist or objectivist view and will measure signals or states in an effort to understand the operation of mechanisms and be able to make changes that will lead to predictable and repeatable outcomes. This is denoted in the figure by the solid circle on the right hand side. On the other hand, in my educational environment, I recognise that each person constructs a unique view of the social world that they may or may not be able to communicate to others and this would locate me towards the subjectivist end of the Morgan and Smircich spectrum. This worldview is indicated by the broken circle at the left of the figure and was the assumed position adopted for this research. I have not fully extended the circle to the extreme left because this is where the improvement in practice I was seeking could at risk of being overtaken by solipsistic theorising. There was a realisation in the middle stage of the ISDM course implementation that the course was possibly in danger of starting to slide into that area. After the concern that the research and teaching activities were becoming too detached from reality there was a change in direction that began to move from an interpretive position towards a more positivistic. These movements between paradigms will be explored in the two final chapters of the thesis.

My initial approach to the design of the course was based upon a situated inquiry-led approach that challenges the educational position where an ISDM is simply selected and taught without its place, value, usage level and efficacy in the real world being thoroughly critiqued. I would regard the teaching of an ISDM in any other way to be bordering on indoctrination and thus as a way of enslaving rather than emancipating students. It is my belief that they should be equipped with the tools and motivation to challenge any claims made for the effectiveness of specific methodologies and to question why they may have been taught approaches that may be ineffective in practice. I encourage them to consider the role of academic promotions or product sales as a factor in the promotion of some ISDMs. In that sense I have an emancipatory view of education, but, as noted earlier, it is not an over-riding factor in the sense of wishing to change the whole educational system through radical change. Nor does it feature so strongly in my agenda that it limits the range of interpretations that I can bring to the investigative process, a danger signalled by McGrath (2005). These views locate me as an integral part of the research, with roles as both observer and participant and this situation falls into the realm of ethnography.

Ron Weber, the Editor-in-Chief of MISQ commenting on the two ends of the spectrum remarks that:

“In my view, it is time to assign the rhetoric of positivism versus interpretivism to the scrap heap. It no longer serves a useful purpose. On the contrary, it promotes unhelpful schisms among scholars” (Weber, R., 2004, p.xi)

My view would be that it may sometimes be unhelpful or divisive *between* scholars but it has great value *within* a scholar where it can serve to remind the researcher of the two possible standpoints and to reflect on their current position.

4.6 Autoethnography

The position adopted by the author for most of this research was strongly towards interpretivism with a critical leaning. The involvement of the researcher with the subject and the system, and with himself as part of that situation suggested that one label to attach to the research was ethnographic.

Atkinson and Hammersley (1998,) identify the problem of defining ethnography and as they do so they echo the linguistic issue that has previously been raised in this thesis in the context of ISDMs:

“Definition of the term ethnography has been subject to controversy. For some it refers to a philosophical paradigm to which one makes a total commitment, for others it designates a method that one uses as and when appropriate.” (Atkinson and Hammersley, 1998, in Denzin and Lincoln 1998, p.110)

They then go on to define ethnography as a form of social research that exhibits a number of features:

- A strong emphasis on exploring the nature of a particular social phenomena, rather than setting out to test hypotheses about them
- A tendency to work primarily with “unstructured” data, that is, data that have not been coded at the point of data collection in terms of a closed set of analytic categories
- Investigation of a small number of cases, perhaps just one case in detail
- Analysis of data that involves explicit interpretation of the meanings and functions of human actions, the product of which mainly takes the form of verbal descriptions and explanations, with quantification and statistical analysis playing a subordinate role at most

For this thesis the particular social phenomena is the sharing of understandings between an educator and a group (or a number of groups over a period of time) who are engaged in attempting to make sense of ISDMs. Data collected was mainly in the form of observations of in-class and some out of class processes and conversations, supported by a number of artefacts generated during discussion. The design and implementation of the course over a

number of years forms a single case and the data captured during that time was subjected to interpretation during reflective periods. On these grounds the research approach can be labelled as being broadly ethnographic in nature and more specifically as autoethnographic.

Holt (2003) notes that the ethnographic writing practice labelled by Reed-Danahay (1997) as 'autoethnography' involves highly personalized accounts where authors draw on their own experiences to extend understanding of a particular discipline or culture. Ellis (1995) characterizes autoethnography as an 'autobiographical genre of writing and research that displays multiple layers of consciousness', with Anderson (2006) describing it as a 'radically nontraditional, poststructuralist form of research'. Ellis and Bochner (2000) suggest that it is part of a more recent style of anthropological practice known as 'reflexive ethnography' in which the researcher's personal experience becomes the focus of inquiry.

Spry (2001, p710) interprets autoethnography as 'a self-narrative that critiques the situatedness of self with others in social contexts' and suggests that 'autoethnographic methods recognize the reflections and refractions of multiple selves in contexts that arguably transform the authorial "I" to an existential "we."

The use of the personal pronoun "I" along with 'the author' was commented on in the opening chapter and stems directly from this notion of the situated educator/researcher interacting reflexively with students and observing both the students and the educator as they share understandings of the subject area. Atkinson, Coffey and Delamont (2003) suggest that:

"[Auto]ethnographers-as-authors frame their accounts with personal reflexive views of the self. Their ethnographic data are situated within their personal experience and sense making. They themselves form part of the representational processes in which they are engaging and are part of the story they are telling." (Atkinson, Coffey, and Delamont, 2003, 62)

Dyson (2007) captures the reflexive nature of autoethnography when reflecting on his own research approach, commenting that:

"In recognising that I was a subject and an object of the research I realised that at the same time I was and could be both an insider and an outsider within the culture that I was investigating. As I focused on auto ethnography I became aware that I was not a "participant observer" (Creswell, 2002). I recognised myself as the ethnographer who tells the account of one's life as an ethnographer and in doing so becomes the self-ethnographer. (Dyson, 2007, p.39)

Duarte (2007) reflecting on his own research using autoethnography in the area of the Scholarship of Learning (SoL) suggests that:

“Autoethnographic writing begins with a descriptive narrative of events and activities that unfold within a particular culture and then develops into a reflective analysis of these events and activities to generate new insights and to enhance the researcher’s sensitivity towards the knowledge gained in the process.” (Duarte, 2007, p.2)

Brookfield, cited in Duarte (2007), reports that the benefit of using autoethnography in education is that:

“Most importantly, my autoethnography made salient the importance of reflective practice in teaching – or the ability to identify and scrutinize the underlying assumptions on the way we teach. It demonstrated how intelligent reflection led me to view my practice as a teacher through a different set of lenses, transforming me into a *learner*” (Brookfield, 1995, pp. xii-xiii).

I also recognise this idea of the member of faculty as learner and appreciate the great value it can offer both faculty and students. Fielden states that:

“The most important skill we can develop in ourselves as educators, and hence impart to our students, is self-observation. Self-observation enhances the capacity to change the way we think. Associations can be made between voluntary acts and their consequences. Developing self-observation gives us greater control over how we react and interact with other people, written material, and the environment. If the skill of self-observation is closely followed by learning the skill of critical self-reflection, then we notice first what happens, question why we react the way we do, see past patterns repeating, and look for new, more informed, ways of thinking and doing” (Fielden, 1998)

Self reflection is a vital part of educational practice and autoethnography can be seen as a conversation with and about self as educational practitioner.

4.7 Action research and action learning

Baker (2000) cites three definitions of action research first compiled by Masters (1995) who noted that among the many definitions in the literature of action research there are recurring themes that capture the underlying sense:

“... "systemic inquiry that is collective, collaborative, self-reflective, critical and undertaken by participants in the inquiry" (McCutcheon and Jurg 1990, p.148).

"a form of collective self-reflective inquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social or educational practices, as well as their understanding of these practices and the situations in which these practices are carried out" (Kemmis and McTaggart 1990, p.5).

"action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework" (Rapoport 1970:499 as cited in McKernan 1990, p.4)” (Masters, 1995)

The key themes that emerge here are those of collective activities by groups of individuals acting to improve their social situations (a sense of critical research arises here) in some practical way using reflective practice.

Action research provides a framework for continuous improvement and provides a means of generating and validating social theory when used to support the systems development process (Avison, Lau, Myers and Nielsen, 1999; Mumford 2001). Understandings gained through action research can be cyclically updated, emphasising their role as guidelines rather than rules (Avison, Lau et al., 1999, p.95).

Hult and Lennung (1980) bring in another dimension when they suggest that:

“Action research simultaneously assists in practical problem solving and expands scientific knowledge, as well as enhances the competencies of the respective actors, being performed collaboratively in an immediate situation using data feedback in a cyclical process aiming at an increased understanding of a given social situation, primarily applicable for the understanding of change processes in social systems and undertaken within a mutually acceptable framework.” (Hult & Lennung 1980, p 247)

This quote identifies the collaborative nature of action research and also introduces the idea of cyclical processes that leads to practical changes in a social setting. The research for this thesis followed this cyclical process, consisting of periods of action accompanied by simultaneous reflection (reflection in action), and also more formal periodic stages of reflection on that action. The purpose was to improve a real learning situation through repeated sequences of action, observation, reflection, and change. Each major cycle was roughly 12 weeks long, that is the duration of each study period of the ISDM course, with the learning being carried forward to subsequent iterations after intervening periods of reflection. Changes were also made during each 3 hour session, although these were more limited due to the quasi-legal nature of course information books that pre-define the activities within each period of activity.

Cusins (1995) offers a sine wave view of cyclical processes of research, as shown in Figure 4-3. Although useful the sine wave analogy implies a balanced temporal distribution of the ‘activity’ slices which may not be the case in practice. For example more time may be spent on reflection than action at some phases in the research and the situation may be reversed in other phases. The other minor criticism is that Cusins (1995) sees the sequential aspect of the diagram as switching of attention from forward to the present to backward and thus does not fully represent the reflection-in-action process where the researcher does not separate means and ends or thinking from doing but builds action into the inquiry process and vice versa.

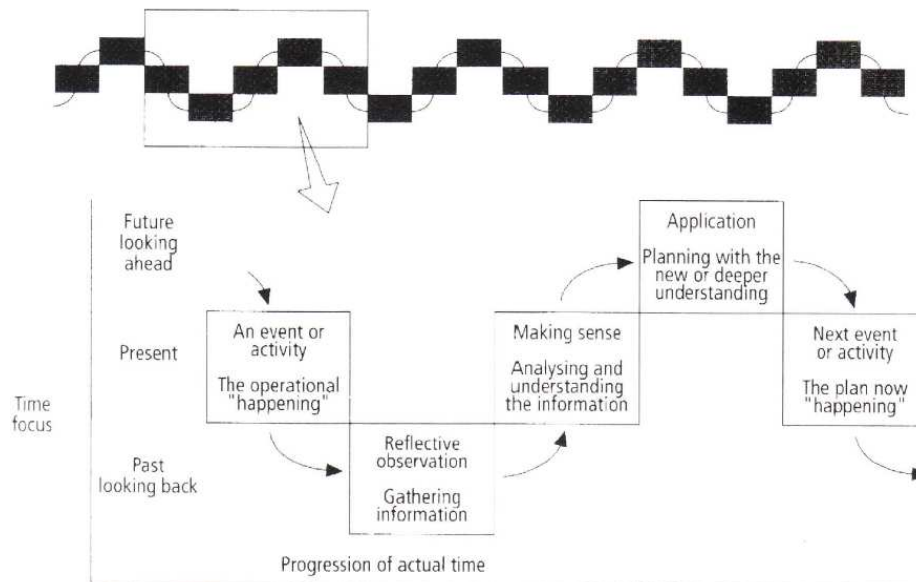


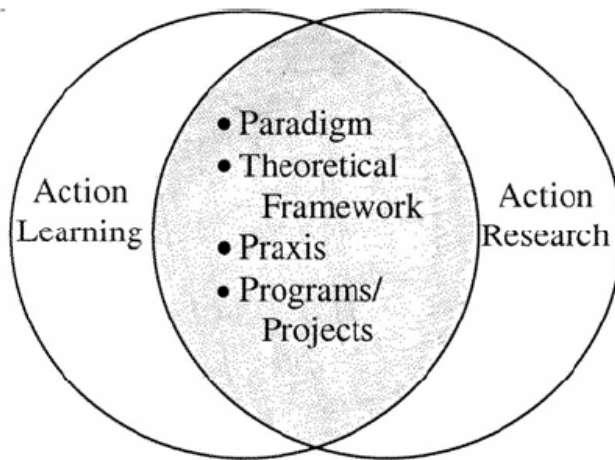
Figure 4-3: Action learning as a sine wave (from Cusins, 1995)

Action-based approaches that utilise reflective cycles have long been part of the educational tradition and the cyclical and reflective aspects of the research began to suggest that it could be classified as action research. However, a significant problem emerged. Action research, in its ‘purest’ sense, can be regarded as a collaboration between parties who are collectively seeking to improve their situation and who typically have some measure of equality of power and influence. Clearly this becomes a problem in a classroom setting where there is perceived asymmetric social power and the process may possibly be better described as cooperative rather than truly collaborative. Students may not even bring with them an awareness that there is a problem in ISDM, nor may some of them be even remotely interested in the existence of a problem, simply wanting to gain paper certification to enhance their career prospects. This suggests that the learning facilitator is the driving force rather than there being a mutual concern. The other problem in terms of an interpretation of ‘action research’ is that each 12 week cycle of activity was carried out with a different group of individuals who brought with them very different sets of concerns and in-class social interactions rather than being one continuously constituted group. Dick (1997) suggests that although action research and action learning share the features of reflective and action cycles, the defining differences can be found essentially in the results of the reflection:

“When considering action research and action learning it can be seen that in each: - action informs reflection and is informed by it. The reflection produces the learning (in action learning) or research (in action research)... (Dick 1997)

In this case the reflection produces both outcomes – changes in personal teaching and learning processes and in the form of tangible research that records the process and makes

it available to others. Action learning can thus be seen as emerging from the same



philosophical and practical space as action research as shown in Figure 4-4.

Figure 4-4: Commonalities of Action Learning and Action Research (Zuber-Skerritt, 2001, p3)

Zuber-Skerritt extends this diagram in a way that closely maps the key areas linked with this researcher's approach and also into approaches that were incorporated into the ISDM course. (Figure 4-5). Personal Construct Theory (PCT) and Grounded Theory both emerged as part of the natural course development path and will be expanded in the 'Course' chapters to provide context rather than developed here. However, as a brief explanation to set the scene, both of these are important because they are significant markers along the path that led the researcher to challenge his initial interpretive position. PCT was adopted as a tool to help students compare ISDMs using an intuitive and accessible approach and Grounded Theory began to suggest an approach to extend the textual analysis triggered by the PCT activities. This path then started to move in a much more positivistic direction as consideration was given to an engineering view of the term 'ontology' which interprets this term very much in the sense of databases. Critical approaches have already been identified earlier in this chapter as part of the teaching philosophy adopted by the researcher, although this was not a dominant influence. Given the topic of the course the systems theory area also influenced the teaching. Interpretations of 'systems theory' are as contentious as any of the other areas that are connected with this research and will not be discussed because they lie outside of the scope of this particular document.

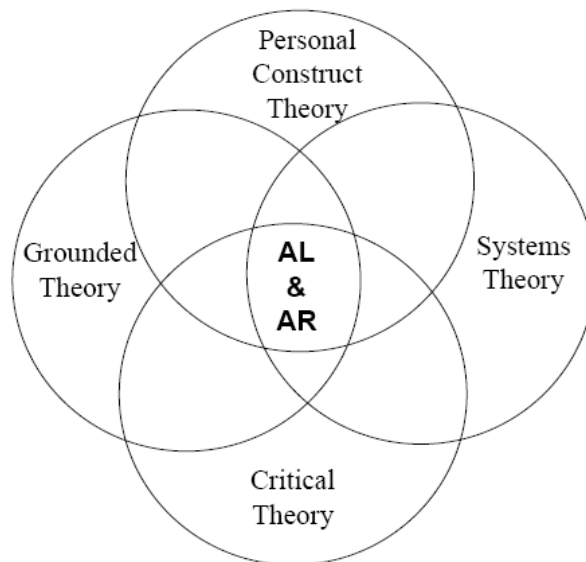


Figure 4-5: Theoretical Framework for Action Learning and Action Research (Zuber-Skerritt, 2001)

As would appear to be the case with most of the words and ideas in this thesis, defining action learning is problematic. Revans, a well respected pioneering figure in the development of the field, comments that even after an extensive period practicing AL in many parts of the world

“... I have had the greatest difficulty in explaining what action learning is ...[and so] it is scarcely for me to voice surprise at what, to those who have never had to start action learning themselves, seems gross incapacity among our preceptors” (Revans, 1979).

He does, however, go on to identify a definition used in a 1974 memorandum prepared for The Council for Technical Education and Training in Overseas Countries (TETOC). One key phrase that is present in that definition is “learning by doing”, a process in which real problems are addressed within a mutually supportive learning environment characterized by advice and criticism. Revans notes that :

“The learning achieved is not so much an acquaintance with new factual knowledge nor technical art conveyed by some authority such as an expert or a teacher ... as it is the more appropriate use, by reinterpretation, of the subject’s existing knowledge, including his recollections of past lived experiences. This reinterpretation is a social process, carried on among two or more learners who, by the apparent incongruity of their exchanges, frequently cause each other to examine afresh many ideas that they would otherwise have continued to take for granted, however false or misconceived. Action learning particularly obliges subjects to become aware of their own value systems, by demanding that the real problems tackled carry some risk of personal failure, so that the subjects can truly help each other to evaluate in what they may genuinely believe.” (Revans, 1979, p.4)

Although AL was used by Revans in real-world business settings where managers had the opportunity to take their thinking back to the workplace to test it, the philosophical foundation forms a sound framework for application to more time-constrained educational settings. What differentiates AL from other activity centred approaches to teaching and learning such as problem based learning (PBL) is the creation of an authentic and safe environment that has the aim of empowering the learners as well as helping them learn about a specific subject. In the context of the previous quote I would see myself as part of the learning process, taking a facilitative role, sometimes expert but more often devils advocate, encouraging students, as co-explorers of the problem area, to challenge their own worldviews and to consider how it coloured their views of both the subject of systems development and their approach to learning.

The problems of efficacy of ISDMs, or of selection, or of their contribution to failure have not been 'solved' by any of those academic or practical individuals interested in the problem in the past several decades. It would therefore be totally unreasonable to anticipate that a group of people new to the subject could achieve sensible outcomes in a matter of 12 weeks. It can be argued that, in terms of AL, at least in a educational setting, this is not necessarily a major concern. Dilworth (1998) points out that:

“The most important link to action learning is that you bring people together for reasons other than problem resolution. You want a problem solved, but the primary value is in the learning that occurs.” (Dilworth, 1998, p.35)

Once again, this comment resonates with this researchers worldview and with the idea of transformative empowerment of learners rather than with a more clinical knowledge transfer process. It echoes the old educational value of 'learning for the sake of learning', a notion which again has great appeal for this writer. It is this type of philosophy that framed the research and made AL particularly appealing. The validity, or sustainability, of this worldview in a more consumer-driver commoditised educational world will be questioned in the final chapter.

4.8 Research risks

Having outlined my personal philosophy in general conversational terms it is now, almost, time to return to a more conventional thesis 'recipe', as Dick describes it:

Traditional approaches to structuring theses, especially in the sciences and social sciences, have resulted in the familiar 'five chapter model', comprising introduction, literature review, methodology, analysis and conclusions. ... this is writing by 'recipe' and, as a rule, supervisors will be anxious to ensure their students are following accepted approaches to reduce the risk of alienating examiners. But what of the student who has undertaken action research? Do these

conventions apply? Can their less conventional research process be made to ‘fit’ the five-chapter recipe and still be true to its practice? Do they take an unacceptable risk by straying outside the mainstream? Or can they write their thesis more in keeping with the *‘performing art’* that is action research (Dick, 2002, italics added for emphasis)

The tension between convention and risky approaches highlighted by Dick reflects a tension I feel in my approach to this research. The concern is not the action research aspect– I shall examine the action research versus action learning issue shortly – but rather the reference to the risk of taking a performing art, or non-compliant, approach. I view teaching as a performing art and my research, which is intimately tied with my teaching, and my publications largely reflect this. I appreciate Dick’s concern that this may be an approach that does carry the risk of alienating the examiners but given the ethnographic, and specifically auto-ethnographic, leaning of the work, I feel it is justifiable to be honest and stay with my guiding beliefs. Interestingly Fisher and Phelps (2006) also consider that conversational approaches to thesis writing, again in the context of action research, can pose risks for the candidate, commenting that:

“One possible risk is that the thesis becomes too ‘wordy’, with too much narrative detail at the expense of clarity and strong theoretical argument. Examiners may not appreciate the ‘suspense format’; feeling that they are labouring up an incline to reach the punch-line (Brown, 1994) or they may be surprised by the introduction of new ideas late in the thesis. Another risk is that students over-identify with their own stories and indulge in too much ‘confessional narrative’”. (Fisher and Phelps, 2006, p.160)

If action research is considered as risky then autoethnographic approaches may be regarded as even more risky. The use of self as the only data source in autoethnography has been questioned (see, for example, Denzin & Lincoln, 1994) and autoethnographies have been criticized for being too self-indulgent and narcissistic (Coffey, 1999). Sparkes (2000) suggested that autoethnography is at the boundaries of academic research because such accounts do not sit comfortably with traditional criteria used to judge qualitative inquiries. Davis (1999) identifies a potential problem with the incorporation of personal subjective experience into ethnographic work when she comments that it can lead to self absorption and the production of what are described by Geertz (1988) as ‘author-saturated texts’. Behar (1996) also cautions that autoethnographic approaches where the writer is also a spectator “has to take us somewhere we couldn’t otherwise go to. It has to be essential to the argument, not a decorative flourish, not exposure for its own sake.” (Behar, 1996, p.14)

Despite these expressed concerns I feel that the reflective nature and processes used by the researcher formed an integral part of the research and so warrants the autoethnographic nature even though the risk of criticism is greater than with many other approaches. Geertz

(1973, p.5) sees man as 'is an animal suspended in webs of significance he himself has spun' and that thick, or rich, description is required to represent the complex process as individuals continuously add richness to their view of the world and this, again, for me requires a detailed and personal narrative to be expressed. The personal detail provided in this thesis is considered to be important in the sense that ethnographic approaches should offer plausible accounts, regarded by Prasad (1997) as:

“Plausible accounts refer to ethnographic writings that are convincing not only because they pay attention to detail, but because the overall narrative incorporates the viewpoints of multiple actors and ties these together in a culturally coherent and articulate fashion ... Many features contribute to the plausibility of the research narrative including the development of the story line, evidence of the researcher's involvement in the field, a sense of historical context and a coherent weaving of disparate events within the field” (Prasad, 1997, p108)

The research activity was focused on the ISDM course and was carried out through a number of action learning cycles over the period 1999 to 2008. Reflection was carried out at the end of each course delivery and also during each delivery, representing both reflection on action and reflection in action.

Interpretations and data, in the form of in-class and out of class assessment work were combined with the personal reflection and conversations with the students. New tools and techniques were incrementally introduced to the course to address issues that arose during each delivery. As well as reporting the way that the course was implemented Chapter 6 embodies the 'how' of the research to supplement this chapter that has provided the philosophical considerations, that is the 'why'.

4.9 Summary

Research methodologies, in common with ISDMs can be seen to have some differentiating characteristics but both also share the common goal of investigating a situation that is perceived to be of interest with a view to gaining an understanding of the situation and, hopefully, improving upon it. Both have the common characteristics of underlying philosophies and collections of tools and techniques that can be aligned with those philosophical positions. The positions can be broken down into beliefs about the nature of reality and, from that position, how the phenomena of interest can be viewed.

This chapter has worked through a process that has led to a typification of my research that could broadly be located under the labels qualitative, interpretive, subjective, phenomenological and critical. Other labels could also be applied, to greater or lesser degrees, including, those identified by Braud and Anderson (1998) as integral inquiry, intuitive inquiry, organic research, transpersonal-phenomenological inquiry, and, inquiry

informed by exceptional human experiences. Other social sciences approaches that express the idea of the organic approach to this research include nomadism, naturalistic inquiry, circling and bricolage. As with ISDMs all use different language but capture an underlying sense of qualitative, social science rather than quantitative, science and engineering.

When I started the research journey I was comfortable with an interpretive position to guide the course and I would still largely subscribe to that position. Nevertheless, towards the end of the research I did, most unexpectedly, come to challenge some aspects of this declared position due to a cognitive dissonance in the positive/interpretive dimensions of my worldview. For me this was the most startling and significant outcome of the research process and will be returned to in the final chapter.

CHAPTER 5: ISDM COURSE DEVELOPMENT PHILOSOPHY

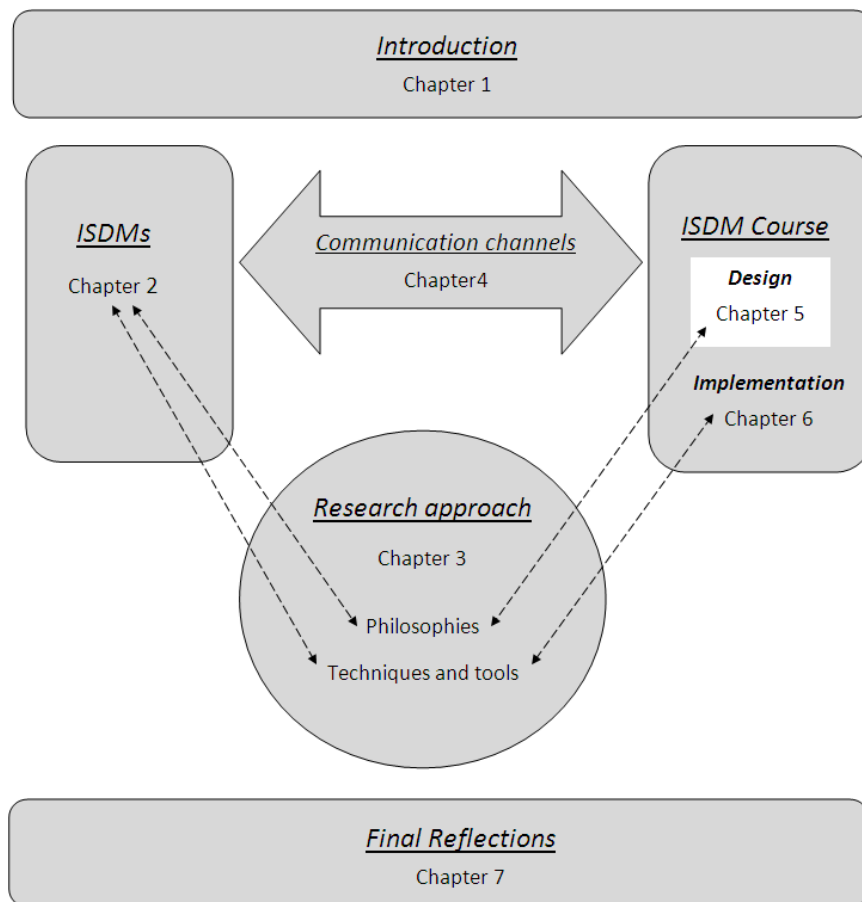


Figure 4-1: Chapter focus - course development philosophy

5.1 Introduction

This chapter examines the design of a Masters course titled “Information Systems Development Methodologies” (ISDM) at the University of South Australia in 1999. The course was designed and implemented by the author as part of a suite of Masters courses that were developed under the Program banner of a ‘Masters in Organisational Information Systems’. The ISDM course was initially developed in 1999 within a School of Accounting and Information Systems but in 2006 the course was moved into a School of Computer and Information Science. The course was withdrawn from the Program in 2008.

The intended aim of the course was to explore the apparently contradictory space between the abundant range of information systems development methodologies and evidence that practical information systems development was reported as achieving low levels of success. This lack of success could be measured as failure to meet deadlines, failure to meet functionality, failure to meet predicted cost or a combination of all of these factors. It

was anticipated that this area could be explored within a semi-structured learning framework that provided a guiding direction but allowed sufficient opportunity for students to consider the issue within their own worldview. The aim was not to imply a single ‘best’ approach to systems development (ie ‘how’) but to consider why this should be a difficult issue (ie ‘why’) and to determine how, or perhaps ‘if’, the declared approaches could be compared as part of a choice process for the developer. The approach developed leaned more towards the promotion of a philosophical understanding of ISDMs rather than to develop practical skills in their use.

This chapter views the course as a system with the researcher taking the roles of system developer, systems implementer and also as one of the ‘users’ of the system. Viewing the course as a system permits exploration of the development process in the light of the literature from the previous systems development methodologies and research methodologies chapters. The system relies upon a variety of communication channels, from face-to-face through to the use of literature channels, and therefore also draws upon the communications chapter.

5.2 Course development and systems development

If the course is viewed as a system then, in line with the systems development methodologies discussed in previous chapters, there will be two significant aspects that influence the design of the system. The first aspect is that of the underlying philosophy that frames the design process, the second being the tools and techniques that were used to implement the design. This chapter concentrates upon the underlying philosophical issues that influenced and framed the design, with the next chapter examining the implementation.

The course design process was framed within an interpretive perspective of information systems and utilised a constructivist approach to the teaching and learning. The course did not set out to teach a specific methodology, the aim being to explore ways of critically examining the various artefacts that are labelled as “information systems development methodologies” (ISDMs). This direction was taken in recognition of the tension between the apparent multiplicity of ISDMs to choose from, and the evidence that the level of success in the delivery of information systems projects can be viewed as being problematic. The course also needed to maintain an awareness of the problems of communicating ISDMs from originator to end user and of individuals communicating with one another in the more general sense.

The philosophy of the author influenced not only the way that the course was designed but also the way that it was practiced. This chapter identifies the thinking and processes that underpinned the initial development of the course in 1999 and the following chapter takes a reflective view of the subsequent development of the course through multiple instantiations in the period 2000 to 2007. Reflection was undertaken both during each delivery and also at the end of each delivery and these reflections represent multiple action learning cycles in accordance with the research methodology discussed in an earlier chapter. The personal reflection on the part of the member of faculty was supported by informal discussions with students during the course as well as by formal feedback mechanisms that are part of the normal university course evaluation process.

Although the author has some concerns about the fine-grain accuracy of the retrospective analysis of the thinking underpinning the development of the course, the significance of underlying teaching and learning philosophies did strongly emerge as an important issue as the author embarked upon the course design process. What was visualised was a flexible course that would respond to the learning needs and this raises the notion of the course developer as an agile system implementer who is guided by his own underlying philosophy of education. The selection of tools and techniques will, in turn, be influenced by this guiding philosophy.

Many adult educators, including this author, are taught to develop courses in a systematic way that identifies learning outcomes, selects appropriate teaching and learning mechanisms to move towards the intended learning outcomes and utilises tools that will support the process. This overall approach echoes an SDLC systems development approach that produces a systematic, documented and detailed set of instructions for delivering a course. What it does not do is take sufficient account of the fact that each cohort of students brings with it a unique set of individuals with their worldview and those worldviews interact on a dynamic basis with that of the learning facilitator. Equally each learning facilitator brings with them a worldview that shapes the way that they select content and processes. They may, consciously or unconsciously, accept or reject certain parts of the declared curriculum, emphasise or de-emphasise aspects, draw boundaries within and beyond the course, reinforce previous knowledge or challenge it.

The initial design of this course was thus informed by a traditional SDLC-style approach reflecting the authors initial training as an adult educator, but the practice was driven by utilizing the authors practical experience in education and by modifications to content and process in appropriate and flexible ways in response to the emergent needs of each cohort.

The approach used in practice is therefore agile and adaptive rather than predicated upon an attempt to create an endlessly repeatable learning mechanism. The system is, in essence, a prototype that can be rapidly re-configured in terms of the sequence of actions and tools to provide different permutations to suit different cohorts of students, but always within the guiding design philosophy.

The design sought to create a space for facilitating mutual story-telling, questioning, creativity and serendipity in and around 'factual' material. There is, of course, a guiding structure that provides direction, milestones and fairly elastic boundaries but within that structure there is considerable participatory freedom to accommodate individual directions of interest. The author is an integral part of the system, along with the students, and the learning is seen as an emergent product of the interactions around the theme of Information Systems Development Methodologies.

Systems are developed and operate within the particular environment with which they interact. The ethos of the surrounding system and the key actors within that environment also provide influencing mechanisms that act upon the development process and the system implementation. The next section considers the environment within which the course was developed.

5.3 Development environment

All systems are developed within environments that impact upon the design and implementation. This section provides the background to the environment within which the ISDM course was developed and subsequently implemented. Changes in environmental aspects including leadership, location, direction and temporal structures have all impacted upon the course and upon the author and these changes are documented here. The broader higher education sector has also been subjected to changes in the last decade and this has also influenced the thinking and approaches of those engaged in the practice of education.

The Information Systems Development Methodologies course at the heart of this chapter was created by the author in early 1999 and was subsequently incrementally modified until its demise in 2008. The course formed part of a suite of Masters programs at the University of South Australia in 1999 that were developed under the Program banner of Master of Business (Organisational Information Systems). The Program was initially conceived in late 1998 within a School of Accounting and Information Systems, located in the Division of Business and Enterprise, under the leadership of the Head of School, Terry Robbins-Jones who sadly died in 2004. Robbins-Jones headed what was the first and only School of Information Systems in South Australia when the University of South Australia was

established in 1991. He had a background in small business and was passionate about IS, insisting that people and process were more important than the technology itself. Swatman and Koronios (2008) capture the highly personable and energetic management style of Terry along with his significant contribution to IS in Australia when they report that:

“Perhaps his most important quality was the way he inspired and encouraged his staff to combine their research with their academic aspirations. Robbins-Jones believed his people were his greatest asset and promoted a philosophy of self-actualisation. He thought staff performed at their best if they were supported in following their passions and expertise. Once convinced of the validity of a proposition, Robbins-Jones would give his unequivocal support to realise its fruition. His ability to inspire staff contributed to the successful amalgamation of three diverse cultures of people when forming the School of Information Systems. Fundamentally, the school incorporated academics from management, business computing and administrative systems and they all had their own way of doing things. Under Robbins-Jones’ leadership, these disparate groups cooperated and united to create an IS school that boasted high standards and academic integrity.

In sum, Robbins-Jones is remembered as a very affable and dynamic man who was evangelical about IS. His contribution to IS in this state remains indelible” (Swatman and Koronios, 2008)

My first contact with Terry was when he visited the University of Humberside in the UK where I was employed in 1997. As a result of meeting him and discussing a number of possible projects I was enthused by his innovative and creative views and accepted an offer to work in Australia. My research interest at that time was decision support systems and I was one of a small number of early adopters of hand-held keypad decision support systems (Audience Response Systems) in education in the UK. Terry felt that I could offer support for the development and operation of the Enterprise Process Improvement (EPI) Centre he was establishing at the University of South Australia. The EPICentre was one of only three such electronic meeting facilities in Australia and New Zealand and used Ventanas’ GroupSystems electronic meeting software that had originally been developed at the University of Arizona.

Robbins-Jones strongly maintained that academic programs should meet the needs of business and had formed close links with industry, meeting with them every three months to keep the school’s curriculum relevant. He believed that students needed a combination of business and technical skills, and to that end he established a number of postgraduate Programs incorporating both aspects, including the Master of Business (Organisational Information Systems) within which the ISDM course was located. This program was designed to provide professional postgraduate education in the application of contemporary and emerging organisational information systems, knowledge for those seeking a career in

organisational management and for existing managers seeking to upgrade their knowledge and skills. The original core courses were:

- Information, Systems and Competitive Advantage M
- Collaboration and Electronic Commerce M
- Information Systems Development Methodologies M
- Organisation, structure, culture and the knowledge worker M
- Integrated Information Systems M
- Managing Networks and Telecommunications M
- Managing the IT Function M

The author designed and taught both the Collaboration and Electronic Commerce and Information Systems Development Methodologies courses. In 2000 a number of the courses were re-labelled; the 'Collaboration and Electronic Commerce' course became 'Collaborative Information Systems'; 'Information, Systems and Competitive Advantage' was modified to 'Information and Systems for Competitive Advantage'; and 'Organisation, structure, culture and the knowledge worker' became 'Critical Approaches to Information Systems'. These changes of name reflected the views of the faculty after one year of involvement with teaching the courses as well as representing responses to perceived market forces.

The courses grew successfully in the following years and were adapted from an initial two semester per year, thirteen-week model through a three semester per year, ten week version and later to a mixture of thirteen week and ten week versions within a seven Study Period per year structure. These changes were driven by 'market forces' rather than by any deeper educational rationale. Shorter courses and more study periods allowed multiple entry points in the year and aligned study patterns with visa requirements for the lucrative overseas student market. One negative outcome from these changes was that the original study pattern, which featured pre-requisites for some course, including both of those managed by the author, was abandoned. This led to situations where some overseas students first contact with the university was with courses that had originally been deliberately placed later in the program so that students would have gained an appreciation of IS before they entered them.

In 2004, immediately following the death of Terry Robbins-Jones, a review of the Division of Business and Enterprise resulted in the restructuring of all of the schools within that division. This review, combined with a strategic university-wide decision to combine all perceived computing-related disciplines into one school. With no champion to defend the IS component of the School the outcome was that the IS discipline as a whole was

transferred to the School of Computer and Information Science (CIS), located within the Division of Information Technology, Engineering and the Environment. CIS was a well established and considerably larger school than the IS school and many IS faculty saw the move more in line with an acquisition, or hostile take-over, of courses (and therefore students) rather than as a beneficial merger.

Before the move to CIS, the majority of the IS discipline faculty (12 academics in total) were based in the School of Accounting and Information Systems at the City West campus, which comprised the three discipline areas of accounting, IS and administrative management. During the merger discussions, all but one of the IS academic faculty agreed to move to the new school and were accompanied by one former faculty member from the administrative management group. By early 2009 only six of the original IS faculty that moved from the School of Accounting and Information Systems remained. Further reductions took place in late 2009 due to an economic crisis within the School of CIS and only three of the original IS faculty remain in 2010.

There is no doubt that both the combination of the loss of the charismatic, supportive and innovative Terry Robbins-Jones and the school being incorporated into a 'hard' computer science rather than business school adversely affected the morale of many of the IS staff. One other negative outcome was that the original IS courses do not appear to have been valued in the CIS setting and have nearly all shown a decline in student numbers to the point where they may not be viable in the future. The reason for the decline in numbers is not clear, but internal politics led to changes in servicing arrangements such that Business students were not encouraged to take up IS courses. However, the main explanation put forward for the fall in student numbers was a suggestion that there has been an international decline in interest in computing and IS courses. This may have some truth attached to it but it shows a 'rear-view mirror' approach that ignores more recent evidence of world-wide recovery in interest. Current moves towards Cloud Computing, for example, will probably require an increase in IS (rather than IT) skills as organizations grapple with policy issues relating to off-site data management and security, intellectual property and so on. Changes in IT and IS governance brought about as a result of Sarbanes-Oxley Act in 2002 and the consequential movement of IT representation from the older silo model to representation on the C-suite has also created opportunities for new IS/IT occupational roles (Gendron, Banks and Miller, 2009). Specifically in Australia the AS8015 (Standard for Corporate Governance of Information and Communication Technology) may also create new educational opportunities in the areas of governance and policy making. In

retrospect, the rationale for the changes that have impacted particularly on the IS provision would appear to be more related to financial and political considerations rather than strictly educational agendas.

These changes in educational environments are not unique to the University of South Australia and can be seen in other IS schools in Australia and around the world. More broadly, tension has existed for a number of years between the ‘instrumental,’ or increasingly business-driven objective of higher education and the more traditional social and cultural role which takes the development of human beings to the fullest extent of their capacity as a primary goal. The language used in everyday meetings reflects the sense of business that now characterises education, Gwynn (2002) comments upon:

“ ... the inappropriate model and language used by our current politicians and bureaucrats. They want to talk of “performance indicators,” “inputs,” “throughputs,” “outputs” and “product.” In the process, they have — and in some cases, like that of Alan Barker of the New Zealand Qualifications Authority (NZQA), with most deliberate intent — confused education with training.” (Gwynn, 2002, p.172)

I have to note here that this thesis uses the word ‘delivery’ in relation to the ISDM course and this word has caused me to wince every time I have used it because it has too many connotations with products and consumers. However, it is a word now in common currency in education and perhaps in the current educational climate is more appropriate than ‘offering; or ‘iteration’.

The idea of ‘learning for the sake of learning’ may well have had its day and universities now appear to be seen as having the role of equipping students with skills for the immediate workplace, a role once fulfilled by employers through the medium of apprenticeships. Kim-Hu and Wai-Hun (2008) comprehensively capture today’s issues in the education versus training debate when they criticise employment-led impacts upon the balance between skills and broader knowledge and upon duration of studies to meet short term variations in supply and demand in the business community. They note that moving from a focus upon knowledge, creativity and critical thinking skills in favour of working skills is problematic, but not unexpected given the financial state of universities. They suggest that:

“Throwing away knowledge and replacing it with skills alone will be a long-term catastrophe. Job opportunities should not become the sole and only priority of education, but unfortunately, due to the lucrative incomes that we can generate in this sector, education has been denigrated into a factory and nothing else. And it seems that we are now heading to a direction that give priority to the knowledge of “knowing how” instead of knowledge of “knowing that.” Thus an institution that

thought the knowledge of “knowing how” alone does not qualify to be called as a university but a factory.” (Kim-Hu and Wai-Hun, 2008)

The frequent changes in educational priorities are often re-inventions of previous unworkable regimes and voices that raise this issue are generally ignored. This is not a new situation, Hancock, for example, commenting in 1954:

‘We university teachers have let our values slip and that is why the university is disintegrating around us. It will not come to life again as a true community, with a purpose of its own which it understands and believes in, until we, as individual persons and in our groups, set ourselves to the task of examining the foundations of our beliefs.’ (Hancock, 1954, p.136)

A little over a decade later the concerns were captured evocatively in ‘The Hornsey Affair’ which reflected on Hornsey College of Art during the revolutionary days on the late 1960s:

“Every year, everything was changed - to the confusion of the students - and nothing was. Incredible, baroque programmes, flowered every spring, dream-edifices to make all things new in the autumn, cunning convolvuli of new approaches and subjects to make the desert blossom. They all sank sadly into the sand in a week or two, leaving us with an ever-deepening sense of fatality and disenchantment. We turned aside more and more to cultivate our own gardens. ... Thus, the different Departments were separate, and all the same, like the houses on an English suburban street, each one buried in its own eccentric, disturbing dream of bliss. Within them, we were all separated and the same, immersed in our particular happiness recipes in whatever few square feet we had contrived to burrow out for ourselves. Ceaselessly intoxicated by the LSD image of ourselves as 21st-century people, we staggered through this grotesque caricature of bourgeois society at the final point of decay, cut off from the students, our colleagues, our work's intended meaning, and ourselves”. (Students and Staff of Hornsey College of Art, 1969, p.21)

A drift towards a view of education as a business accompanied by changes in Australian government policies relating to permanent residence and skilled migration has changed the educational climate. Income generation and ‘customer’ satisfaction combined with micro-management of teaching and learning practice, oscillating views of the relative values of teaching and research, greater use of PhD students or low-paid recent graduates as casual faculty have all combined to create a very different educational landscape to the one that prevailed when the author first entered education. Davis (2002) identifies many of the challenging features in the contemporary climate of Australian university education:

“Barely a week passes without news of underfunding, staff and student dissatisfaction or the intrusion of corporate demands into scholarly activity. The pages of papers like the *Australian Higher Education Supplement* teem with the jargon and rhetoric of educational privatisation and depict the bizarre commercialized offshoots of public universities. Student beer-drinking, no longer a diversion from study, becomes a constituent part of a beer brewing course ... The Bob Connolly and Robin Anderson 2001 documentary, *Facing the Music*, graphically depicts the total demoralisation of the renowned Sydney University

Music Department after persistent financial cuts. La Trobe University's Music Department, with an excellent research record, is abolished. While Australian public opinion firmly rejects the entry of refuge-seeking 'boat people', it requires an influx of full fee-paying foreign students to shore up its ailing tertiary education structure. Pressure is applied to adapt standards. A highly regarded geneticist is sacked at Wollongong for opposing 'soft marking.' Modern academia appears locked into an economic rationalist environment disfigured by a succession of corporate disasters." (Davis, 2002, in Biggs and Davis, (eds), 2002)

The foregoing material is not meant to be critical of any specific educational institution. Extensive quotes have been used to demonstrate that this is not just the author's worldview but is fairly widely shared, and often passionate concern voiced in the educational community. Equally this section has not been written as a generalized grumble about the changes that have taken place in education. All open systems and environments adapt and change under the influence of a range of external forces and there is no reason why education should be an exception. The above material is presented because the issues identified by Davis, along with many others, impact upon those individuals, including the author, engaged in teaching and learning and can lead to dissonance between the internal educational paradigms (or philosophy) of an individual and the paradigm of the institution within which they act. From the reflective and autoethnographic perspective of this writer the relationship between the educational process and the environment within which courses are developed and enacted is significant and exerts an influence upon the underlying design and operation of a course. Wall (2006) notes that:

"Those who complain that personal narratives emphasise a single, speaking subject fail to realize that no individual voice speaks apart from a societal framework of co-constructed meaning. There is a direct and inextricable link between the personal and the cultural. Thus, rich meaning, culturally relevant personal experience, and an intense motivation to know are what typify and strengthen autoethnography. "(Wall, 2006, p9).

It was against this background of educational changes in emphasis between 'knowing what versus knowing how', as Kim-Hu and Wai-Hun (2008) describe the situation, that the course was developed. Having set the overall environmental background the next section considers ways that the philosophical position of the course designer influenced the actual design.

5.4 Design and philosophical positions in education

Mahdjoubi (2003) describes design as the systematic process of thinking prior to action and as an activity that is mostly "related to the conceptualization (pre-execution) stages of making new products, usually organized under 'art versus technique' or 'form versus function.'" He cites industrial design, engineering design, art design, and architecture as examples of design as activity but also suggests that the process of creating an education

course can also be classified as a design and planning activity because it is based on a plan in mind, and is intended for subsequent implementation (Mahdjoubi, 2003). He suggests that the difference between science and design is that “science is aimed at searching for “truth” design, however, is a method for change, expression and implementation.” This thesis is not seeking a scientific ‘truth’ or even an explanation for a phenomenon - it relates more to the notion of ‘change, explanation and implementation’ and thus may be regarded more akin to industrial design, engineering design and so on. The approach to the design process is therefore not grounded in the tradition of scientific experiment but more in the design of a practical artifact. This does not mean that the educational design process is unstructured or ad hoc but it does not express the ‘clinical’ sense of setting out to ‘prove’ something through controlled experiments. It is a process that demands structured and continuous reflection on the design practice itself (Bødker & Iversen 2002) and that in an educational setting can be expressed in the form of curricula.

5.5 Curricula

Grundy (1987) uses Jurgen Habermas' (1972) theory of "knowledge constitutive interests" to construct a hierarchical model for curricula comprising three basic cognitive interests: Technical, Practical, and Emancipatory. These can serve as a useful basis for considering both research and curriculum development and each interest is discussed below.

5.5.1 *Technical interest*

Technical interest: has as its basis the need to control and manage the environment and aligns with an empirical-analytic scientific approach that has at its heart laws, rules and prediction and can also be labelled as positivism. Grundy (1987) views the results of curriculum approaches predicated on the technical interest as acting to control the learner by the enforcement of rule-following actions so that they achieve the requirements set in the original objectives. A designer with this philosophy may emphasise the structural and procedural aspects of ISDMs and seek to equip students with skills that can be directly applied to the workplace. If developing an ISDM course there may be a tendency for the course designer to favour highly structured ISDMs, for example SSADM, where rule-following is required, although any ISDM can be enacted in a way that emphasises management and control. This is very much a behaviourist approach to teaching and learning and relies upon reductionism. The behaviourist Skinner rationalises the reductionist approach that underlies behaviourism as:

“The whole process of becoming competent in any field must be divided into a very large number of very small steps, and reinforcement must be contingent upon the

accomplishment of each step. This solution to the problem of creating a complex repertoire of behaviour also solves the problem of maintaining the behaviour in strength. ... By making each successive step as small as possible, the frequency of reinforcement can be raised to a maximum, while the possibly aversive consequences of being wrong are reduced to a minimum.” (Skinner, 1954, p.94)

Rule following, practice, small steps and avoidance of mistakes could perhaps be seen as appropriate attributes for developers engaged with high ceremony ISDMs, although this approach brings with it the risk of blind rule-following with blame for failure attributed to the ISDM rather than practitioner. The communication processes in the educational process may emphasise knowledge transfer from expert to novice (teacher to student) and utilise the ‘sage on the stage’ approach favoured by behaviourist educators. Communication is likely to be asymmetric with the teacher talking more than the students. Student progress is seen by behaviourists as compliance with set goals and features objective measurement of the learners’ ability at the end of the learning process (Shepard, 2000).

5.5.2 *The Practical Interest*

This ethos still has an underlying orientation towards control but with an emphasis upon understanding – not technical understanding but a sufficient understanding of the environment such that it can be interacted with. Grundy defines this as “...*the practical interest is a fundamental interest in understanding the environment through interaction based upon a consensual interpretation of meaning*” (Grundy, 1987, p15, italics in original)

In terms of curriculum, approaches informed by the Practical interest “do not shun subjectivity, but rather acknowledge the centrality of judgment, that is it rests on teacher judgment rather than teacher direction” (Grundy, 1987, p19). The approach seeks to clarify, interpret and discuss rather than enforce. An ISDM course designed from this perspective may take an inquiry-led approach rather than the more prescriptive approach that may be found in the Technical interest. A range of ISDMs would be anticipated to feature in courses designed from this philosophical position. The teaching style here may be more in line with the ‘guide on the side’ than the ‘sage on the stage’ (King, 1993). This is also referred to as a constructivist approach to teaching and stresses that it is the ‘facilitation’ of learning that is important. The role of the teacher is to create and facilitate a learning environment where students can question and explore in contrast to the behaviourist controlled stimulus/response approach.

The communication processes needed to support such a facilitative setting are more evenly balanced in terms of the available speaking time and will center more on debate than exposition from the teacher.

5.5.3 *The Emancipatory Interest*

The Emancipatory interest is concerned with praxis, that is action that is informed by reflection, to emancipate, to expose power and to bring about social justice. (Cohen and Manion, 1994). Grundy defines this interest as “*a fundamental interest in emancipation and empowerment to engage in autonomous action arising out of authentic, critical insights into the social construction of human society*” (Grundy, 1987, p.15, italics in original).

From a curriculum standpoint:

“... the subjects participating in the educational experience will come to know theoretically and in terms of their own existence when propositions represent distorted views of the world (views which serve interests in domination) and when they represent invariant regularities of existence’.” (Grundy, 1987, p19).

Grundy goes on to say that both teacher and learner will engage in an educational encounter which impacts upon the structures which constrain freedom in the learning environment in often unrecognised ways. The learning is not about the transfer of information that characterises the technical interest, but instead the teacher is, through dialogue with the students, a learner and the learners are teachers (Friere, 1972). An emancipatory curriculum also promotes a reciprocal relationship between self-reflection and action on the part of both teacher and learner. An ISDM course designed from this perspective may lean towards challenging the social and political dimensions of the systems development process in which case SSM, Multiview and ETHICS may feature more strongly. Communication processes and balance will be similar to that of the Practical interest.’

In summary the guiding philosophy for the ISDM was framed by ideas of confronting the perceived tension between many available ISDMs and poor systems development outcomes. Had the focus of the course been upon training students to use one or more ISDMs teaching approaches based upon the Technical interest would have been appropriate. The technical interest was rejected on the basis that it would prove to be inappropriate for this course because it relies upon the transfer of facts and the intention of the course was to consider the absence of facts. The Emancipatory interest could have been adopted, given the social nature of the design and building of information systems, but this too was not considered to be appropriate because it focuses on only a relatively narrow, although extremely important, part of the whole ISDM area. The Practical interest fitted

with the teaching and learning approach that the author had developed over a number of years and the use of discussion and multiple perspectives with the students as co-inquirers appeared to fit well with this position.

The author would align himself with the Practical interest, although he has strong sympathy with the Emancipatory in the sense of freeing students from imposed beliefs and helping them to create their own interpretations of the subject area. This reinforces the position outlined in the Research Approach chapter, but this time in the context of educational practice rather than research orientation.

5.6 First thoughts about the course design

For an educator about to develop a course examining Information Systems Development Methodologies a number of concerns become evident. The first is the question of which ISDM to select as the focus for the teaching, given that the literature states that there is no single ISDM that will guarantee success in every situation. One response to this question could be to select one ISDM and simply teach that in the hope that it could be generalized or adapted in practice. The immediate challenge here lies in the difficulty of selecting a single ISDM that would prove to be sufficiently representative of all others to allow for such in-practice modification. An alternative approach could be to teach one randomly chosen ISDM per week, that is, to adopt a ‘shotgun’ approach. The constraints of educational systems that are predicated on limited time availability, typically two or three hours per week for between ten and thirteen weeks, would run the risk of a rather ‘surface’ treatment only being provided. Yet another approach would be to determine if the several thousand possible ISDMs could be reduced to discrete groupings on a familial basis, followed by selection of one from each group with each of these being taught within the time available in the study period. Again, this is not an ideal approach.

As a result of these considerations during the design stage of the new course it was decided that an exploration of some underlying questions would potentially prove to be more interesting and challenging than focusing on any specific ISDM or collection of ISDMs. The other questions that began to emerge at this point included;

- What are the defining characteristics of ISDMs?
- How do we explain their role in the number of failed systems development projects?
- How do we gauge the success and failure of ISDMs when they are located within complex and dynamic environments with multiple parties involved in making judgements of the development outcomes
- Where did ISDMs come from, why are there so many and how have they developed over time?

- Where are the descriptions ISDMs held, are they complete and how are they communicated?
- How can we determine which, if any, ISDM may be appropriate for a given situation?
- How could we group ISDMs in families to provide a more manageable set of data to explore?

The first design of the course to explore these questions was very much based upon the experience of the author, conversations with other faculty who were designing other courses on the Program, and with the Head of School who had spoken at length with the external business advisory panel with whom he had regular meetings. It was always anticipated that the course, as with all courses on the Program would be modified in the light of the first deliveries. The initial design was tested in 2000 and worked well but the author felt that it would be useful to examine existing IS-related curricula in order that any key area that may be missing could be identified.

5.7 Curriculum models

A number of Information Systems (IS) curriculum models are available and these formed a useful reference point for reviewing content, approach and connections with other subject areas. Three curriculum models were considered in the early stages of development and delivery these being selected because they were felt to be representative of the spread of areas that typically constitute the field of IS.

The curriculum models were: the Computing Curricula 2001 (CC2001) produced by the Joint Task Force on Computing Curricula; the Model Curriculum and Guidelines for Graduate Degree Programs in Information Systems (MSIS2000) produced jointly by the Association for Computing Machinery (ACM) and Association for Information Systems (AIS); and the IRMA/DARMA model produced by the Information Resource Management Association and the Data Administration Managers Association. These model curricula respectively cover the IS spectrum from computing, through the ‘middle ground’ and through to a business and management focus.

The relevant key features of the curriculum models are shown below.

5.7.1 CC2001 curriculum model

This model is clearly focused on computing, although the document does note that:

“Past curriculum reports have attempted to merge such disciplines as computer science, computer engineering, and software engineering into a single report about computing education. While such an approach may have seemed reasonable ten years ago, there is no question that computing in the 21st century encompasses

many vital disciplines with their own integrity and pedagogical traditions.”(Joint Task Force on Computing Curricula, 2001, p1)

In the “CS271S Information Management” section they comment that:

“With the development of any information system, there will be imperatives of various kinds. One important one is the business or commercial perspective. Accordingly, this course can be used as a vehicle for introducing students to the world of business and commerce and to the imperatives—including the ethical ones—that operate in this environment.” (Joint Task Force on Computing Curricula, 201, p.226)

but then go on to highlight the more engineering flavor of the course:

“Software engineering employs engineering methods, processes, techniques, and measurement ... ultimately there will be an underlying life-cycle model with a requirements phase, a specification phase, a design phase, a development phase, as well as validation and verification phases. Ideas from human computer interaction and networking will also be relevant. Students need to be exposed to these ideas to convey the notion of a disciplined and considered approach to the development of these systems.

They indicate that SE benefits from the use of tools for ‘managing software development; analyzing and modeling software artifacts; assessing and controlling quality; and for ensuring a disciplined, controlled approach to software evolution and reuse’. The engineering-oriented focus on software suggested that this curriculum model could only provide limited new insights to the development of the ISDM course.

5.7.2 IRMA/DARMA curriculum model

The IRMA/DAMA (Cohen, 2000) perspective is clearly oriented towards business and management, noting that:

“This curriculum model prepares students to understand the concepts of information resources management and technologies, methods, and management procedures to collect, analyze and disseminate information throughout organizations in order to remain competitive in the global business world”.

The most relevant course description in the context of the ISDM development is the IRM6 - IRM Design and Implementation course, which has as its aim “to provide students with hands-on applications of the design and implementation of information systems in organizations”. The full range of topics within IRM6 is comprehensive and is included as Appendix 5 but the relevant sections that were considered in the light of the ISDM course are shown in Figure 5-2.

Even though the IRMA/DARMA course is intended mainly for MIS students section 4 in Figure 5-2 suggests a strong computer science view of systems design. Once again this curriculum model did inform the ISDM course development but only in a minimal way.

- 2. Systems Analysis of Information Systems (15%)**
 - system analysis and information management
 - systems analysts and information managers
 - phases of systems analysis and information management
 - differences between systems analysis and information management
 - software review and selection analysis
- 3. Systems Definition of Information Systems (15%)**
 - systems scope and business requirements
 - alternative solutions
 - evaluation of alternative solutions
 - cost of alternative solutions
 - recommended solutions
- 4. Systems Design of Information Systems (15%)**
 - logical and physical modeling
 - input and output design
 - files and database design
 - systems and subsystems
 - systems hierarchy chart
 - input and output format
 - system phases and time table

Figure 5-2: Relevant sections of the IRMA/DARMA IRM6 course

5.7.3 MSIS2000 curriculum model

The Master of Science in Information Systems (MSIS) curriculum model is US oriented and is aimed more at graduate students than the previous two and the suggested benefits (Gorgone, Gray, Feinstein, Kasper, Luftman, Stohr, Valacich and Wigand, 2000) of adopting the model is that:

“ ... faculty, students, and employers can be assured that MS graduates are competent in a set of professional knowledge and skills, know about a particular field in detail from the career track, and are instilled with a strong set of values essential for success in the Information Systems field. In short, it is a program that reflects current and future industry needs” (Gorgone, et al, 2000)

The full MSIS2000 curriculum model is shown in Appendix 3 but the section most relevant to the ISDM course is shown in Figure 5-3.

<p>Project Management</p> <ul style="list-style-type: none"> • Advanced Project Management • Advanced Change Management • Outsourcing • Virtual Organization or Telecommuting
<p>Systems Analysis & Design</p> <ul style="list-style-type: none"> • Advanced Design Methodologies (e.g., Object-Oriented Analysis and Design, RAD, prototyping) • Advanced Project Management • System Integration • IS Consulting

Figure 5-3: MSIS2000 curriculum extract

As with the previous models there was no clear curriculum description that fitted with the intentions of the ISDM course although it did highlight the link between systems development and project management. This overlap was incorporated to some extent in the ISDM course but only in terms of some project management literature and tools being considered as useful additional reading for the course.

5.8 An active view of curriculum

All of these models have the benefit that they offer the possibility for standardising curricula around the world, thus potentially aiding student mobility. The negative aspect of all of these three curriculum models, indeed all published curriculum models, is that they are fundamentally descriptive lists of recommended content with very little indication of how they should be enacted. The author shares the view of curriculum theorists Pinar (1994) who argues that curriculum should not be viewed as a noun but rather as a verb, ie to enact curriculum. Considering curriculum as a verb serves to move the focus from the end product – a list – towards the way that the list items are ordered and re-ordered, modified and acted out in the classroom. This provides a sense of a dynamic approach to education rather than to static listing of desirable areas to be explored within the duration of a specific course. Making curriculum is a highly personal activity and faculty who create their own curricula have high levels of intellectual ownership. It is interesting to note that curricula appear to be seen by some in some higher education institutions as topic lists, teaching notes and so on. They are much more than this. No matter how ‘standardised’ curricula become they are still open to interpretation in practice with the words and the notes being placed into the context of specific groups of students and translated through the worldview and life experiences of faculty who teach.

Curricula can be oppressive in terms of learning, Postman and Wiengartner (1971) commenting that the assumptions behind the sequential curriculum which prescribes the order in which skills must be learned and the dates and times of the scheduled learning are best understood by visiting the Ford Motor plant. They argue that the sequential curriculum is inadequate because learning does not take place in predictable or linear sequences, suggesting that a more useful way to view the learning process is as a Jackson Pollock canvas where the colours increase in intensity as intellectual power grows. The author fully agrees with these views, but the reality is that faculty at the University of South Australia were increasingly bound by a sequential learning model, and by public documents that explicitly state the aims and 'content' of course. The Course Information Book at the UniSA, for example, is seen as a quasi-legal document with no real latitude for change once it has been handed to students on the first day of the course. Minor changes can be made once the course commences, but only if agreed with all students in the group; a single dissenter would render the changes impossible. Prescribed assignment patterns were introduced for undergraduate programs by the University in the form of a universal assessment pattern which dictated that a course with a value of 4.5 units should have no more than 4500 words of assignment attached to it, that there should be no more than three assessments per course, that the first assessment should carry no more than 15% of the available marks and should occur within the first third of the course. These rules were later introduced to graduate programs but the author essentially ignored these edicts and was willing to defend the position should the occasion have arisen. Put quite simply students exhibit great variety and the learning system should contain equal or more variety in the teaching and learning approaches used.

In the light of these considerations it was decided that no single model curriculum offered any new insights and the original design remained largely unmodified. Later modifications to content and structure were made in response to perceived student needs.

5.9 Creating the learning environment

Thinking about the way that the identified philosophy could be turned into educational practice suggested an ISDM course design that should be flexible, student-centred, inquiry-based, socially interactive with opportunities for reflection and the sharing of understandings. An inquiry-based approach offered merits in the light of the open-ended exploration of ISDMs that was planned for the course. Postman and Weingartner (1971) characterise the inquiry-focused teacher:

“Believes that ‘telling’, when used as a basic teaching strategy, deprives students of the excitement of doing their own finding and for increasing their power as learners

Uses questioning as the basic mode of discourse

Uses both convergent and divergent question, regarding the latter as more important

Does not accept a single statement as an answer to a question – a persistent aversion to the ‘Right Answer’

Encourages student-student interaction as opposed to student-teacher interaction

His lessons develop from the responses of the students and not from a previously determined ‘logical’ structure. The only kind of lesson plan that makes sense is one that tries to predict, account for and deal with the authentic responses of learners to a particular problem: the kinds of question they will ask, the obstacles they will face, their attitudes, the possible solutions they will offer etc

The ‘content; of his lessons are the responses of his students. Since he is concerned with the process of thought rather than the end results of thought (The Answer!), he does not feel compelled to ‘cover ground’ ... or to ensure his students embrace a particular doctrine, or to exclude a student’s idea because it is not germane.” (Postman and Weingartner, 1971, p45)

The danger in such an approach is that it can appear to be unstructured and some students may feel uneasy in such a learning environment. The author had experienced this in a previous undergraduate course that he had taught and the remedy was to explain carefully to the students at the start of the course what approach was being taken, why it was being taken and how the learning outcomes would be achieved (Banks, 2001b). There is sometimes a tendency for educators not to share their plan with the students and there is no reason why this should be so.

This approach described by Postman and Weingartner suggested that an approach based on constructivist learning would be appropriate in the light of the authors declared worldview. Constructivism is the idea that learners actively and individually construct meaning when discussing ideas with others. The principal differences between traditional and constructivist teaching and learning paradigms are illustrated in Figure 5-4.

Table 1. Differences in the Teaching and Learning Paradigms	
Traditional Paradigm “Teaching”	Constructivist Paradigm “Learning”
Memorization	Understanding
Recall	Discovery
One size fits all	Tailored; option rich
Talent via weeding out	Talent cultivated and sought out
Repetition	Transfer and construction
Acquisition of facts	Facts + conceptual framework
Isolated facts	Organized conceptual schemas
Transmission	Construction
Teacher = master and commander	Teacher = expert and mentor
Fixed roles	Mobile roles
Fixed classrooms	Mobile, convertible classrooms
Single location	Plurality of locations and space types
Summative assessment	Summative and formative assessment

Figure 5-4: Teaching and learning Paradigms (Brown, 2005)

One issue that does arise in the use of constructivist approaches is that the individual meaning constructed from a common group experience may well differ from participant to participant because the meaning is constructed from their own interpretation of events in the context of their prevailing worldview. This meant that mechanisms were required to allow students to share their ideas with their peers. The approaches used to create an environment that would enable this included carefully designed assessments and incorporation of opportunities for reflection.

5.9.1 Assessment

One role of assessment is to generate grades which record the progress of the students against specific criteria within the course. A second function, more important in the eyes of this author, is to provide the student with feedback that can help them to identify strengths and weaknesses in their understanding of course material. It was decided that assessed pieces of work would be tightly integrated into the overall course design and would take account of the constructivist learning that was being promoted. Students construct their own meaning in the constructivist approach and this can be seen as a positive benefit in the sense that it is their view rather than a received view. However, it leads to the interesting position where each student may have the same experience but exit that experience with

differently construed meanings. It is therefore difficult, if not impossible, to attach a pass, fail or even a grade to an individual's interpretation which meant that the emphasis in assignment work was placed upon explanation of thinking to other members of the group, accompanied by an indication of how that conclusion had been obtained. Most of the assessment, with the exception of the major written work, were therefore designed to allow students to share their interpretations with other members of the group rather than simply subscribe to the view of the member of faculty. No examination was used in this course, and special dispensation had to be obtained by making a case to the Professor of Teaching and Learning in the School of Computer and Information Science.

The assessment pattern varied slightly from delivery to delivery but Figure 5-5 shows the assessment page from the 2006 Course Information Book. (The full 2007 Course Information Book with detailed assessment requirements is shown in Appendix 4).

Form of assessment	Weighting	Due date
Mapping and explanation of personal and SDLC positioning	10%	START of Session 2
Mapping and explanation of two methodologies plus biography of actor	15%	START of Session 4
Role play	10%	START of Session 7
Constructs development	10%	During Session 10/11 (Dependant upon time taken to complete group discussion) GROUP WORK handed in at end of session.
Conference style paper	55%	Final paper START of Session 13, soft copy by 5pm

Figure 5-5: Typical assessment pattern for the ISDM course

It was decided that one of the key approaches to be adopted would involve the use of a mapping tool (explained in more detail in the next chapter) that required students to identify particular locations on the map. This meant that the assessment 'output' would be a dot marked on an overhead projector slide so in addition to this simple exercise it was decided that students would present their mapping to the rest of the group and explain what had led them to identify their specific locations. The intention here was to surface the

thinking of the presenter and make it visible to the audience through their explanation. Other presentations were submitted in the form of narrated PowerPoint files so that they could be re-visited on the course web page.

Draft assignments or ideas for assignments were discussed in an open forum to help students appreciate the range of different approaches that were being adopted by their peers. Assessment was designed into the course as an integral element, with many of the assignments being incremental, inter-related and building upon each other.

Assessment was thus designed to be used as a vehicle for the formative sharing of ideas and understandings through reflection within the group rather than as simply summative exercises.

5.9.2 Reflection

Nygaard and Bergo (1975), suggest that "... a major objective in any education in systems development should be to teach its students to analyze every method(ology) they are exposed to with the purpose of identifying its embedded perspective". This implies that the learning should be active rather than passive, that is that students should be helped to take critical view of courses material rather than be uncritical recipients of someone else's interpretations of the subject. From a teaching perspective simply advocating to students that there is a single effective approach without flagging the potential problems leans towards indoctrination rather than acknowledging the more emancipatory aspects of the educational process. A learner who accepts a description of a methodology without careful thought, or learns to use it by rote, may be misled into assuming that failure to achieve an objective is a result of failure of the methodology.

Dewey (1910) comments that the easiest path for a student is to 'accept any suggestion that seems plausible and thereby bring to an end the condition of mental uneasiness' but indicates that this uncritical thinking offers little educational value to the learner. For a deep understanding of a methodology to be reached there is a need to adopt reflective thinking which Dewey describes as "to turn the thing over in the mind, to reflect, means to hunt for new data that will develop the suggestion, and will either, as we say, bear it out or else make obvious its absurdity and irrelevance'. In the context of learning Boud, Keogh and Walker, (1994, p.19), define reflection as 'a generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations.'

Jayaratna (1994) suggests that methodology users who become alert to the philosophical assumptions embedded in a methodology and in their own thought processes are in a much better position to benefit from the use of that methodology than those who believe in one philosophy or remain unconscious of the philosophical assumptions they make. The core theme of the ISDM course, that of helping students to develop a critical view of the nature and value of ISDMs, appears to fit comfortably with these views and emphasise the need for reflection in the learning process.

Two qualitatively different approaches to learning emerge from this discussion, namely what are described as surface and deep learning approaches in educational literature (for example, Marton and Säljö 1976; Entwistle 1998). A surface learning approach is characterized by a student completing a learning task without attributing meaning to the task, ie the learning task is perceived as an isolated event. A deep approach, in contrast, seeks meaning in a learning task through trying to relate the task to other tasks and/or existing understanding and/or personal experience. A deep approach focuses on developing the cohesive whole which is considered to represent understanding (Entwistle 1998). An example of surface learning would be a student who rote learns content and is able to reproduce 'facts' in an assessment but may still be unable to explain it when asked to do so face-to-face, or may be unable to put the learning into action in a practical setting. In surface learning the outcomes of learning may be gauged by the learner against such extrinsic criteria as grades and explanations for failure may be attributed to external influences rather than to the actions of the individuals. If the outcome is blamed on others or upon perceived factors that they feel they have no control over, this may lead to rationalization with little consequential changes affecting future actions. It is interesting to observe that some students upon receiving assignment feedback only read the grade itself. Extensive feedback notes are often totally ignored thus depriving the students of the opportunity to learn from their work and to take action to address any shortfalls or to reinforce any positive performance. Surface learning leads to minimum modification to future actions and where modification does occur it is based on accommodation of system rules rather than personal change.

In contrast a deep learning approach leads to contextualisation of the material and efforts are made to link the latest material presented with previous experiences. A deep learning approach thus leads towards an understanding of the whole rather than the individual parts with gauging of the outcomes being based upon intrinsic measures, such as increases in personal understanding, as well as against external criteria such as grades. This process

requires active reflection and if the process of reflection leads to significant changes in approach or belief occurring then the consequential changes may be seen as representing deep learning outcomes (Entwistle, 1998). Deep learning becomes evident in those (all too rare) students who seek feedback on their work, usually pre-ambling discussion with a comment that the grade is not the important concern but they wish to know how to improve future work or to better understand the subject.

Surface and deep learning loops were identified in the diagram used in the opening chapter and the relevant part of that diagram is shown again in Figure 5-6.

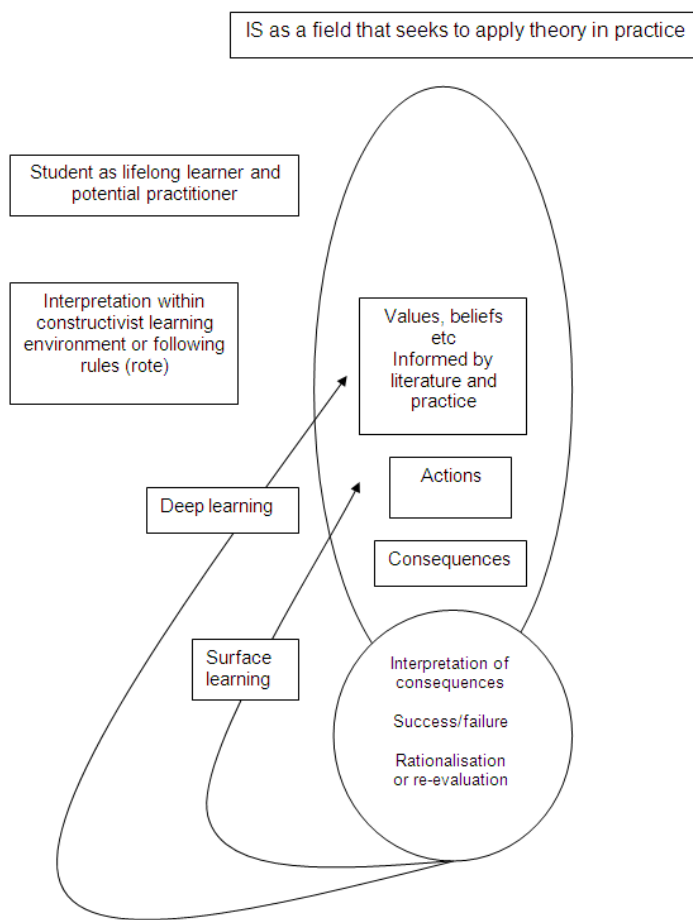


Figure 5-6: Surface and deep learning loops (students)

Practitioners also have internal attitudes and beliefs built upon their experience that influence the way that they go about developing information systems. Unlike students they may have a more active need for reflection given that their current success or failure will often directly impinge upon future employment opportunities. Some writers suggest that

practitioners operate within a functionalist paradigm where an empirical organizational reality is believed to exist independent of the observer and within which they seek objective and measurable cause-effect relationships (Goles and Hirschheim, 2000).

As with student learners, two types of reflective feedback loops are discernable, namely single loop and double loop learning (Argyris & Schön, 1996; Courtney, Croasdell and Paradise, 1998). Rushmer, Kelly, Wilkinson, and Davies (2004) suggest that single loop learning (Figure 5-7) is appropriate in circumstances where environments are stable and activities are consistent from day to day, the benefit being improvements in efficiency. In single loop learning there will typically be an instrumental rationalization that may only slightly influence future work, for example by individuals arguing that they strictly followed the prescribed approach and therefore have no cause to question their own actions. This represents a view of methodologies as fetish (Wastell, 1996).

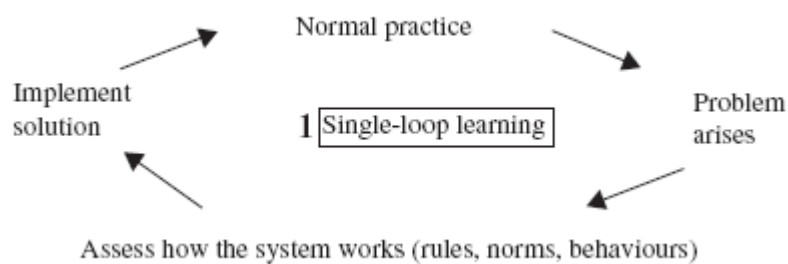


Figure 5-7: Single loop learning (Rushmer, Kelly, Wilkinson, Davies, 2004)

In double loop learning there is a recognition of some deeper concern that requires them to re-evaluate and possibly modify their thinking in ways that they hope will improve future actions. Double loop learning leads to the same considerations of outcomes as deep learning and is shown in Figure 5-8.

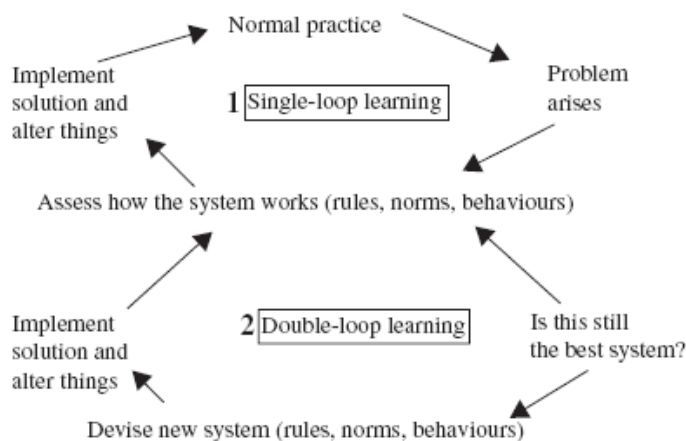


Figure 5-8: Double loop learning (Rushmer, Kelly, Wilkinson, and Davies, 2004)

The combined reflective learning loops for practitioners reflect those of students as shown in Figure 5-9

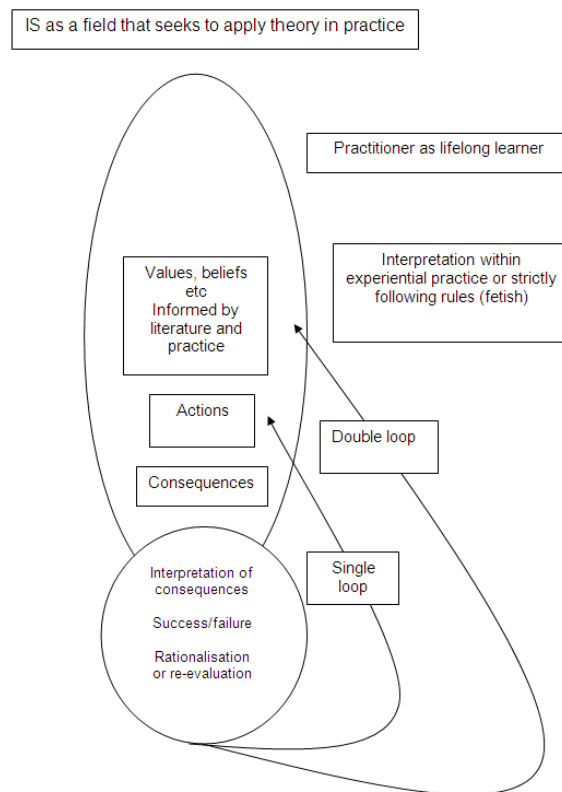


Figure 5-9; Practitioner learning loops

It seems reasonable to assume that for practitioners, as for students, there will be conscious or unconscious choice of single or double loop learning, contingent upon the situation and upon the experience of the developer.

Rushmer et al (2004) note that there is also a third learning loop, one that relates to learning about learning. In this situation the understandings gained from the double loop learning are taken beyond the immediate situation and made available in other situations. For example, as approach to studying that has worked well in one particular subject may be applied to other subjects or to life in general. Encouraging students to become lifelong learners is an inherent part of the mission of any educator and can only be achieved by helping students as individuals to improve on their strengths and overcome any weaknesses.

5.10 Summary

This chapter has addressed the issue of the significance of educational philosophy in the design of an ISDM course. The author has defined his own position in the educational

landscape and demonstrated how this position framed the design of the Information Systems Development Methodology course that lies at the heart of this thesis. The central influences that guided the development of the course have been identified as constructivism, inquiry-based teaching and learning and reflection. The specific environment within which the course was designed and delivered initially supported the identified approach but, as with the changes in the broader higher education sector, may mean that courses such as this become more difficult to provide in schools that are science-based. This issue will be considered in the final chapter of the thesis.

The course was delivered through a series of iterations that formed an Action Learning process and data was gathered during the iterations. The data took the form of mappings of ISDM locations, repertory grid lists and comparisons, role play exploration of tacit and explicit aspects of ISDMs and group discussions.

The next chapter considers the tools and techniques that were used to support the learning and data gathering within the educational philosophy detailed in this chapter.

CHAPTER 6: COURSE IMPLEMENTATION

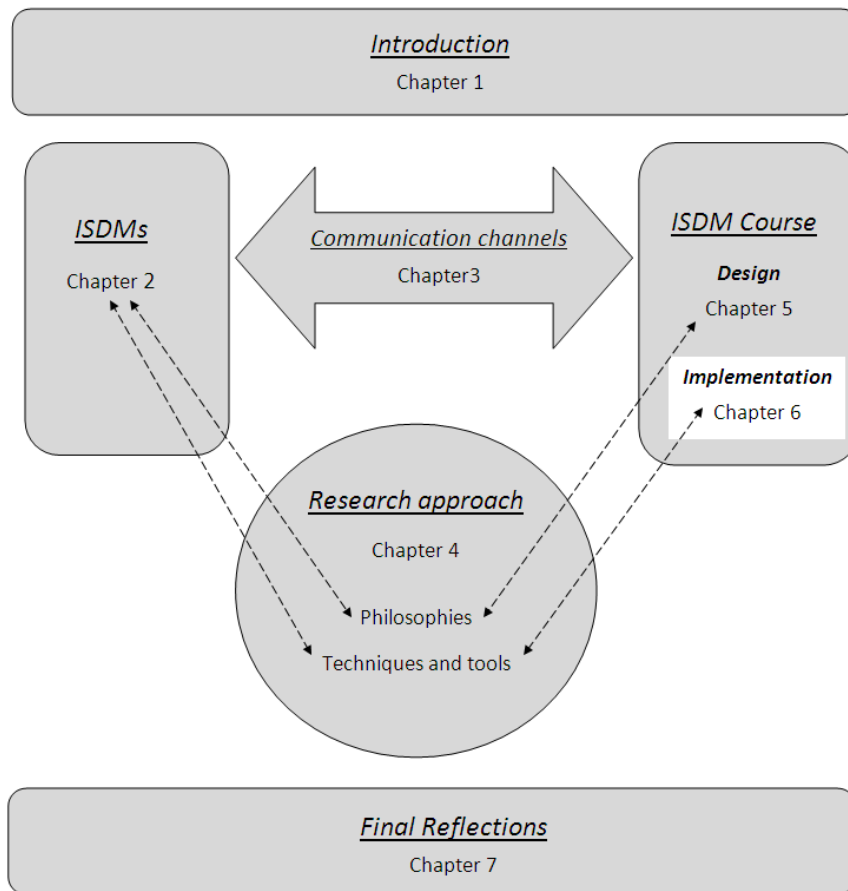


Figure 6-1: Chapter focus - Course Implementation

6.1 Introduction

The previous chapter considered the design issues that underpinned the development of the ISDM course that lies at the heart of this thesis. This chapter shows how that design was implemented in practice through a number of iterations. A considerable amount of the material in this chapter is drawn from lecture notes, in-class events and assignment work.

The chapter opens with identification and description of the tools and techniques that formed the core of the course. It then identifies a change in the direction of the course that resulted from the authors' reflections on the results of a mapping tool and identifies and explains other tools that were gradually introduced as a result of those reflections.

Although this is a historical story of the course it is not intended to represent a definitive history but rather to provide a sense of the way that the course was delivered, that is the

way that the underlying philosophy framed and guided the delivery. The story provides a vehicle for reflecting on how the course developed and changed over its lifetime.

6.2 Core approaches and tools for exploring broad educational issues:

6.2.1 No right or wrong

One key issue identified in the previous Course Design chapter was that of the need to help students develop, or enhance, a critical view of ISDMs. This required the development of mechanisms to help students appreciate that there are few right and wrong answers not only in this specific course but in many fields of study. Students were told at the start of the course that there were few black and white ‘facts’ in the subject and that they would be expected to demonstrate the ability to analyse and synthesise material in a creative way. For some students such an approach can be unsettling, requiring them to think about material and offer their own interpretations rather than replay the thoughts and beliefs of the member of faculty. This is particularly true for students who have previously been exposed to quite different, and sometimes rote-based, learning environments in their home countries. Asking questions, challenging faculty and expressing their own views (although in an academically justifiable way) are alien and potentially threatening for some students. A number of approaches were therefore used to help students appreciate the ideas of broader and multiple perspectives and also to appreciate that they could draw ideas from outside the perceived boundary of the specific ISDM course.

The first part of the chapter identifies some of these mechanisms, including those designed to address issues of success and failure, historical boundary drawing (periodisation), ‘method and methodology’ and personal perspectives. The first of these relates to success and failure. These are potentially emotive words and certainly words that students can relate to. A ternary view of success and failure was developed to help students see how black and white poles could be moderated by the inclusion of an uncertainty factor.

6.2.2 Ternary views of development project outcomes

As already noted, in common usage the word ‘failure’ has as its antonym ‘success’ and such a purely binary classification of the complex situation represented by a complex information systems project outcome may be an inadequate way to represent the broader range of interpretations. The Standish Group (1995) has started to label ‘Failed’ projects to those that are cancelled before completion, never implemented or scrapped following installation. They label as ‘Challenged’ those projects that are completed but have either single or multiple undesirable features that include being over-budget, late or encompassing fewer features and functions than initially specified. This more euphemistic

terminology may help overcome some of the emotive elements but still does not help to provide a comprehensive basis for understanding the situational, dynamic and sometimes possibly contradictory aspects of the success/failure issue. The material in this section of the chapter was developed to help students move towards a broader view of this area and to recognise the value of multiple perspectives.

There may be situations where the technological aspects of the systems development project meet all originally specified criteria but the business requirements changed as a result of a lengthy development process. Equally, the technological components may not be fully implemented but the organization may be able to derive value from even the incomplete system. One way to begin to view this situation is to separate the IT and IS components. The incongruity of these perspectives may well be an important contributing factor to judging development failure (Nuseibeh and Easterbrock, 2000; Ward and Griffiths, 1996).

The label ‘IT’ is being used here to refer specifically to the technological (‘hard’, ‘engineering’) perspectives of the project, with the ‘IS’ label being used to refer to the ‘softer’ perspectives that relate to the human and business aspects of the overall system. This differentiation allows the simple matrix shown in Figure 6-2 to be produced.

		'IT' element	
		Success	Failure
'IS' element	Success	1	3
	Failure	4	2

Figure 6-2: Binary Success/Failure matrix

Box ‘1’ in the matrix represents a view that both the IT and the IS elements achieved successful outcomes, with box ‘2’ indicating a failure from both perspectives. Boxes ‘4’ and ‘3’ represent, respectively, the meeting of all specified hard criteria but still with a negative outcome for the organization and an IT failure but where a successful business outcome is achieved from the process. The latter may appear to be the most unlikely situation but there will be cases where the planning process itself provides benefits through insight even if the planned technology failed to match the vision.

This matrix still does not permit representation of ambiguous outcomes that occur when the business outcome may be indeterminate at the moment when the technical aspects of the project are considered to be complete, that is, the technological infrastructure elements of the overall information system are in place and functional but have not been fully or sufficiently tested in the everyday working environment. Sauer (1993), for example, suggests that a process need not be labelled as a failure the moment it encounters unforeseen difficulties. The real-world problem situation is likely to be ‘messy’ (Ackoff, 1974) or ‘wicked’ (Rittel and Webber, 1973) and will be located within a technical, social and political environment where negotiated outcomes lead to an accommodation of the financial, technical, social and political requirements of all stakeholders rather than to an optimum outcome. This may lead to an outcome that is less satisfactory than that anticipated at the start of the project and where further negotiation can take place.

In an attempt to develop a more accessible view of this complex situation for students, the author drew on his electronics background to develop a multiple state view of systems development outcomes. Electronic logic systems are typically thought of as having the binary states of ‘on’ (also ‘true’ or ‘1’) and ‘off’ (also ‘false’ or ‘0’). However there are also ternary (three-valued, trivalent or 3VL) logic systems which are multi-valued logic systems capable of dealing with ambiguous truth conditions. (Yamamoto and Mukaidono, 1988). In ambiguous situations three truth values can be utilised, indicating true, false and a third value variously described as *uncertain*, *unknown*, or *irrelevant*.

Applying this third state of ‘uncertain’ to systems development project outcomes shown in Figure 6-2 creates an additional space between the poles ‘Success’ and ‘Failure’, producing the expanded IS/IT/Success/Failure matrix shown in Figure 6-3

		‘IS’		
		Success	?	Failure
‘IT’	Success	1		3
	?			
	Failure	4		2

Figure 6-3: Ternary view of project outcomes

In this matrix the cell labelled 1 indicates a total success, the cell labelled 2 indicates a total failure. The cell labelled 3 describes an outcome where all ‘hard’ outcomes were

successfully achieved but there was no benefit for the system owner. Fortune and Peters (1995) would regard this as 'Type 1 failure', and illustrate this category by using the analogy of a toll bridge which was correctly engineered but which carried barely any traffic. Cell 4 in Figure 6-3 indicates the reverse situation where although the engineering aspects did not comply with requirements the system still generated business benefits. The use of a ternary matrix also allows representation of those situations where, for example, a system may be completed on time, to cost and to specification (an IT 'success'), but where the business ('IS') benefits may be uncertain at the time of completion of the project or may later prove to be less desirable than anticipated. Similarly a system may appear meet the immediate business requirements but the infrastructure may fail to be sufficiently adaptable to changing business requirements at some time in the near future. These uncertain or ambiguous situations are indicated by the cells that are shaded grey in Figure 6-3.

This approach helped students to move beyond the simple success and failure labels and take a more critical view of the reported outcomes of systems development projects. It also prompted one student to observe that maybe systems developers needed to hire the services of advertising agencies to help them create the perception that they had been successful even if they had not. An interesting debate centred on professional ethics ensued.

6.2.3 *Periodisation*

Although the particular years and durations (eras) that Avison and Fitzgerald (1995) nominate are a useful interpretation students were reminded that the eras cannot be easily or sharply delineated in practice. This was part of the strategy to help students to take a thoughtful view of the literature in general. One can argue that there are no distinct 'ends' to each era, rather that they overlap, with newly emergent approaches co-existing or sometimes blending with the old ones. Thus aspects and approaches that were prevalent in earlier eras can still be detected in contemporary settings. Similarly, while Avison and Fitzgerald characterise the current era as one of 'reassessment' it could equally be argued that the periods between the eras that they identify were also times of critical reassessment and exhibited as much radical rethinking as can be found in the post methodology era.

Looking back at the history of any topic always raises the issue of temporal boundary setting or 'periodisation'. This is significant because nominating eras is effectively a boundary-defining process and what is excluded from the bounded items may be as significant as that which is included because this reflects the worldview of the boundary-

setter. Phillips (2002) notes that the general consensus about the subject of periodisation can be summarized as:

“The ordering of history is inevitably to a large extent subjective, though it will often be defended in quasi-objective terms;

The essential purpose of periodisation is to make sense of otherwise unmanageable time spans by identifying unities of some kind;

Identifying such coherence in turn depends on the identification of significant events that may be taken to determine change” (Phillips, 2002, p364)

Other systems development periodisations can be identified in addition to that of Avison and Fitzgerald. Dahlbom (1996) for example identifies four eras in the history of information systems, these being Data Processing, MIS, Personal Computing and Networking. The basis for the Dahlbom periodisation is that of usage and was developed from a slightly different perspective to the Avison and Fitzgerald nomenclature. Brown (2002, p33) describes the period between the 1950s and early 1960s as the ‘early pre-modeling systems development methods’ phase where the focus was on finding and building solutions rather than gaining an understanding of the clients problems. He describes this as a focus on efficiency, that is ‘doing the job right’ rather than upon effectiveness, or ‘doing the right job’ and comments that some systems analysts still had that view in 2002 (Brown, 2002, p33). Although Avison and Fitzgerald take their starting point as the 1960s, business computers had already emerged in the 1950s as a potentially useful tool for business with software being built in-house by programmers and analysts whose role Marakas (2001) suggests was “understanding the computer and its languages and possessing the necessary skills to convert common manual processes into more efficient and cost-effective automated ones” (Marakas, 2001).

In addition to the problem of setting temporal boundaries the sense of direction of flow implied by different perspective can be misleading. Avison and Fitzgerald (2003) lead the story of methodology development from an initial state of ad hoc, individualized development processes, through a period of development of formalized approaches and then towards a methodological arena that may again be characterized by features of ad hococracy, flexibility and agility, contingency and outsourcing. This may be seen almost as a return to the original amethodological development scene, or a closing of a historical loop. However it would be simplistic and misleading to view this as a cyclical narrative. Different organizations move at different speeds, in different directions and with different motivations. Some could still be identified as being in one of the early eras characterized by Avison and Fitzgerald and may or may not follow what appears to be a historical imperative. Large organizations driven by the need to control and who see people as

resources may not be at all interested in moving in participative or emancipatory directions. For some organizations the central management theme may be predominantly that of accountability (blame attribution) and there are ISDMs that can be used to support this objective. Small organizations may never adopt the formal and detailed ISDMs that are available, simply on the basis that they are overly complex for small developments and demand significant resources to manage them. What may at first appear to be a linear developmental history of ISDMs that can be periodised must be seen in the broader context of a number of dynamic threads that include programming, business, management, people, technology, analysis and systems development methodologies that collectively form an interwoven history that is beyond the scope of this thesis.

Another concern with periodisation is that it locates specific ISDM artefacts in specific eras and does not therefore fully take account of the evolution of ISDMs over an extended period of time. In discussing the Social Construction of Technology (SCOT) model, Bijker (1993) notes that an artefact does not “suddenly leap into existence as the result of a momentous act by a heroic inventor; rather, it is gradually constructed or deconstructed in the social interactions of Relevant Social Groups.” Checkland, (2000) expresses this gradual evolutionary process in his ‘30 Year Retrospective’ when he comments that:

“As the thinking about SSM gradually evolved, the formation of this precise definition of ‘hard’ and ‘soft’ systems thinking did not arrive in the dramatic way events unfold in adventure stories for children (‘With one bound, Jack was free!’). Rather the ultimate definition is the result of our feeling our way to the difference between ‘hard’ and ‘soft’, as experience accumulated, via a number of different formulations. (Checkland, 2000, p.S-17)

Any individual concerned with a specific area for a number of years may well change direction or emphasis as their thinking and practice develop within a social and broader environment that is changing and any artefact developed by them will thus evolve or change. ISDMs are thus dynamic rather than static and co-exist with others rather than supplant them.

For the above reasons it was felt that the idea of periodisation was important for students to be aware of so that they could form a broader, and potentially personalised, view of the overall developmental history of ISDMs. The working diagram that was developed by the author to support discussion sessions in this area with students is shown in Figure 6-4. This attempts to capture some of the underlying historical development themes including changes in formality and the notion of ISDMs existing in parallel.

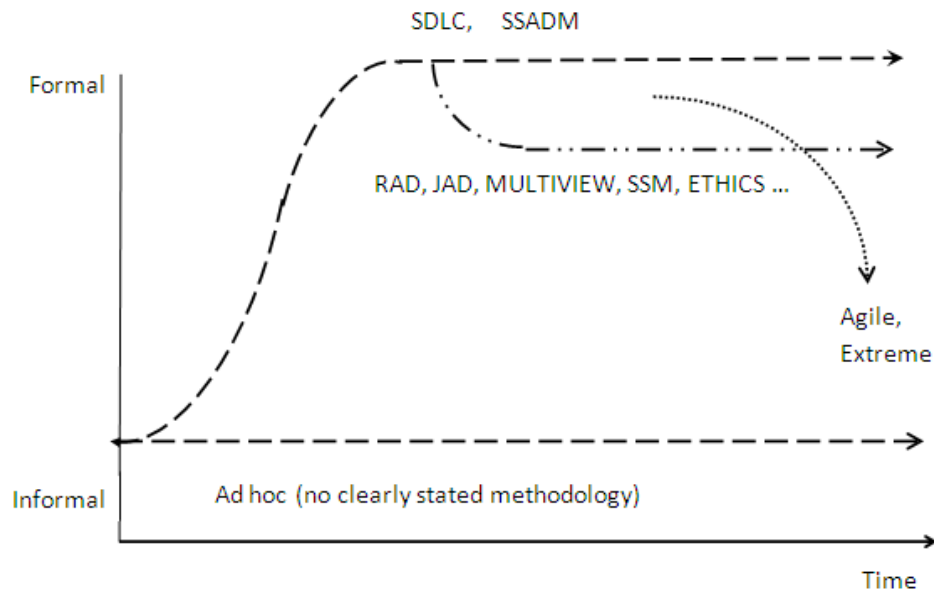


Figure 6-4: Alternative view of ISDM development history

6.2.4 Juggling – more than method

Thinking about juggling was used to help students see beyond method as ‘recipe’. The approach used was essentially to use entertainment to engage students and to provide a vehicle for them to explore an issue that could become rather abstract. The use of theatre can add a little frisson and I was prompted to take this approach as I reflected on effective techniques used by myself and my colleagues in the past. I particularly recalled one colleague at a previous university who was a jazz musician and a member of the Magic Circle. When he walked into the hubbub of a 300-seater lecture theatre he would sort out his slides and then, with a flourish, take his trumpet from its case. The hubbub would quickly begin to diminish. When he placed the trumpet to his lips and fingered the valves silence descended on the whole lecture theatre ... at which point he put the trumpet down, switched on the overhead projector and began his lecture. This anticipatory device never failed him and he never played a note – but the students still hoped that maybe *this* was the lecture when he would.

My juggling session consisted of placing three juggling balls on the desk in front of me as I prepared my notes for the session. Making no comment about them I started the session and, from time to time, picked up one or more of the juggling balls and then put them back down again. Finally I announced that we would be looking at ‘Method’ and asked the group if they felt that an ISDM could be seen as a recipe to be followed. They replied that, yes, this seemed to be reasonable. I asked if they felt that they could follow a recipe if they were provided with the level of detail we had seen in some ISDMs. Again, they replied in the affirmative. At that point I asked for a show of hands of students who could *not* juggle. A majority of the students raised their hands. I asked for a ‘volunteer’ (which means, of course, that I had to press one of them) to come to the front of the room and follow some simple instructions. They were presented with the three balls and the instructions shown in Figure 6-5 which were displayed on the overhead projector:

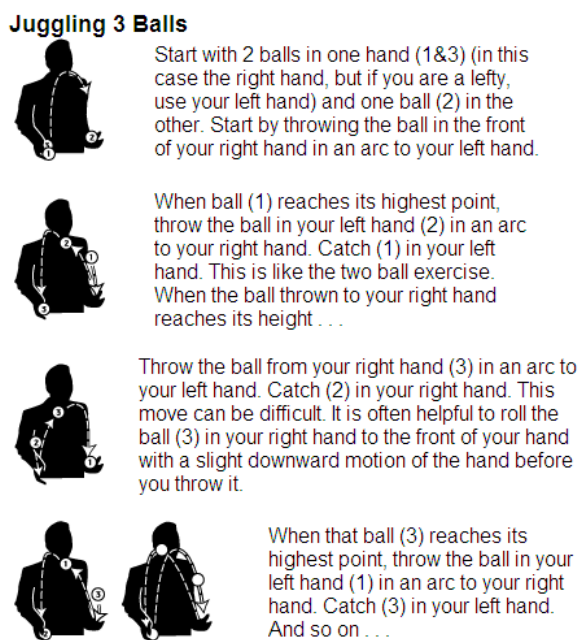


Figure 6-5: Instructions for juggling three balls
(source: <http://www.yoyoguy.com/info/ball/>)

Mayhem usually ensued, with the volunteer throwing the balls to all corners of the room and members of the ‘audience’ throwing them back. Other students were invited to try. After some time they were asked to resume their seats and asked to discuss why they could not follow the simple instructions. The conversation that followed ranged across experience, skill, dexterity, learning and so on. Typically a student studying mainly computing subjects would argue that they were scientifically minded and that you needed to be ‘arty’ to juggle. For those students the formula developed by Shannon and cited in a

paper titled “The Science of Juggling: Studying the ability to toss and catch balls and rings provides insight into human coordination, robotics and mathematics” was presented on the screen:

“Juggling theorem: The exact equation is $(F+D)H=(V+D)N$, where F is the time a ball spends in the air, D is the time a ball spends in a hand, V is the time a hand is vacant, N is the number of balls juggled, and H is the number of hands.” (Beek and Lewbel, 1995)

This indicated to the students that knowing the science did not really help them with practice either.

Juggling is first learned as a logical pattern of movements, largely using the left brain which has attributes of logic, analysis and quite narrow focus. Once learning reaches a certain point the series of individual steps move into a rhythm and the intuitive and holistic right brain takes over. All of this material was woven together through the discussion and activity to help students think about the broader skills of systems development beyond basic rule-following. It also introduced the idea of the ways that methods may require a degree of focus in the early days of the developers learning process but later they become embedded into the repertoire of the individual. This echoes Mode 1 and Mode 2 Soft Systems Methodology (SSM) usage, Checkland and Scholes 1990, p.280) stating that SSM can be used across:

“... a spectrum of (in principle) use of SSM from, on the one hand, a formal stage-by-stage application of the methodology (let us call it Mode 1) to, on the other, internal mental use of it as a thinking mode (which we will call Mode 2)”

This juggling section of the chapter has been reported in some detail to provide the reader with a sense of the sessions. Other tools, techniques etc will not be as extensively documented but were typically enacted in the same sense as this activity.

The typical final question from the students at the end of the session was to ask me if I could juggle. My response was not to reply but instead to give them a brief demonstration, usually to the delight of the students.

6.2.5 *East, West and sunset*

This simple technique was used to introduce students to thinking beyond the obvious. The first image in of the setting sun shown in Figure 6-6 was projected and the students asked where they would say West was located. The usual immediate reaction was to state it was obviously where the sun was setting. The second image, taken from exactly the same place was shown and the question asked again. As they pondered this the third image, also taken

from the same place, was shown and the students asked again. The explanation is relatively simple but helped the students to move beyond a simple ‘knee jerk’ answer.



Figure 6-6: Where is West?

6.2.6 *Dallenbachs' cow*

A simple slide was used to help students appreciate that individuals see the world differently even when presented with the same data. The left hand image in Figure 6-7 is the original used by the psychologist Dallenbach (1951) to explore the way that individuals perceive hidden figures. Effectively, in terms of the communication models discussed in chapter 3 of this thesis, the image is hidden in surrounding ‘noise’.

The right hand image in Figure 6-7 is a ‘cleaned’ version made by tracing the highlights onto an overhead projector slide for improved projection. Students were instructed not to speak but to raise their hands to indicate that they recognized what the image was. The overhead projector was then switched on and the normal pattern that emerged was one where one or two individuals will raise their hands immediately and thereafter others will follow at intervals. After some time when no more hands appear to be likely to be raised they were asked if they could see the cat crawling through the hedge at the top centre of the image, having killed the small mammal at the bottom left. It was not unusual to see nods of agreement from those who had not yet raised their hands, although those who had already seen the image show signs of puzzlement. After a little more time students were advised that they were being deliberately misled and that they needed to think about farm animals. This usually led to more raised hands. In groups of 25 to 30 students it was usual for at least one student to still not be able see the cow, even when a finger was used to trace round the outline.

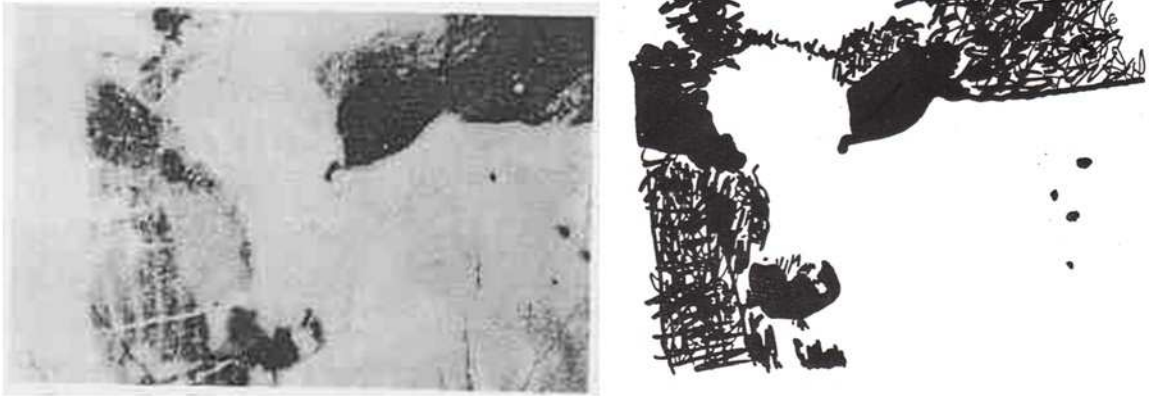


Figure 6-7: Dallenbachs' cow (left) and the 'cleaned' version

This approach was used to help students appreciate that even though they all saw the same data at the same time, the time for individual sense-making processes varied from person to person. It also helped make it clear that in conditions of doubt it is possible to mislead individuals, and finally that some individuals will never see what the data is representing. The link to systems development is that developers will be working with a range of clients and using a variety of graphs, charts images and text and they, as developer, may be absolutely clear in their own minds but the client may not share that same view.

6.2.7 Taking risks

Students were asked in this course to take an approach that many had not previously experienced. They were expected to read widely, to contribute to discussions, to engage in role play and to present their views to other members of the group. For many students, particularly those from cultures where 'loss of face' is a serious issue, this posed a considerable challenge that required them to take risks. I was more interested in hearing their views than in the students simply replaying my words or the words of other people. I also wanted them to take on different perspectives and try new approaches that challenged their normal positions. This required considerable work with the students to create an environment where they felt safe enough to express views that were sometimes only half-formed or to challenge accepted wisdom. Helping the students to see that I was not claiming expert status and was exploring the material with them, although I had an idea of the paths we could consider and an overall direction, was difficult but many students were willing to challenge material that was presented to them. In some ways encouraging students to take risks and test their own ideas goes to the ideas of emancipation discussed in the previous chapter.

6.2.8 Culture sharing session

This session was not included in every delivery of the course. When it did take place it comprised an informal hour and a half in the three hour block where students were encouraged to bring along food from their own cultures and to generally chat with other students and with the member of faculty. The idea here was to help students to relax and talk more freely among themselves and with the member of faculty in an atmosphere different to the standard teaching session.

6.3 Exploring Explicit and Tacit aspects of ISDMs

In addition to the general educational tools and techniques described above a number of approaches were adopted to explore explicit and tacit aspects of ISDMs. As was noted in Chapter 4 an ISDM has two constituent components, the philosophy (considered as the tacit aspects) and the tools and techniques (considered as the explicit aspects). These may pass through the communication channels from originator to potential user with different amounts of signal degradation to the two channels as indicated in Figure 6-8.

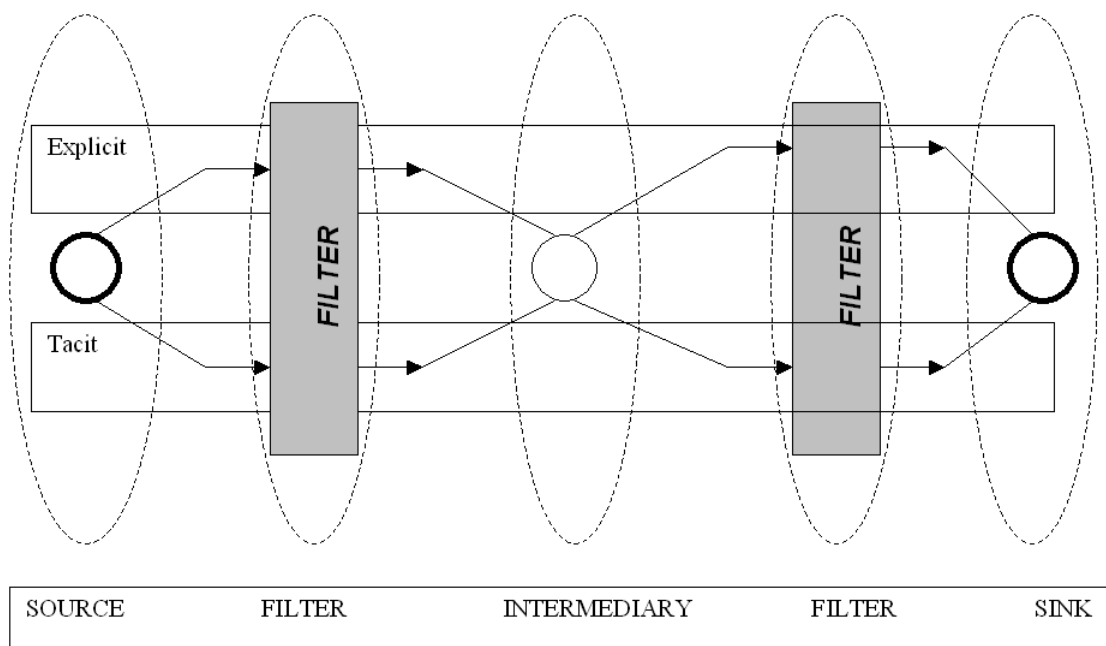


Figure 6-8 Tacit and Explicit signals

The explicit component is the method, tools, techniques, graphs and charts associated with the overall ISDM. In order to understand these explicit components it is necessary to read widely and critically, bearing in mind Holwell's comments about the reliability of secondary literature. Broad reading should reveal any discrepancies in the explicit component and may allow the reader to determine a consensus view. Learning to read

critically and take into account the influence of one's own world view upon the interpretation applied to the reading process needs to be emphasised to allow students to come to an informed understanding. Opportunities to test that understanding against the real world are also valuable.

The tacit aspect is altogether more problematic. Academics typically do not reveal specific details about their personal worldviews, the norm being to write papers in an objective and rather detached way. Gaining an understanding of the worldview of an ISDM originator, or indeed any other author, requires a different approach, relying more upon scattered details that together build the biographical background of the author.

The next section of the chapter considers tools and techniques to help students gain an understanding of the tacit and explicit components of ISDMs.

6.4 Core tools and techniques for exploring the Explicit aspects

6.4.1 Case study and visiting speaker

It was felt that a 'real' case study was needed as a central theme to support course activities. By chance I had become involved in a local Adelaide development project as in early 1999 a result of a seminar I had given to the local business community as part of the University of South Australia Working Links programme. This programme encourages faculty to present their subjects to invited members of the local business community and explore them with that community. The seminar explored hard and soft approaches to project management and systems development. Some time after the seminar I was approached by the newly appointed Project Officer of a systems development project in Adelaide and asked if I could recommend an ISDM that would be appropriate for their project. I stated that I could not offer a definitive answer but could point to some relevant literature, and also mentioned that I would be interested in observing the project if that was possible. After approval from the government organization (the South Australian Community Housing Authority, SACHA) a week later I became part of the project as a non-participant observer, attending meetings at all levels in the organisation and with the end users and developer for the first full year of the project. The SACHA case study became a key part of the course planning and implementation and a paper (Banks, 1999) was published to capture part of the story of the early stages of the project development. The paper is included in this thesis as Appendix 6.

Cases can be very useful vehicles for focusing discussion and other work and the SACHA case was felt to be particularly useful for five key reasons. First of all, it became known to the member of faculty in greater detail than the many published cases that were examined

in the planning of the course. This knowledge allowed detailed answers to be provided when students raised questions. For example, relationships between the various parties could be expanded upon on the basis of first-hand experience and the Project Officer could easily be contacted and asked to contribute to sessions to provide additional insights if required. He was very willing to talk about his experiences and provided a great deal of detail and insight that would not normally be available. The name of the organization was periodically mentioned in television and radio news items and this helped to reinforce the students' awareness that they were studying a real organization. This local and authentic background helped the students to appreciate that the 'real world' is complex, changing and political.

Secondly, it was a 'methodology neutral' project in the sense that there was no single methodology that had been adopted by the organization. This lack of declared methodology allowed the case to be explored from multiple perspectives without fear on the part of the students that they could be wrong. This meant that the case was an excellent focus for the role play work where the students considered how their nominated actor might have gone about the project had they been involved.

Thirdly, the case was sufficiently small to be contained within a 13-week study period, but was also sufficiently rich in detail to allow a large number of issues to be raised.

Fourthly, the development project was ongoing and it was possible to gather up-to-date material on a yearly basis from SACHA reports and other media sources.

Finally the involvement of the member of faculty with a genuine local project created a sense that the course did fit with real world activities and this led to it being perceived as having value for the students.

It has been noted that the Project Officer became a regular guest speaker and it should be mentioned here that other guest speakers were used from time to time. One ex-student of the course re-visited the course several times as a guest speaker to talk about his experiences in the use of novel approaches to systems development in a local council. A conference paper based upon this individual's assignment work had been published with this student (East and Banks, 2000) and this provided a useful link between the course and the real world. His attempts to introduce rich pictures to a department of engineers had initially been greeted with the view that this was merely 'finger painting' but he persisted and the tool/technique was adopted by some in the department. Professor Trevor Wood-Harper was a fairly regular visitor to the University of South Australia and was always

willing to participate in ISDM sessions, providing a strong visible link between a methodology developer and the course.

6.4.2 Literature and HAARP

The core reference text for the course was 'Information Systems Development methodologies: Tools and Technique' by Avison and Fitzgerald (1995; 2006). All students were expected to have a copy of this text and it was used for assignment work and as a general reference book. The textbook provides both details of a range of ISDMs and useful related material.

Other papers were provided wherever they were felt to be appropriate. Students were expected to read widely and, as they read, to think about the credibility of the various sources that they came across. They were asked to consider who the book had been written by, when it had been written, where it had been written (UK, US etc), how often it was cited by others, who published it (was it a reputable publisher or a vanity press) and why the book had been written (to make money, to disseminate ideas, to gain promotion for academics, to promote a specific ISDM and so on). They were asked to be alert to similarities between differently labelled ISDMs as well as possible contradictory views.

It was pointed out that reading is an interpretive process and therefore that they may be convinced of a particular view not by sound argument but by their own unchallenged belief systems. An approach was needed to help students consider how their own views unconsciously influence the credibility that they attach to published materials. As a focus for thinking about personal positions the High Frequency Active Auroral Research Program (HAARP) which is an ionospheric research program located at Gakona in Alaska was selected. This was chosen because material relating to it is plentiful and a wide range of views are taken of the project. (It had been found by the author in a web browsing session in which I was looking for areas that may prove to be contentious)

Accessing only this site (<http://www.haarp.alaska.edu/>) would suggest that it is an interesting American scientific program involved with ionospheric research, with web-cam images of the antenna systems available. However, further searches will reveal pages relating to weather control, mind control, damage to the upper atmosphere, the Strategic Defence Initiative, early work by Tesla in beam energy and links to crashed flying saucers. The spectrum of interpretation therefore goes from beneficial and benign research through to 'messing with mother earth'. Much of the linking material, for example key players in the project, links to previous beam weapon work, Tesla, patents etc, appears to be genuine but at some point on the spectrum students will decide that it has reached the 'science

fiction' level and the ideas are not credible. This point will vary from student to student. Interestingly this material is also useful for introducing students to semiotics as the official site has a fluttering American flag and the 'science fiction' end has the dark eyed, large-headed alien. Once students recognize the difficulties of dealing with this range of information in a reasonably 'fun' way they are more motivated to search for contradictions to other materials that they locate on the Web.

In addition to being alert to contradictions students were urged to consider other non-IS writing from an IS perspective and look for connections between literature. The example provide for them related to the systems concept of 'emergence'. This property is described by Checkland (1999) as:

"The principle that whole entities exhibit properties which are meaningful only when they are attributed to the whole, not to it's parts ... Every model of a *human activity system* exhibits properties as a whole entity which derive from its component activities and their structure, but cannot be reduced to them." (Checkland, 1999, p.314)

A less 'academic' reference to emergence can be found in Fry, Dawkins, Adams, and Guzzardi's (2002) summary of Adams' unpublished book 'The Salmon of Doubt':

"Dirk Gently, hired by someone he never meets, to do a job that is never specified, starts following people at random. His investigations lead him to Los Angeles, through the nasal membranes of a rhinoceros, to a distant future dominated by estate agents and heavily armed kangaroos. Jokes, lightly poached fish and the emergent properties of complex systems form the background to Dirk Gently's most baffling and incomprehensible case: (Fry, Dawkins, Adams, and Guzzardi, 2002)

Keen students sought links between the systems area and Adams and found that he was connected with a large number of writers in many fields, some of whom contributed to the Salmon of Doubt, using eclectic ideas from these fields as threads in his books.

Ernest Hemingway, in response to a question posed by an interviewer who was seeking the characteristics required for a person to be a 'great writer' offered the view that in order to be a great writer a person must have 'a built-in, shockproof crap detector'. Postman and Weingartner (1971) argue that we can measure the progress of our intellectual development by the points at which an individual develops 'a new perspective, a new meaning, or a new metaphor', and that education should cultivate individuals to develop such multiple perspectives in a critical manner. Hemingways 'crap-detector' would appear to be an essential tool to support this development, particularly in an increasingly complex and data-rich world where a plethora of unsupported and often propagandist opinions are easily disseminated.

6.4.3 *Argumentative approaches*

The HAARP exercise (Banks, 2003a) led students into positions where discussion featured the use of words such as ‘probably’, ‘possibly’ and so on. This provided a useful link to the work of Stephen Toulmin who explored the soundness of claims in the context of argument. The students were pointed in the direction of Toulmin (1999) rather than required to study him in detail because it was felt that, useful as his approach to argument is in the formulation of assignment work, the language is rather complex for students who may have English as a further language. Once again this is a tool to help students think and order their thoughts and some students found his approach valuable for assignment-writing for many of their courses.

6.5 Core tools and techniques for exploring the Tacit aspects

The philosophical, or tacit, aspects of ISDMs can prove to be more daunting to appreciate than the explicit elements to students. For many students the word ‘philosophy’ carries connotations of obscurity, abstractness, and lack of any practical value. Approaches were therefore developed to try to help students appreciate how different worldviews could influence the way that systems development projects were executed.

6.5.1 *Biographies and role play*

One issue identified in the Communication chapter was that of the difficulty facing a potential methodology adopter in gaining access to the tacit aspects that form the philosophical foundations of a methodology. It was argued that during transmission it is these tacit aspects that are most likely to be lost or distorted in the communication chain that loosely connects the originator to potential methodology adopter. To facilitate exploration of this aspect of a methodology it was decided that role-play would serve as a useful mechanism. It was felt that the use of role-play would help to make the various authors referred to during the course ‘come to life’ as individuals with their own histories, beliefs, skills, attitudes and relationships. Investigating and interpreting biographical material can be a complex and time-consuming process but it was felt that any level of appreciation of the perspectives of some key actors broadly within the IS field would provide benefit for the students by connecting them with the authors as people rather than as simply names.

Playing a role is not simply performing but requires the adoption of a behavioural repertoire or social position (Thomas and Biddle, 1966) and if carried out effectively can engage both the affective and cognitive domains (Bloom, 1956). Ladousse (1987, p.9) describes role-play as a “short, low input-high output, interactive teaching and learning

technique which requires participants to assume the role of a specified actor in a specific learning situation”. Of the four role-play approaches identified by Errington (1997) the issues-based approach was adopted. Errington suggests that this approach is useful when not all of the facts are known, the selected issues requires that participants carry out background research, there are a number of possible perspectives and the positions require evaluation and justification (Errington, 1997, p16).

The SACHA case study formed the focus for the role-play, with each student assuming the part of a nominated actor drawn from the world of information systems or quality. Quality was included because it allowed for the use of some quite clearly defined perspectives of the chosen actors and also because quality is a key component in the judgment of the success or otherwise of development projects. Students were allocated a single named actor from a list such as that shown in Figure 6-9.

Actors for role-play session

Actor
1. W Edwards Deming
2. Phil Crosby
3. Joseph Juran
4. Rudy Hirschheim
5. Grady Booch
6. Edward Yourdon
7. West Churchman
8. Nimal Jayaratna
9. Harold Kerzner
10. Geoffrey Vickers
11. Stafford Beer
12. George Alexander Kelly
13. Gordon Davis
14. Peter Checkland
15. Kay Fielden
16. Colin Eden
17. Nancy Pouloudi
18. Robert L Flood
19. Trevor Wood-Harper
20. Michael C Jackson
21. Nancy Russo
22. David Avison
23. Kalle Lyytinen
24. Kaoru Ishikawa
25. Robert Galliers
26. Ian Mitroff
27. Richard Vidgen
28. Peter Senge
29. Tom Peters
30. Gerald Midgley

Figure 6-9: Role play actors

Each student was asked to ‘get under the skin’ of their actor by gathering the biographical information based on the following questions:

- What key contribution has the individual made to their field –a theory, an ISDM etc
- How credible are they (Publications, awards etc)
- Who have they worked with, influenced or been influenced by
- What is their history, background (engineering, philosophy, maths, arts ...)
- Do they have interests beyond their primary publication area
- What appears to be their underlying worldview
- What projects have they been involved with
- How might they tackle a specific development task

Students were free to draw on sources of their own choosing and one or two did directly contact their actors for more detail. It was pleasing to see how positively the academics contacted reacted to the enquiries and provided support for the students. It did, however, cause some controversy when, in one of the deliveries, two students complained that contacting the actor was unfair. When it was pointed out to them that this was a practical and legitimate approach they replied that legitimacy was not the issue – the practical problem was that their particular actors were no longer alive!

Jones (1980) comments that:

“For lonely, shy and introverted students the experience of being a person of importance can be traumatic, a vision of a new world, of excitement, of growing confidence, and a feeling of being wanted and respected. Such experiences can sometimes be remembered with utmost clarity for years afterwards” (Jones, 1980, p.24)

For some students a role itself can act as a mask, allowing the student to speak openly as someone else rather than as themselves and even quiet students were willing to participate and defend their actor quite strongly. In one session a student printed out the face of the actor (Hirschheim) from their web page and made it into a mask that they wore during their presentation, much to the amusement of everyone in the room.

Having had some weeks to gather materials the students then engaged in a role play session where they used their understanding of their actor to suggest how they might have approached a development project. The instructions given to the students for the session are shown in Figure 6-10.

Role play session

Aims: To explore and reveal ways in which the worldviews of a collection of significant figures in the information systems and quality fields would be brought to bear on a specific project.

Your roles: is that of an expert witness who is indicating how they would have brought their specific worldviews and expertise to bear on a particular case study of an information systems development.

You should first of all announce your REAL name to the group

You should then state which actor you will be role-playing

Briefly establish the credentials of the actor – brief outline of their positions held, publications, contribution to their field of expertise and any special approaches that they have developed

Finally, apply their thinking to the case explaining how you feel they would have tackled the project, what their underlying philosophy is and what specific methods, techniques and tools they would have brought to bear on the development.

You should allow yourself around 5 to 6 minutes for this task

Each person will present their actors views in turn.

At the end of all presentations there will be an opportunity for actors to debate the merits of the various approaches presented.

Marking

I am looking to see how well you seem to know your actor – not particularly their declared qualifications, publications etc but how well you use their worldviews in the context of the case.

I will also be looking at how well you are able to argue the case for your actor against other actors

Figure 6-10: Instructions for role play session

It was pointed out to the students that they were free to improvise around the material they located and that their interpretations would not be criticised. The limitations of gathering information about the actors was also recognised, Stanislavski (1980) remarking to the stage actors he was training:

“Does the dramatist supply everything that the actors need to know about the play? Can you, in a hundred pages, give a full account of the life of the dramatis personae? For example, does the author give sufficient details of what has happened before the play begins? Does he let you know what will happen when it is ended, or what goes on behind the scenes? The dramatist is often a miser in commentary. In his text, all that you find maybe “the same and Peter”; or, “exit Peter”. But one cannot appear out of the air, or disappear into it.” (Stanislavski, 1980, p55)

The role-play session occupied one three hour session, including breaks and debriefing, and provided considerable enjoyment to students as well as serving the serious purpose of bringing a number of different perspectives to bear on the SACHA case. Sometimes the session produced unanticipated benefits, for example in one case the students taking the role of Crosby stated that his actor would not have wanted anything to do with the case because the quality was so poorly defined that he would not wish to risk his reputation by being involved with it. The other ‘Quality’ actors (Deming and Juran) were able to offer other quite distinct views and this demonstrated the diversity of perspectives within just the quality area.

A closing debate brought the material together well with some students vociferously promoting the approach of their allocated actor. The research into some of the actors did carry through into later sessions, for example into the sessions where music and art were discussed where one student noted that Stafford Beer was an artist, poet and musician to which another student remarked that Peter Checkland enjoyed playing jazz. The role-play also carried over into subsequent session with students using their actors as conduits to participation in discussion, usually prefacing their comments with “Yes, but as Checkland would probably say ...” Colleagues managing other courses in the Program commented to me a number of times that this behaviour was carried through to their courses. This is an example of deep learning taking place in students.

6.5.2 Mapping using the Bell & Wood-Harper grid

ISDM comparison was another feature of the course that required the use of an approach that would allow students to engage with literature in a practical and interpretive way. Various mapping approaches identified in Chapter 2 on the thesis were considered and eventually the Bell and Wood-Harper (1998) map was chosen. This map was felt to be sufficiently simple for it to be used as the basis of exploration of ISDMs with the students. This map considers methodologies along an X axis spectrum from reductionist to systemic with the Y axis representing a range from focus on business/people through to a focus on technology, as shown in Figure 6-11.

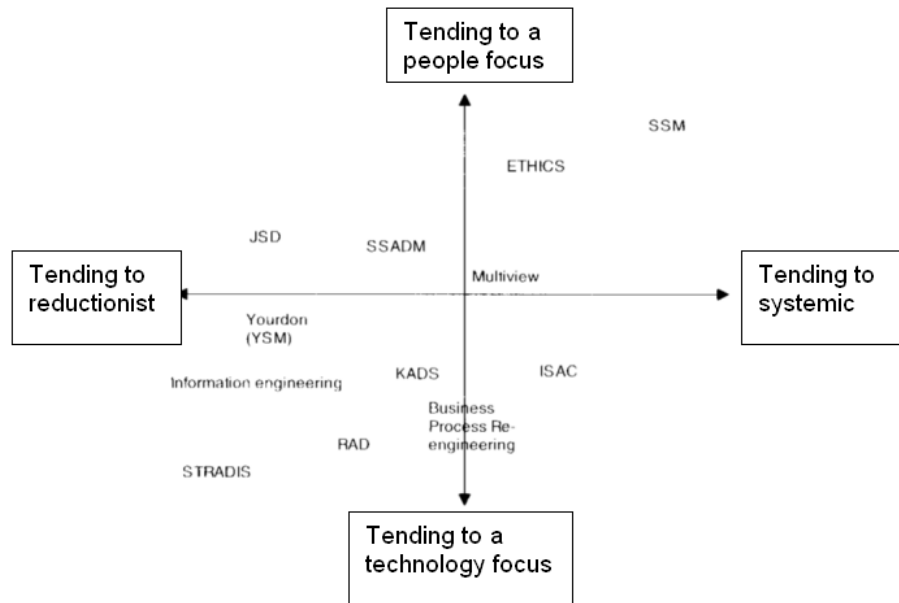


Figure 6-11: Bell and Wood-Harper 'map' (1998, p. 229)

The authors point out that the various ISDMs shown have been located on the map in line with their own view of the 'fit' in terms of tending towards the various dimensions. The located ISDMs were removed from the map so that the students could be presented with a blank map and so would not be biased by the Bell and Wood-Harper interpretations. Although the language used for the dimensions was felt to be uncomplicated in practice it emerged that one problem was that the word 'systemic', was often seen as 'systematic', particularly by students who had English as a further language. After the first use of the grid these terms were explained in more detail to overcome this problem.

Students were required to read about a number of specific methodologies and then map these onto the grid over a period of several weeks. The assignment instruction sheet for the opening assignment is shown in Figure 6-12

Course code INFS 5026

Coordinator David A Banks, Room EM5-29, david.banks@unisa.edu.au

Textbook: Information Systems Development: Methodologies, Techniques and Tools, Avison and Fitzgerald, 3rd edition, 2003

Required reading for week 2: pages 17-22 and 527-572 and 31 to 40 (provided as photocopy)

Assignment 1: Due at START of week 2

Consider where you feel you would locate yourself on the grid discussed during week 1. You will be required to mark your location on an overhead slide in session 2 and to explain WHY you feel that the location represents your worldview (3 marks)

Read pages 31-40 of the textbook and decide where you feel that SDLC would be located on the grid. Mark this location on the sheet provided. Explain how you arrived at your conclusion using 100-150 words. Use the web to find other materials relating to SDLC to help inform your conclusion. Note: there is no 'right' or 'wrong' answer – the strength of your explanation is the key to this assignment. (7 marks)

Assignment 1 is worth 10 marks. It must be handed in at the START of week 3.

Subsequent assignments build on Assignment 1 and therefore no late submission will be accepted.

You should also start to research your allocated 'actor' and begin to think about a focus for the conference-style paper assignment.

Figure 6-12: The SDLC assignment brief

At the assignment presentation session students used a blank Bell and Wood-Harper grid on the overhead projector to mark the various locations and explain to all present in the room why they had located the given methodology at the point indicated on the map. The map was also used by students to indicate where they felt they would locate themselves, again accompanied by an explanation. In the first week the student was required to read about the Systems Development Life Cycle (SDLC) and then indicate where this, in their opinion, would be located on the map, labelling this as 'M1'. At the same time they were required to consider where they would locate *themselves* on the map, this being indicated by 'S'. In week 2 another given methodology was studied and marked on the map as 'M2'. Finally the student was required to reverse their thinking and identify a methodology that would be located in the opposite quadrant and mark this as 'M3'. The 'M3' required a reversal of the approach adopted for M1 and M2 in the sense that they needed to think about the characteristics of a quadrant and then search the literature relating to methodologies for one that they felt could be argued to fit. An example of a student mapping generated over a three week period is shown in Figure 6-13

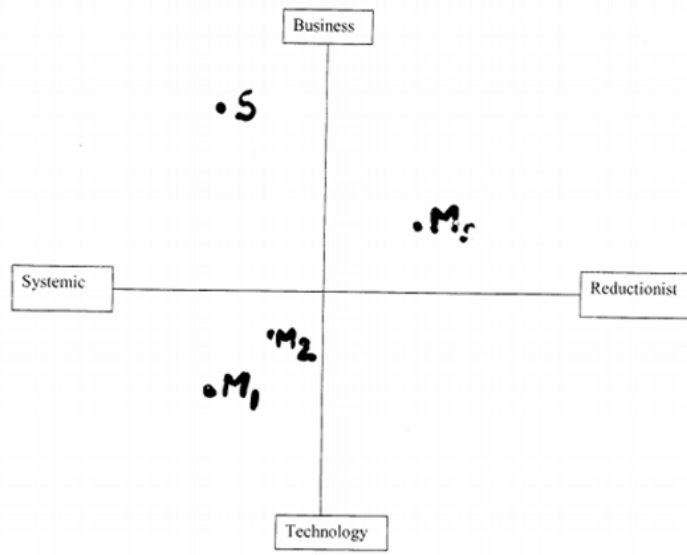


Figure 6-13: Sample of student mapping

On a later version of the course this map was revisited at the end of the course (Example shown in and students asked to identify any changes they would make to their initial personal location.

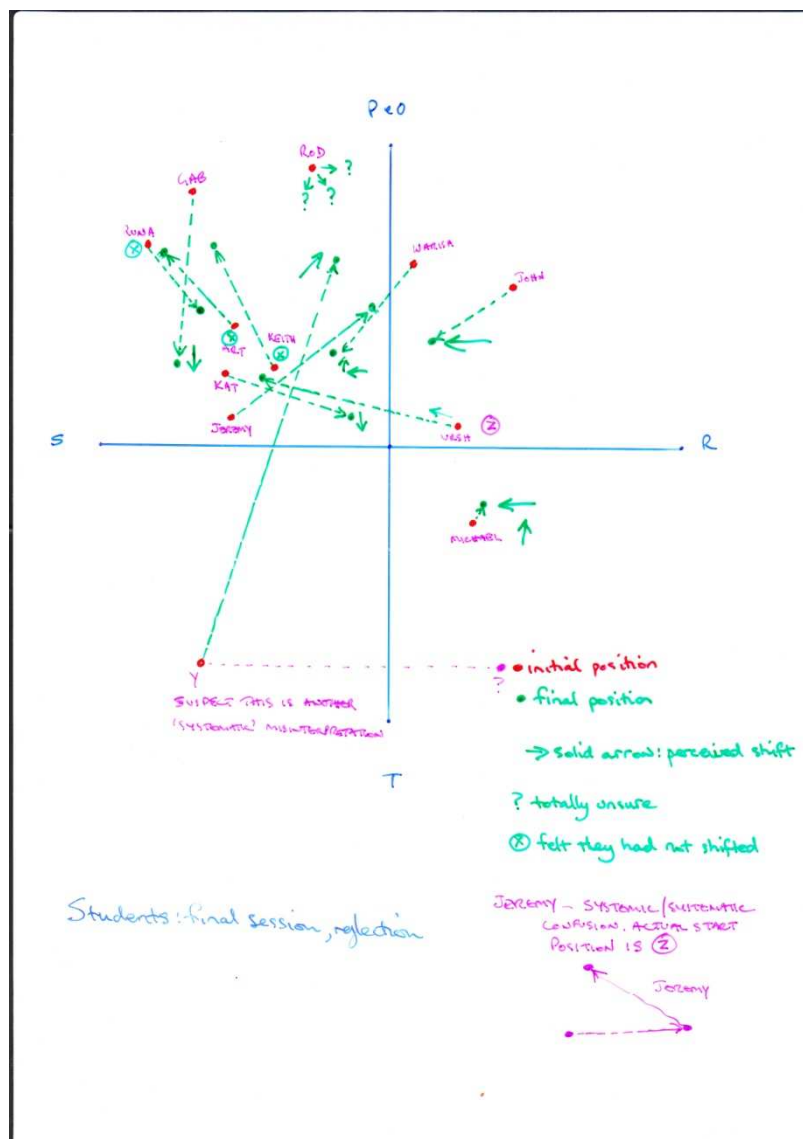


Figure 6-14: Example of reflective mapping by students

6.5.3 Interpreting the ISDM mapping

Figure 6-15 shows the result of combining the individual plots for Systems Development Life Cycle (SDLC) for all students involved in the 2005 and 2006 courses (a total of 40 students).

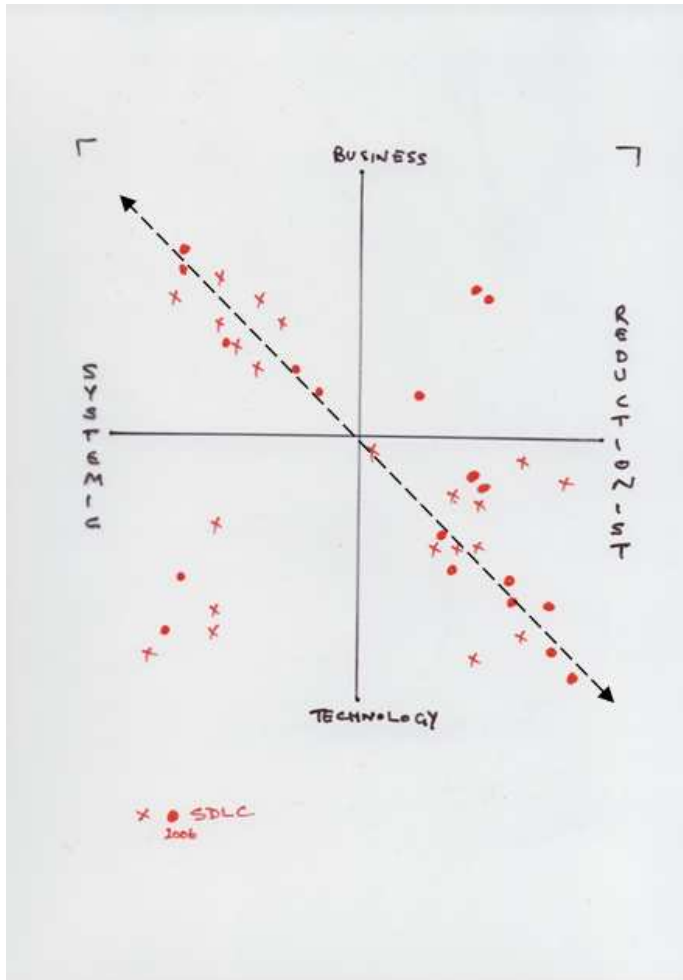


Figure 6-15: SDLC plots, 2005 and 2006

It can be seen that the plots mainly lie along the dotted arrow with some outliers. This plot was shown to another group and they were asked to comment on the plots. The general agreement was that SDLC was more a description of any development process rather than a methodology as such, and that what was probably happening was that each student plotted the part of the cycle that was most familiar to them. That is, students with a computing background may have favoured the technology/reductionist quadrant because this reflected their area of interest, with business students favouring the top right quadrant because that reflected their particular orientations. Many interpretations can be applied to the mapping, none right or wrong, and these are secondary to the point that other students were able to apply a well thought-through inference to the map. The bottom left quadrant

grouping did not elicit any explanations other than a possible confusion of systemic with systematic, with the resulting systematic/technology oriented description of the quadrant being a reasonable explanation.

Figure 6-16 shows the mappings for all students on the course in 2003. It can be seen that some ISDMs, SSM for example, appear in almost every quadrant. Others, SSADM for example, appear on the reductionist side of the map but at different places in the Y orientation. Clearly each student was interpreting the same text sometimes in very different ways, but sometimes in a more consistent manner. As each student stood at the front of the room and gave their explanation for their plots they were able to present plausible explanations for their chosen locations. Only on very few occasions did other students challenge the position and on these occasions it was usually established that there had been a linguistic misunderstanding.

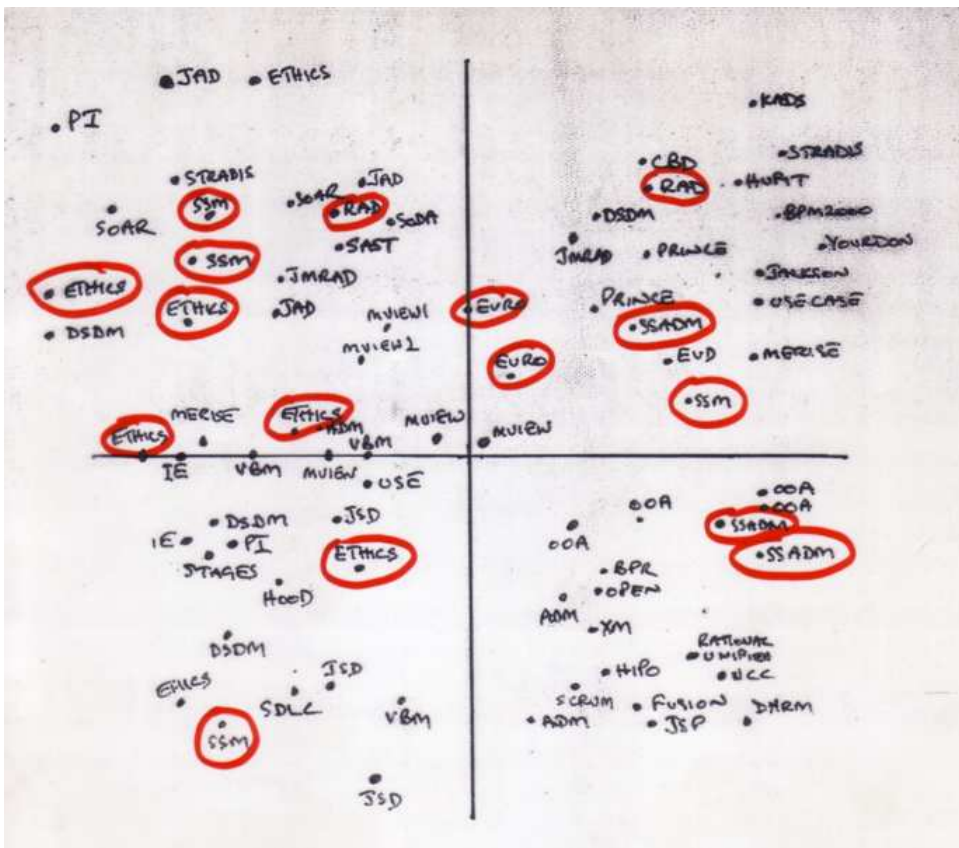


Figure 6-16: 2003 mapping - various ISDMs

What the plots began to suggest to the author was that some of the texts that the students were using contained semiotic signals that were being interpreted in roughly the same way, although other texts did not have this effect. One other factor that may have influenced the mapping was the possibility that I was leading the students in some unconscious way at the time, possibly in the way that I explained the map. This effect can be seen most

dramatically in Figure 6-17 which shows the 2006 plots for Dynamic System Development Method (DSDM) for two courses in that year. Each group showed quite close groupings but one clustered in the top left quadrant and the other in the top right. Both groups worked from the same text which would suggest that there is some external effect that has created this outcome, possibly the influence of the member of faculty although how this occurred is not clear.

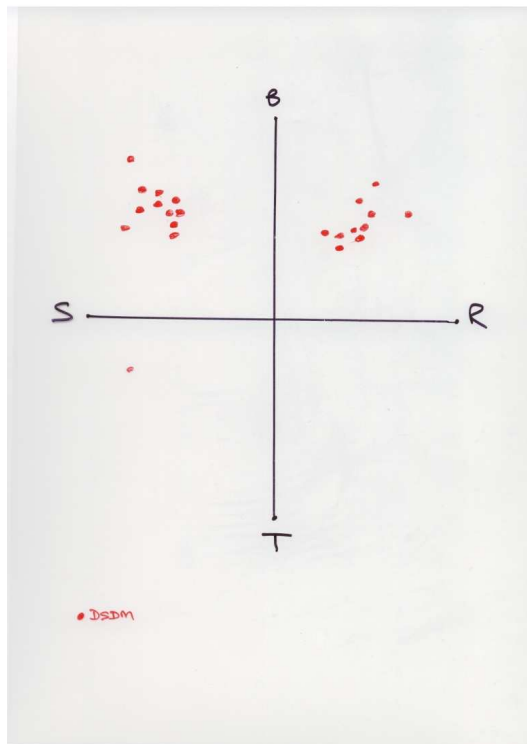


Figure 6-17: DSDM mapping, 2006

It was early recognition of the inconsistencies in the mappings from student to student and course to course that set the author on a new path. The mapping process was retained but approaches were developed to try to identify the textual and other signals that were prompting the students to generate specific map locations. Music and art were initially introduced as ways of leading the students in the direction of thinking about the signals in different media, the period 2003 to 2005 being the height of the interpretive and liberal arts phase of the course history.

The initial introduction of tools and approaches that mark a shift from a strongly interpretive to a more positivist direction was probably in 2004 when repertory grids were introduced as indicated in the shaded area of Table 5. Note that all previous teaching and learning tools and techniques were retained but a stronger emphasis was gradually placed upon searching for the deeper differences that may help to characterise ISDMs.

	2000	2001	2002	2003	2004	2005	2006	2007
Lecture/seminar	X	X	X	X	X	X	X	X
Case-based role play	X	X	X	X	X	X	X	X
Juggling	X	X	X	X	X	X	X	X
Mapping – basic	X	X	X	X	X	X	X	X
Mapping – multiple			X	X	X	X	X	X
Mapping – reflective				X	X	X	X	X
Music				X	X	X	X	X
Artwork					X	X	X	X
PCP/Repertory grids					X	X	X	X
Film trailers, music						X	X	X
Genre, chess sets						X	X	X
Concordance							X	X
Data mining/Ontologies								X

Table 5: Timeline showing teaching and learning elements and transition period

The next section of the chapter identifies the later tools that were incorporated into the course, with an explanation for their choice.

6.6 Music, film, poetry and silence

The notion of signatures existing in documents in such a way that they suggest a particular interpretation was tested with the students by using musical extracts. A number of short

extracts from a selection of pieces of music was played to the students and they were asked to create categories for the music. Students were quite easily able to place the extracts into categories such as jazz, film music, rock, heavy metal and so on. When asked *why* the extracts belonged in certain categories they were unable to clearly articulate reasons but quickly realised the link to the texts and mapping processes they had carried out. The same exercise was carried out with film trailers which were shown to the students and again they had no difficulties classifying the pieces as docu-drama, comedy, suspense and so on.

Given the students obvious enthusiasm for this approach to learning the music and art themes were expanded, culminating in a mini-lecture given in the style of the John Cage piano piece titled 4'33", first performed on stage by David Tudor in 1952. Cage believed that the primary act of musical performance was listening rather than making music. In the 'instrumental' version Tudor walked on to the stage, sat silently at the piano for four minutes and thirty-three seconds, then rose, bowed to the audience and exited the stage. Various interpretations have been applied to 4'33", including suggestions that the work is actually a series of silences of different lengths interrupted by pauses, or that the shuffles, coughs and other audience sounds are the actual music. (Blum (1977) records that the renowned cellist Casals also regarded silences as an integral and important part of music). Demonstrating this piece of work to students is both fun and helpful in drawing students' attention to the need to listen more carefully to both the content and the silence in lectures, seminars, everyday conversations and in the systems development environment.

Santoro (1996, pvi) comments in his preface that music changes as it interacts with other cultures and that "... good listeners have to be willing to stretch and bend and learn and be willing to discard, however provisionally, what they think they know in order to be able to understand afresh. In other words, to become a little more like the artists they're listening to". I would not wholly advocate, of course, that students should necessarily become more like their teachers - the whole indoctrination issue lurks in that direction - but the ideas of new understandings reinforced a core theme in the course.

Given the way that many students, particularly those from international backgrounds, talk to each other, leave the room to make or take phone calls, or work on their laptops during formal sessions the above piece of theatre may be a case of art mimicking reality. Discussions with students about Cage and Kagel often leads them to raise their eyebrows and ask me if I am really being serious. This raises a useful discussion point that allows another voice to be brought to the situation, in this case that of Pace (1997) who, after carrying out a detailed consideration of the work of Kagel, comments:

“But as ever with Kagel, I have my doubts. Maybe he has the last laugh, mocking the po-face seriousness of myself and others who try to get to the bottom of his work. He could, after all, have a concealed agenda: to show up the pretensions of those who analyse and probe music, or expose the emptiness and backward-looking nature of the ‘post-modern’ aesthetic.” (Pace, 1997, p.33)

This again allows the idea of multiple and critical perspectives to be visited and placed in the context of systems development, which takes place in a human conversational environment. As such it will be replete with complex narratives, some of which may be distractions, some may be important but may be missed in the general surrounding clamour, and equally there may be silences carrying potential significance if they are detected and their context appreciated.

Consideration of music also led to an interesting perspective on the way that methodologies can be interpreted in the light of understandings of the originator. Feather (1950) reports that Bill Taylor, an outstanding modern jazz pianist, explained that if he were handed a manuscript and told that it was a Beethoven sonata he would read and play the music very differently from the manner in which he would read and play the identical sheet of manuscript if he were under the impression that it had been written by a well-known jazz musician. An understanding of the philosophical position of the originator of an ISDM may equally lead to it being practiced in a specific way. Feather also considers what is and what is not jazz and uses Duke Ellington’s *Mood Indigo* as an example. He suggests that as it is based almost entirely on whole, half and quarter notes, it has no qualities that are inherently jazz and that *Mood Indigo* played by, say, André Kostelanetz, may be said not to be jazz, yet *Mood Indigo* played by Ellington’s own orchestra can be classed as jazz. The reasons he offers are “(a) the jazz beat instilled by the accompanying Ellington rhythm section, (b) by the use of tonal effects, such as trumpet and trombone muted by rubber plungers, long associated with jazz, (c) the psychological association of Ellington’s name with jazz, (d) the “‘Tain’t what you do” principle.” This suggests that SSM practiced by Checkland, and perhaps his closest acolytes, is clearly SSM because it uses certain approaches and tools and, most importantly, is practiced by Checkland. Other individuals may make use of Checklands work but one could argue that what they practice is subtly different from SSM as originally intended.

One student was sufficiently intrigued by the musical association with ISDMs to write a very good assignment that I later worked on with him as co-author to generate a successful publication. (Michalec and Banks, 2004)

Poetry was also used as a vehicle to explore some systems concepts. Students were asked to analyse a poem by Emerson to identify the ideas of reductionism and holism as a way of

helping the students better appreciate the systemic/reductionist axis of the Bell and Wood-Harper grid:

I thought the sparrow's note from heaven,
Singing at dawn on the alder bough;
I brought him home, in his nest, at even;
He sings the song, but it cheers not now,
For I did not bring home the river and sky;--
He sang to my ear, -- they sang to my eye
The delicate shells lay on the shore;
The bubbles of the latest wave
Fresh pearls to their enamel gave,
And the bellowing of the savage sea
Greeted their safe escape to me.
I wiped away the weeds and foam,
I fetched my sea-born treasures home;
But the poor, unsightly, noisome things
Had left their beauty on the shore
With the sun and the sand and the wild uproar.

(Extract from 'Each and All', Ralph Waldo Emerson)

They were able to see how the idea of an object placed initially within an environment and then later transported to another environment could lead to a very different interpretation of the object even though only the context had changed. They were able to make the link to the tacit and explicit aspects of ISDMs with very little difficulty. The poem by Hornsby shown in Appendix 2 was also used as a focus for discussion.

6.7 Artwork and chess pieces

The interpretation of music and recognition of identifiable categories was carried forward into the visual medium. Students were presented with a series of photographs and images of paintings and asked to think about classifying these in the same way that they had with music and film. This proved to be more difficult for them but some students were sufficiently intrigued to visit the local art gallery and talk with the guide to find out how pictures were classified as classical, post-modern, cubist and so on. They reported back to the other students and explained that the process was identical – identification of certain underlying or unique characteristics that specific groupings exhibited. Chess pieces were also used as a vehicle for the comparison of objects, a discussion being held around chess piece design that is detailed in a book outlining design issues in the turning of wooden chess sets (Darlow, 2004). This theme of comparison of object signatures was used to lead into the introduction of Repertory Grids in a subsequent version of the course.

6.8 PCP/Repertory grids

The Bell and Wood-Harper grid proved to be a useful initial vehicle for exploration of methodologies but as students became more critical they recognized that the grid imposed some limitations. The systemic-reductionist axis proved to be useful and easy to use (once the 'systematic' confusion was eliminated), but the focus on business versus focus on technology proved to be rather troublesome. Students felt that these 'Y' dimensions were not as clearly 'opposite' as for the X axis. Investigation of the idea of 'poles', or constructs, that could help overcome this problem was therefore undertaken. Kelly (1955) developed Personal Construct Psychology (PCP) which is a constructivist system for psychology. Kelly postulated that:

“Man looks at his world through transparent templates which he creates and then attempts to fit over the realities of which the world is composed. Constructs are used for predictions of things to come, and the world keeps on rolling on and revealing these predictions to be either correct or misleading. This fact provides the basis for the revision of constructs and, eventually, of whole construct systems.”
(Kelly, 1955, p.14)

He suggested that the constructs can be seen as poles, such as rich and poor, old and young and so on. An individual's view of the world is based on where they place themselves and others on collections of constructs. The idea of poles resonated with the Bell and Wood-Harper map and suggested that more poles could be used to better refine the mapping process. The music, film and artwork approach had already started to bring the idea of poles into use but the question that emerged became one of how to manage a large number of poles in a comparison process. Kelly developed a tool called the Repertory Grid for supporting counselling interviews, with various emerging personal traits forming the focus for the poles. This offered a useful possibility as a basis for developing an ISDM comparison approach and was tested and refined in a number of the ISDM courses.

The use of repertory grid software such as Enquire Within was considered but rejected due to the time required to learn the software and the requirement for a computer room rather than the normal case study room. However, the underlying principle of comparing objects, generating constructs and eventually using the outcome of this process as a vehicle for evaluating new objects in such a way that they could be grouped suggested a useful learning approach. One problem is that methodologies are sufficiently complicated for this to be a difficult and potentially quite tedious process without the software. As a precursor to using the technique with ISDMs a number of other objects were used as a preamble to explain the overall process in an accessible way. The first objects chosen were photographs, a typical grouping being shown in Figure 6-18. The process consists of

starting with two of the pictures and considering what they have in common that differentiates them from the third. After as many constructs as possible have been identified two different pictures are selected and the process repeated. In the example shown, for example, the two outer images have flowers while the central image does not. This can be stated as ‘flowers ---- no flowers’. If a fourth image (Figure 6-19) is examined and the constructs applied to it will be found that it fits with the other landscape image. This may sometimes be obvious from an immediate inspection but the use of constructs enables a more critical interpretation to be obtained.



Figure 6-18: Images for repertory grid work



Figure 6-19: A fourth image

The Repertory Grid sessions were constructed as in-class session with students working in small groups. In this session students worked together on three ISDMs and generated as many poles as they could within a set time. After this they worked through a procedure that allowed them to determine how closely the approach used in the SACHA case study fitted with the three they had analysed. One major benefit of this process is that groups work

closely together and share their understandings of the various ISDMs as they generate the poles. Figure 6-20 shows one page of student generated poles. Typically groups produced at least two sheets on constructs.

Detailed							Vague
People focused							Technology focused
Heavy documentation							Little documentation
Soft							Hard
'Thinking about'							'Doing'
Creative							Protocol driven
Fun							Serious
Team based							Individual
Multiple stakeholders involved in process							Few stakeholders involved
Method only							Philosophy only
Few steps							Many steps
Relatively unbounded							Clearly bounded
Strong user focus							Weak user focus
Output is possible solutions							Output is specification
Design oriented							Implementation oriented
Well documented							Poorly documented
Original							Derivative
Formal							Informal

Figure 6-20: Student generated poles

ASSIGNMENT 4

Group Members:

Zakir
Maryam
Franco
K.

	Constructs	SDLC	DSDM	Merise
C1	Traditional	Y	X	X
C2	Conceptual	X	Y	Y
C3	User Interaction	X	Y	Y
C4	More Technical focus	Y	X	X
C5	More Business focus	X	Y	Y
C6	Static	Y	X	X
C7	Dynamic	X	Y	Y
C8	Reductionist	Y	X	X
C9	Systemic	X	Y	Y
C10	Large Organizations	Y	Y	Y
C11	All type of Organisations	Y	Y	X
C12	More Stages	Y	Y	X
C13	Significant Budget Time Constraints	Y	Y	X
C14	Design/ Analysis oriented	Y	X	Y
C15	Flexible	X	Y	X
C16	Well Documented	Y	X	Y
C17	Well organized database	Y	X	Y
C18	More time/emphasis on design phase	Y	X	Y
C19	Recent	X	Y	Y
C20	Expected System Use Time (Short)	Y	X	X

Constructs	SDLC	DSDM	Values	SDLC	Merise	Values	DSDM	Merise	Values
C1	Y	X	0	Y	X	0	X	X	1
C2	X	Y	0	X	Y	0	Y	Y	1
C3	X	Y	0	X	Y	0	Y	Y	1
C4	Y	X	0	Y	X	0	X	X	1
C5	X	Y	0	X	Y	0	Y	Y	1
C6	Y	X	0	Y	X	0	X	X	1
C7	X	Y	0	X	Y	0	Y	Y	1
C8	Y	X	0	Y	X	0	X	X	1
C9	X	Y	0	X	Y	0	Y	Y	1
C10	Y	Y	1	Y	Y	1	Y	Y	1
C11	Y	Y	1	Y	X	0	Y	X	0
C12	Y	Y	1	Y	X	0	Y	X	0
C13	Y	Y	1	Y	X	0	Y	X	0
C14	Y	X	0	Y	Y	1	X	Y	0
C15	X	Y	0	X	X	1	Y	X	0
C16	Y	X	0	Y	Y	1	X	Y	0
C17	Y	X	0	Y	Y	1	X	Y	0
C18	Y	X	0	Y	Y	1	X	Y	0
C19	X	Y	0	X	Y	0	Y	Y	1
C20	Y	X	0	Y	X	0	X	X	1
			=3			=6			=12

	SDLC	DSDM	Merise
SDLC		3	6
DSDM			12
Merise			

- DSDM and Merise have high levels of agreement.
- SDLC and DSDM have very low levels of agreement.

Which of the 3 Methodologies is closest to that used by SACHA case?

- We believe **DSDM** is the closest methodology used within the SACHA case, because:
 - o The case looks into **High Level of Requirements Definition**
 - o **High User Interaction** is involved – constant feedback is taken from the users
 - o **Business Oriented** – The case was seen as an Information Systems Project rather than an Information Technology Project
 - o **Collaboration and Co-operation** – The case looks into collaborating and full co-operation from the end users, the CHO.

Figure 6-21: Sample of completed student (in-class) group repertory grid work

Figure 6-21 shows a typical completed output from the session. The Repertory Grid sessions proved to be valuable in that they helped students to consider key features of ISDMs and start to move towards comparing a small number of ISDMs. One problem was that the constructs were not universal, that is each group produced its own constructs although there was considerable overlap. It was felt by the author that a more reliable way of locating key words and generating poles would be useful. The next sections consider the approach that was taken to addressing this idea.

6.9 Seeking signatures

The final section of this chapter relates to material that was only partially implemented in the final year of the course. It marks a strong move in a direction that had as its aims the identification in more rigorous terms of the signatures that would help to definitively define ISDMs on the basis on semiotic representation in texts. The whole area of genre is complex and it was not felt that it would be possible to move the course in this direction given the time constraints. It was also felt that such a direction would fundamentally change the interpretive and liberal ethos of the course in a direction that became too positivistic. Concordances were only introduced to the students in the final two deliveries of the course. The need for students to learn to use concordance software in practice was rejected as being too time consuming for the reward that it may have offered.

6.10 Genre

What was emerging from the general direction taken in the course evolution was that it was moving into the area formally known as genre. The notion of *genre* has its roots in the Greek word *genos* meaning ‘race’, ‘kind’, ‘sort’, ‘style’ or ‘class’. Scaringella and Zoia (2005) see musical genres as the main top-level descriptors used to organize professional music collections but note that “even if terms such as *jazz*, *rock* or *pop* are widely used, they remain poorly defined concepts so that the problem of automatic genre classification becomes a non-trivial task.” In discussing document genre, Crowston and Kwasnik (2004) also emphasis the complexity of genre when they comment that “... we see genre as a multidimensional phenomenon, which takes into account not only the attributes of the document itself, but also of its role in human endeavor”. Other literature also suggested that genre-based approaches would be useful in classifying ISDMs as a prelude to comparison but all signaled the difficulties inherent in such tasks. Genre was included in the course but only as from a general position, a more detailed approach being considered for future versions of the course. In practice the course ceased to exist and genre was never incorporated. However, concordance-based approaches did prove to be possible and were implemented in two versions of the course.

6.10.1 Concordance

Discussion with students indicated that the Repertory Grid poles were derived from key words in the text and a number of text analysis tools was examined to determine how such key words, constructs and concepts could be identified. Concordances are collections of key words in a document, often arranged alphabetically or by frequency of use. Concordance software provides some useful insights by accepting textual input and generating a list of the frequency of appearance of all words within a text along with the option to display the sentences within which specific words appear so that context can be obtained. This was felt to be a useful approach to generate poles within the repertory grid approach but is a rather cumbersome when used to compare multiple texts. A free software product (Antconc) was used with students for just two deliveries of the course. The figures below show concordance outputs from a DSDM text.

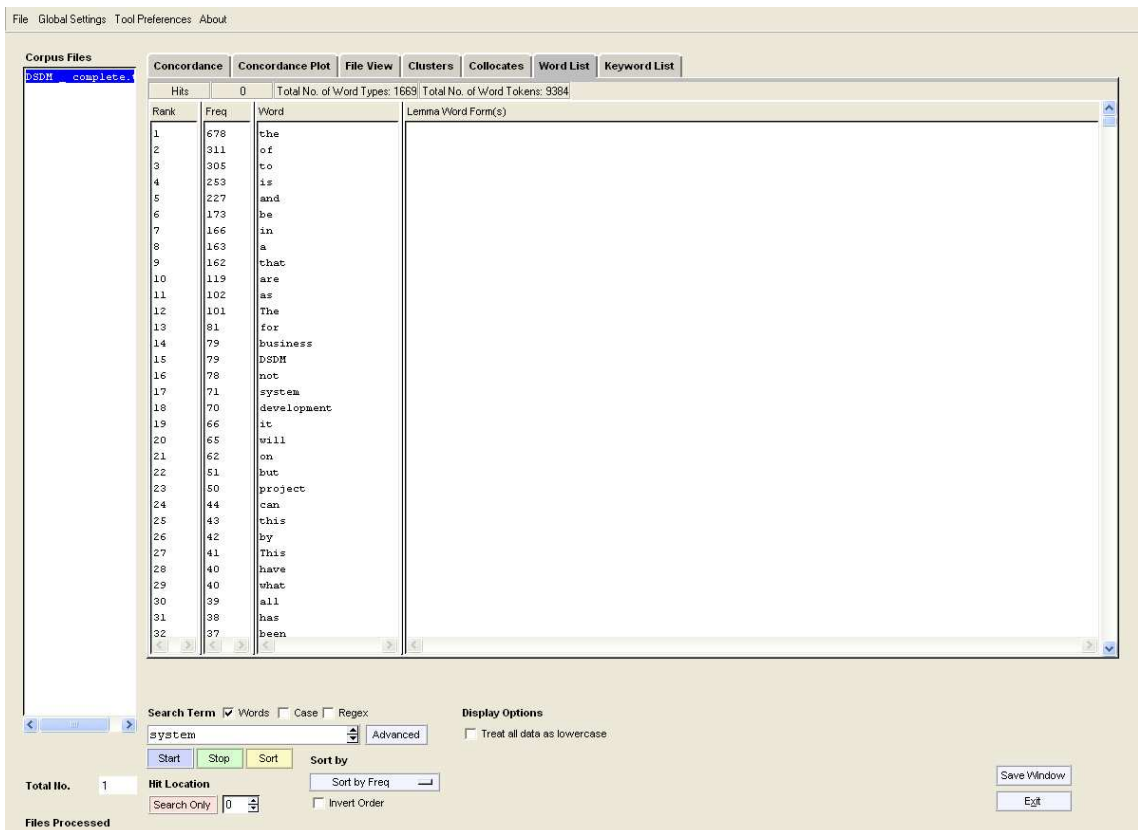


Figure 6-22: Wordlist from Concordance software for DSDM text

Concordance		Concordance Plot	File View
Hits	0	Total No. of Word Types: 16	
Rank	Freq	Word	
1	678	the	
2	311	of	
3	305	to	
4	253	is	
5	227	and	
6	173	be	
7	166	in	
8	163	a	
9	162	that	
10	119	are	
11	102	as	
12	101	The	
13	81	for	
14	79	business	
15	79	DSDM	
16	78	not	
17	71	system	
18	70	development	
19	66	it	
20	65	will	
21	62	on	
22	51	but	
23	50	project	
24	44	can	
25	43	this	
26	42	by	
27	41	This	
28	40	have	
29	40	what	
30	39	all	
31	38	has	
32	37	been	

Figure 6-24: Word Count for DSDM

Concordance		Concordance Plot	File View	Clusters	Collocates	Word List	Keyword List
Hit	KWVC					File	
1	licly available method that covers all aspects of system development from project inception through to sup					DSDM _ comple	
2	ode before any real understanding of the proposed system has been reached. My view is that RAD should real					DSDM _ comple	
3	to this definition are equally important. If the system is to meet the business needs, then it must be su					DSDM _ comple	
4	, they are no longer able to wait for years for a system to be provided: the business may be radically cha					DSDM _ comple	
5	ples have been found to be necessary if a quality system is to be supplied in the timeScale required by t					DSDM _ comple	
6	tial; feasibility to asses the suitability of the system to the approach and to provide an initial view of					DSDM _ comple	
7	lutionary prototyping of functionality inside the system architecture, which is also defined at a high lev					DSDM _ comple	
8	ood, the design and build iteration engineers the system component to sufficient quality to be delivered i					DSDM _ comple	
9	phase. Implementation covers not only moving the system to the production environment but also training t					DSDM _ comple	
10	at of Technical Coordinator, who is basically the system architect and keeper of the technical vision. The					DSDM _ comple	
11	he users are more likely to take ownership of the system. The risk of building the wrong system is redu					DSDM _ comple	
12	of the system. The risk of building the wrong system is reduced. The final system is more likely to					DSDM _ comple	
13	uilding the wrong system is reduced. The final system is more likely to meet the users' real business r					DSDM _ comple	
14	irements. The users will be better trained. The system implementation is more likely to go smoothly. Wh					DSDM _ comple	
15	arrows, and recognised routes back to evolve the system are shown by the lighter arrows. As stated in the					DSDM _ comple	
16	. business study 3. functional model iteration 4. system design and build iteration 5. implementation. T					DSDM _ comple	
17	he functional model iterations before moving onto system design and build iterations and finally iterating					DSDM _ comple	
18	nd finally iterating through the placement of the system in the working environment. However, this approac					DSDM _ comple	
19	rs to questions such as 'Do we think the proposed system is technically possible?', 'Is the impact on the					DSDM _ comple	
20	r the question 'Is DSDM the best way to build the system?'. Some applications will be difficult to produce					DSDM _ comple	
21	less there is a real business need to deliver the system within timeScales that would be considered next					DSDM _ comple	
22	se not to leap into building something before the system is a little better understood. This can engender					DSDM _ comple	
23	be affected in any way by the introduction of the system. From these user classes, the individuals who wil					DSDM _ comple	
24	ly the functionality to be developed but also the system architecture that will be used. So another produc					DSDM _ comple	
25	So another product from the business study is the System Architecture Definition, which describes the deve					DSDM _ comple	
26	hing else produced during the business study, the System Architecture Definition is allowed to change duri					DSDM _ comple	
27	placement of processes in a client/serverD based system could change as a result of considerations about					DSDM _ comple	
28	is better understood. Moreover, the detail of the system design will be added and refined as work progress					DSDM _ comple	
29	ration is on refining the business aspects of the system, that is building on the highDlevel functional an					DSDM _ comple	
30	take place. Careful analysis is necessary if the system is to be well founded. It is essential that the					DSDM _ comple	
31	Functional prototyping review documents. As the system is iteratively reviewed by the users, the comment					DSDM _ comple	
32	sibly dealt with, given the short time before the system or system increment must be delivered into the op					DSDM _ comple	
33	t with, given the short time before the system or system increment must be delivered into the operational					DSDM _ comple	

Figure 6-23: Concordance context screen (DSDM)

Although concordance software did appear to offer some benefits it was felt to be complex for students to learn to use and consumed too much session time. It did however work well as in-class demonstrations.

6.11 Data mining and ontologies

A richer view of texts that allows easier comparisons can be obtained by using data mining software and one such product, Leximancer, was used to explore a number of texts.

Leximancer is a data-mining tool that can be used to analyse the content of collections of textual documents and to visually display the extracted information. The information is displayed by means of a conceptual map that provides a birds eye view of the material, representing the main concepts contained within the text and how they are related. Apart from viewing the conceptual structure of the information, this map allows users to perform a directed search of the documents in order to explore instances of the concepts or their interrelations. That is, Leximancer provides a means of both quantifying and displaying the conceptual structure of a document set, as well as a means of using this information to explore interesting conceptual features.

The on-screen display from Leximancer offers the following features:

- The brightness of a concept is related to its frequency (i.e. the brighter the concept, the more often it appears in the text).
- The brightness of links relate to how often the two connected concepts co-occur closely within the text.
- Nearness in the map indicates that two concepts appear in similar conceptual contexts (i.e. they co-occur with similar other concepts)

Figure 6-25 shows a typical screen from Leximancer. Two documents were used for this plot, one a chapter from a strategic management book (top left circle) the other an early chapter from a book describing approaches to the development of computer systems. The separation of the circles shows a clear difference in the styles or languages of the two books.

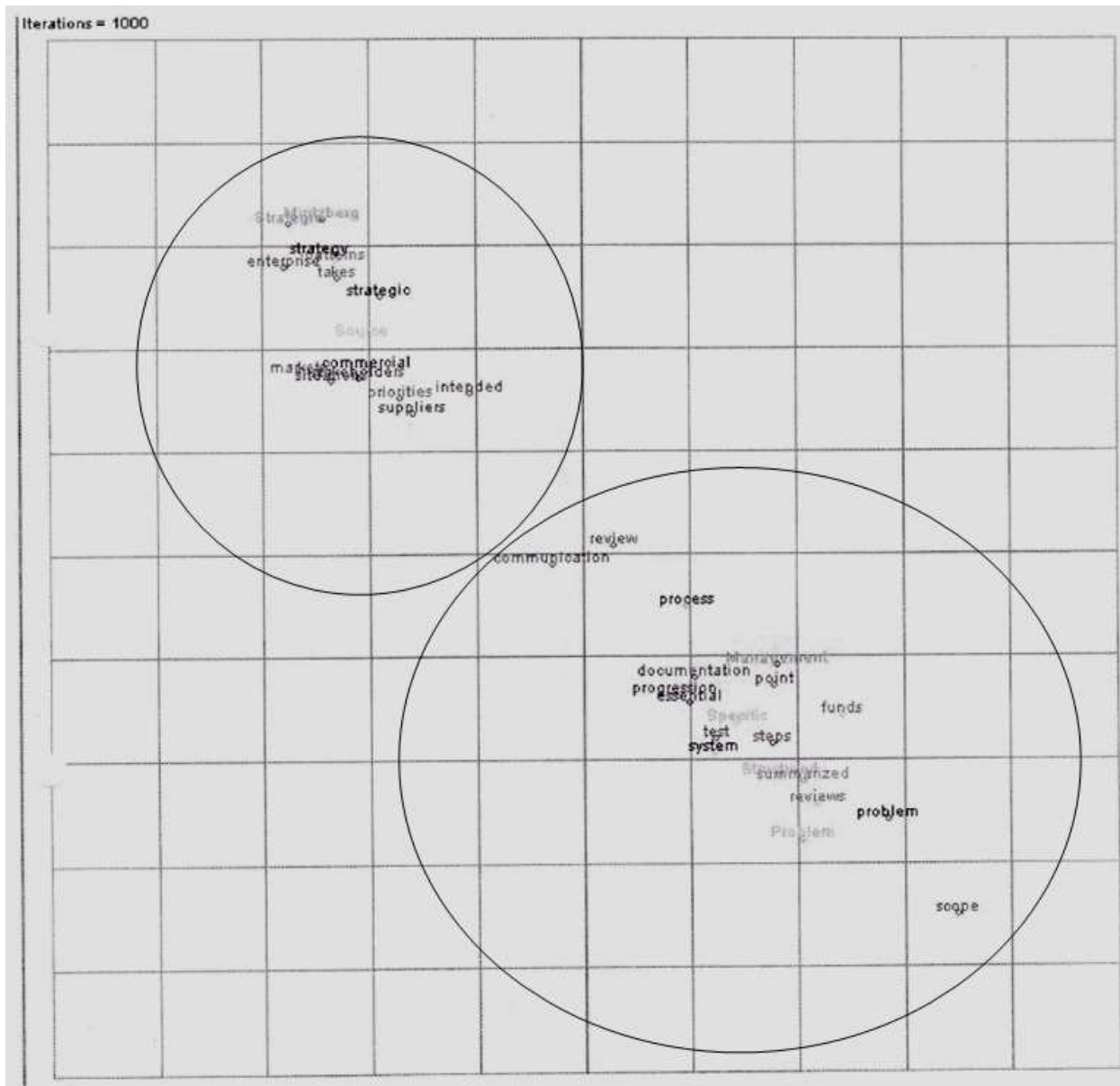


Figure 6-25: A Leximancer display

Leximancer did offer a way to view texts in order that key words could be identified and differences easily seen between documents. It is, however, a difficult piece of software to use and only screenshots were shown to students as part of discussion sessions. Again the demise of the course terminated investigations in this general direction.

6.12 Overall reflection

The ISDM course outlined in this chapter moved in a direction that surprised the author, even though each step was quite logical. It started as a strongly interpretive course and gradually introduced more tools to support this stance. Students found the course challenging but rewarding, many commenting that their views on ISDMs had changed as had their own thinking about where they would place themselves within the Bell and Wood-Harper (1998) grid. Many students felt that their initial position in the

technical/reductionist quadrant reflected their starting position but the course had led them to move in the direction of the systemic/business quadrant. They felt that this was a positive outcome because it gave them a new perspective on the more traditional systems analysis courses that they had attended prior to this course.

Figure 6-26 shows illustrates the way that the general, tacit and explicit communication elements of the subject were structured in the course. The ‘Seeking signatures’ box marks a transition point in the course, initially towards a very liberal flavour in the sense that art, music and poetry were becoming increasingly dominant rather than playing a supporting

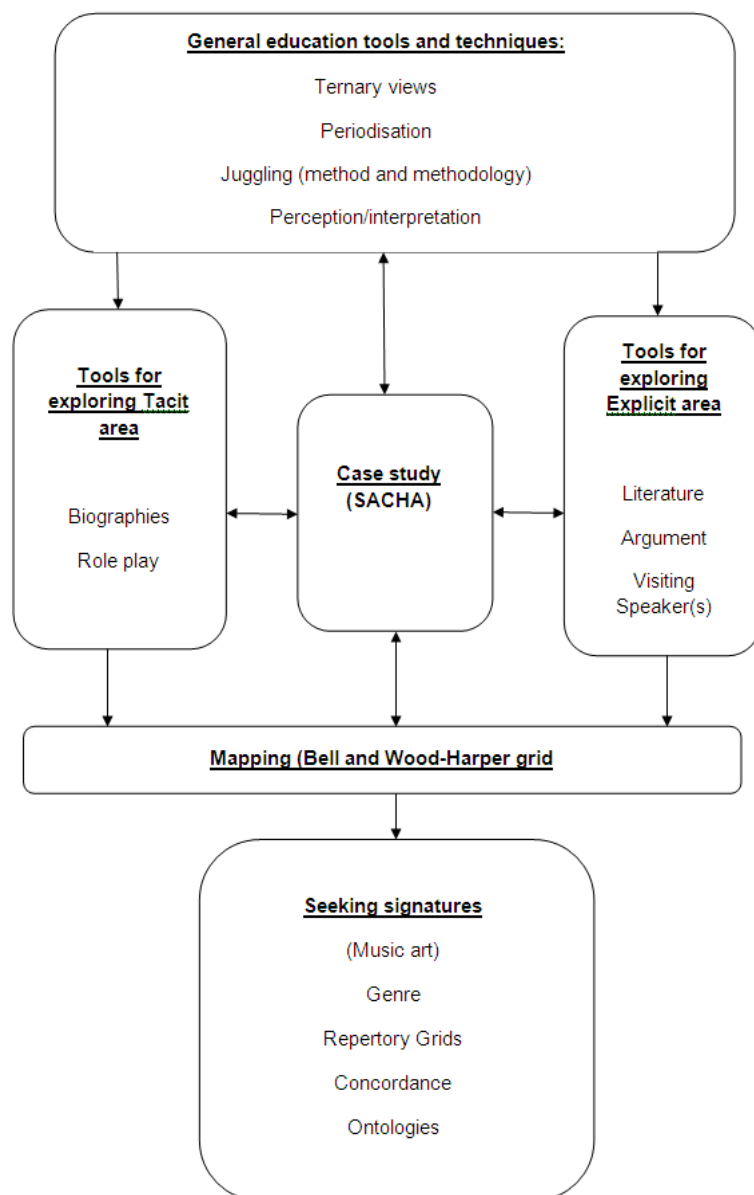


Figure 6-26: Summary of tools and techniques used in the course

role.

Even though the students enjoyed the course (in fact in this period the author was nominated by the students for a Lecturer of the Year award) and appeared to be deriving benefits from it I felt that it was losing focus and not addressing the original aims.

The drift towards extreme interpretivism halted and instead started to move in a strongly positivist direction as linguistic signatures were sought to try explain what was behind the variability in the student mapping on texts. However, the move towards an attempt to use a variety of approaches and software to categorically define ISDMs felt equally as uncomfortable.

The latter stages of the life of the course raised doubts as to the effectiveness of the newly shaped course that was emerging. Although it clearly provided students with an interesting, challenging and useful experience there was an underlying concern on the part of the course designer that this was not a sufficiently strong foundation for them as potential practitioners.

This concern will be discussed in the final chapter.

CHAPTER 7: REFLECTION, DISCUSSION AND FUTURE WORK

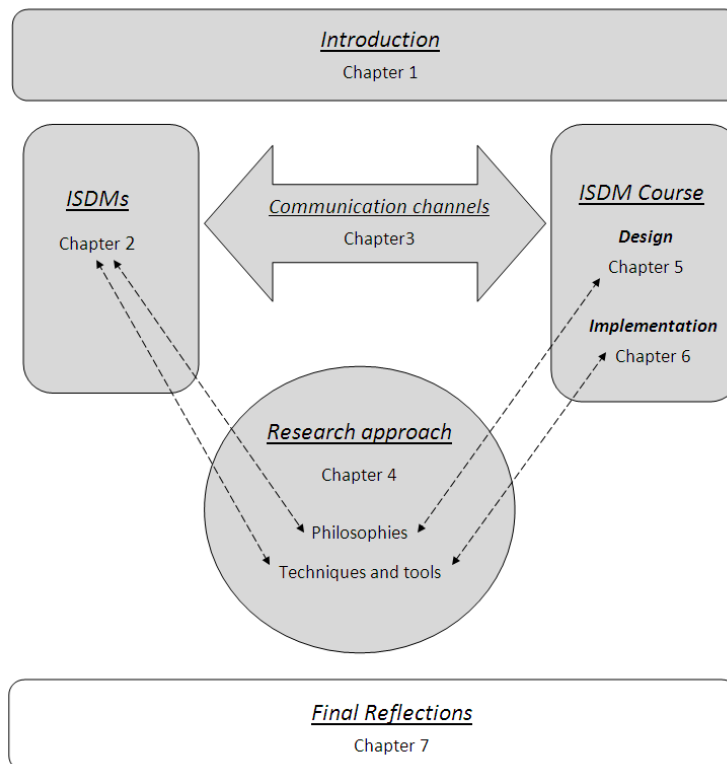


Figure 7-1: Chapter focus: Final reflections

7.1 Broad reflection

This development and implementation of the course that forms the focus of this thesis represents a journey taken by the author along with several groups of students as we jointly considered issues surrounding the paradox of ISDMs. Simply stated the area of concern was that the development of information systems for use in business appeared to consistently achieve poor outcomes despite their importance to the business community, despite several decades of activity in which lessons should have been learned, and despite the existence of an almost overwhelming library of literature explaining how the development process should be undertaken.

The brief to develop a course titled ‘Information Systems Development Methodologies’ posed an interesting challenge. Providing students the skills and knowledge to use one or more ISDMs did not seem to be a productive route, in fact it seemed as though this would simply equip students, as would be practitioners, with appropriate tools and techniques to go confidently into the real world – and fail. On the other hand, simply telling students that

no matter what they did they would always fail seemed to be a negative message as well as being a message that would not occupy ten weeks of their time.

Exploration of courses around the world suggests that a great many systems analysis and development courses in the higher education sector are indeed teaching skills-based approaches, sometimes advocating a single approach, sometimes multiple approaches. This could be regarded as sometimes teaching just one way to fail in the real world or sometimes teaching several ways to fail, or if not to fail then to find that application of their skills gained at university was problematic in the real world. Kautz, Malmborg and Pries-Heje (1998) for example, followed up on their teaching of Multiview in the third and last year of the undergraduate education for a degree in computer science and management accounting to determine if it had been applied in practice after graduation. They found that:

“One respondent declared that he had totally forgotten the methodology, as he did not work in system development. As such, he was part of the 25% (30 individuals) who answered that they did not work within system development and had jobs where Multiview was irrelevant. Company standards represented a significant obstacle for the adoption of the methodology: 17% (20 people) said that Multiview was incompatible with their organization’s procedures for method use and 11 respondents answered that their company had its own methodology which they used. The survey did not investigate if the respondents were not in a position to introduce a new methodology or if they did not see any benefits in a potential introduction of Multiview. A few non-adopters stated that Multiview is not widely known in Denmark. Finally, 10 former students reported that they worked in companies that do not use methodologies for system development at all. (Kautz, Malmborg and Pries-Heje, 1998, p.566)

Given that the students attending many Masters courses (including the ISDM course) are from many different countries of the world the issue of applicability of a specific methodology in specific cultures is an interesting one. Several of my students identified approaches that they felt they could implement in their home country but these would be ones that they themselves constructed in the light of their understanding of ISDMs in general and their appreciation of their local cultures.

I am, of course, quite deliberately and provocatively over-stating the ‘failure’ position because I cannot furnish definitive evidence to prove conclusively that ISDMs are the major factor in failed development projects. Many other financial, temporal, social, cultural and political possibilities are at play in the working environments within which systems are developed. One must also assume that all of the effort put into developing and publishing ISDMs is driven by a belief that they do offer some significant contribution to the systems development field. Of course they may, as Flood (1995) remarks, simply be products of the academic or consultancy paper factories and therefore serve a very different purpose.

However, whatever the merits or otherwise of any specific ISDM there is little doubt that a framework to guide actions – perhaps any framework – does confer benefits to a developer. By having a reference framework rather than simply taking an ad hoc approach it becomes possible to reflect upon the successful and less successful outcomes of a systems development endeavour. Understanding gained from this reflection can be combined with an appreciation of how it fits with ones own view of the world and that of the organization within which the development is taking place and this may offer tangible benefits to systems developers.

All of this speculation and confusion led me to ask exactly what was the value of ISDM-related courses, and I was reminded of the comments of Nuttgens, the eminent architect and Director of Leeds Polytechnic, who, in his early days in the educational sector, tried to understand how some subjects were taught:

“One of the turning points for me ... occurred a few years ago when, after studying the work of teacher training colleges, it struck me that quite a few of the subjects only existed because they were taught. If they weren't taught at all, I suddenly realized, they wouldn't need to exist. I hurried to consult a most eminent educator whose views and work I profoundly respect. He was surprised that I should only just have discovered this fact. I am still reeling at the thought of teaching nothing because it makes an impressive-looking syllabus. Of course it also provides teaching jobs.” Nuttgens, 1988, P102

If we didn't teach systems analysis and design, or specific ISDMs would systems cease to be developed in the future? This would clearly not be the case because organizations need information systems so that they can function and grow, and organisations would (as some already do) take on the role of indoctrinating their developers into whatever in-house ISDM they used. This leaves the question of how could a course titled “Information Systems Development Methodologies” offer value to students as would-be systems developers?

The answer was to create a course in which students were encouraged to ask questions about ISDMs rather than receive answers. This approach fitted well with the way that my teaching approaches had changed over the years. In my first days in higher education in the UK I was perceived, as a result of my previous career, as a technical person and was given subjects such as networks and telecommunications, computer systems architecture and database design to teach. These can be comfortable subjects to teach in the sense that predictable and repeatable links can be established between the ways that electronic devices interact. This predictability and fact-based approach quickly became tedious, for faculty as well as students, and creative approaches were slowly introduced to the material. Case studies became more complex and detailed so that students could appreciate why

understanding the technical nature of the subjects was insufficient for occupational roles outside of laboratories. Issues of change, complexity, social and technical interactions, finance, politics and culture were all brought into the courses. This was not a problem because the courses were located within a business school and this broader view was welcomed. This view was equally well received on moving to Australia, again in a school that was essentially business-oriented. It was only in the last two years of the life of the ISDM course when it was re-located to a school of computer and information science (CIS) that questions started to be asked about the authors approach. My perception was that the lack of an exam was viewed with some suspicion and the course did not appear to be seen in the same positive light as the existing systems and analysis and design courses.

If the CIS management was uncomfortable with the course this was not true for the students. The student population attending the course changed from mainly business students with a small number of computing students who were taking the subject as an elective to the reverse of that population. When the course was re-located to CIS my first action was to point out to the students that the course had been developed from business perspective and ask the students if they would prefer that the course moved in a more technical direction. Many of the students knew of the course from fellow students who had attended the course and their immediate response was to ask that the course be left as it was. When asked why, the students responded that they knew that the broader view offered by the course would expand their thinking and that this would supplement their more technical studies.

7.2 Reflecting on the research approach

The research was framed with an interpretive view of the world and I felt that the approaches I adopted to exploring the topic of the thesis were appropriate. Viewing the course as a case study enacted through a series deliveries punctuated by reflection suggested action research, later modified more specifically to action learning also seems to be valid. The inclusion of myself in the study, along with the students, implied an ethnographic approach and the way that the story was told from a personal perspective supported the idea of autoethnography. Looking back, I still see this as a valid approach but also appreciate why it can be perceived as a risky approach. Telling a story with sufficient detail to help the reader appreciate the reflection in action and reflection on action that characterised the research helps to support plausibility but perhaps at the expense of expression of the other aspects of the research. As I responded to the needs of the students and developed new tools and techniques to support the teaching and learning I

carried out considerable background research that does not appear explicitly in this document. This is particularly true of the middle and later deliveries of the course where there was a shift first of all to a very strong arts ethos and then quite sharply in the direction of a more positivist approach. The positivist direction required considerable reading in the areas of genre, schema theory, concordances, data mining, and ontological engineering. The populating of the Bell and Wood-Harper maps by the students has clear links to Grounded Theory but again this has not been articulated in this document.

These areas of opacity are a result of the activities being seen as a natural part of the development of my teaching practice. Argyris and Schön (1996) indicate that the ways in which practitioners and academic researchers pursue their inquiries have much in common but also exhibit some significant differences. They suggest that practitioners share a common interest with academic researchers in building explanatory models of organizational worlds and in dealing with data that they consider to relevant or irrelevant. The single most significant difference that they identify is that practitioners may have a different appreciation of ‘rigour versus relevance’ noting that:

“ ... practitioners’ models must also serve the purposes of designing. However appealing models may be as tools of exploration or explanation, they are judged by how well they “work,” in the sense of enabling practitioners to do something they wish to do. This decisively affects what criteria apply to the reasoning of practitioners, in what sense they experiment, and in what sense their experimentation may be appropriately called “rigorous.” (Argyris and Schön, 1996)

Here lies probably the greatest lesson for me in terms of the research process. Finding a balance between objectively researching a situation and subjectively being part of that situation is a challenge. Perhaps the focus has been rather more on myself as practitioner than as researcher but this is a case where theory and practice come together to form praxis, with both aspects informing each other. It would be fair to say that building an effective course was the primary aim with the action learning part of the research being an integral part rather than vice versa.

7.3 Reflections on the course

The student voices are also subdued in this document, not because this was the case in practice but because their conversations were a vital and integral part of an ongoing dialogue as the course progressed and it would be impossible to report all of the conversations in this document. Students were frequently very vocal and challenging, being willing to express their views, uncertainties and beliefs in a frank and open way. Two examples can be given here as exemplars of the thoughtfulness and participation that characterised these students.

The first relates to a student from Japan who, during her presentation of her personal location of the Bell and Wood-Harper slide commented that she was not involved in systems development and had initially found this to be a difficult exercise. She then went on to comment that she remembered that I had asked them to think about their own backgrounds in the light of the grid. She had been a ski instructor and explained that she felt there was a reductionist element in what she did in that role, in the sense that she had to break down skiing to a series of small movements. She then said that despite this she felt she could argue that she could relate more strongly to the systemic part of the grid in terms of holism because she wanted skiers to appreciate that the results of those small movements would finally be put together to produce the intense pleasure of actually skiing in a natural environment. This thoughtful explanation showed considerable insight and encouraged many other students to relate the grid to their own way of thinking about themselves and their various roles.

The second example is that of a student from Croatia who, in the second session of the course raised her hand and said “David, I am confused”. I enthusiastically replied that this was wonderful because it showed that she was not simply accepting or believing what I said but was clearly trying to make sense of it and that was a sign that learning was about to take place. She frowned for a moment, then grinned and said “You are right!” Other students copied her phrase and the cry “I’m confused – and I know that is good!” accompanied by wide smiles punctuated the following weeks. She had effectively given permission to her fellow students to ask questions in a much more powerful way than I was able to.

Other student voices found expression through published papers that we worked on together after the course was completed. Three students produced papers covering the diverse area of a novel council system project (East and Banks, 2000), information systems and jazz (Michalec and Banks, 2004) and a viable systems view of organisational security (Gokhale and Banks, 2004). Helping students to publish was a great success and was personally rewarding as well as adding to the perceived value of the course.

7.4 Success and failure: the course

I have identified the courses as a system and indicated that the development process moved from an initial SDLC style approach, through prototyping and on to adaptive and agile implementation. The question of success and failure has to be raised as for any development project.

From the perspective of the students I feel confident in saying that they saw the course as a success. Many of them personally thanked me at the end of the course and, as noted earlier in the thesis, I was nominated for Lecturer of the Year by one of the groups. The Lecturer of the Year scheme was created by the students union and had no input from the broader university system and I valued that nomination far more than the Teaching Excellence Award that I was granted by the university.

The course did not attract many students, typically around 18 to 25 per delivery, students being aware that the course was challenging and different and only students who were willing to accept this enrolled. From the perspective of the university the course was therefore not a great revenue generator and could only be regarded as a partial success in financial terms. The course was not strongly promoted by many of the Program Directors because they perceived it very much as a 'soft' course that did not fit with the more traditional computer science flavour of the school. I resisted requests to produce an online version of the course, to the chagrin of the school. The essence of the course lay in the face to face contact and the free-flowing discussions that could roam freely within the rather elastic bounds of the course. The other perceived problem with the course was that I used minimal lecture notes and virtually no supporting materials. This meant that the course could not easily be 'packaged' for delivery in other parts of the world or locally by cheaper delivery agents (ie newly graduated Masters or PhD students).

From my perspective I am still not sure about the success or failure of the course. It succeeded in prompting students to take a critical view of systems development and exposed them to new ways of thinking not only about ISDMs but also about other subject. The greatest doubts I have are about the way that the course drifted first towards a strongly arts position and then in the opposite direction towards a positivist position.

7.5 Finding a balance

The interpretivist and constructivist approach taken for the major part of the life of the course was, I believe, grounded in sound educational thinking. The idea of students being able to individually and in a group to examine a proposal and arrive at a reasoned outcome is a very positive educational outcome.

The doubt that began to concern me was that although students were able to mark a point on a map corresponding with their interpretation of an ISDM text and justify that position the fact was that each student found, and justified, a different point on the map. In that sense we shared understanding of why each point could be regarded as valid but still did not have consensus on where the ISDM might actually be. Although some texts, notably

the one used for DSDM, produced reasonably tight groupings, that is a fairly consistent interpretation, the majority did not. Even in the case of DSDM the interpretations could be closely grouped but in different parts of the map when mapped by different cohorts.

I began to feel that the course had lost its way and was not helping students to find a meaningful way of locating ISDMs in a consistent way. From the perspective of critical thinking and applying various techniques to the assessment of art and music, ie general education, the course was performing well. I felt that there was evidence in the student mappings to suggest that it should be possible to take a text describing an ISDM, interpret it and generate a reasonably consistent view of where that ISDM may be located. If this could be achieved then it should be possible to start seeing groupings of ISDMs emerging and this comparison process could provide useful insights.

The use of repertory grids allowed students to work in small groups and identify key words in the texts that could be used to generate constructs in a more formal way than each student simply reading the text and using their own analysis technique to gain understanding. The repertory grids worked quite well but created the problem of how to map all of the constructs in such a way that those for a number of ISDMs could be easily compared. The sessions were also quite long because students needed to discuss the meaning of the various words in the text and I was not sure that this time was well spent. The use of concordance software allowed key words to be extracted quickly and therefore to shorten the time to carry out the repertory grid work and the next step, data mining using the software package Leximancer, took this further and allowed word extraction and automatic mapping. In parallel with this development I was looking at Wand and Webers ontological work and seeing that this direction would lead towards the creation of a consistent tool that could be used for comparison of ISDMs in the broader IS community.

These developments were not planned or even anticipated but the initial course design had been carried out very much in the spirit of prototyping and it was recognised that changes would need to be made as the course progressed. Treating the course as a system and the educator as analyst/designer/implementer allowed the systems development literature to support the educational literature used in thinking about the way that the course developed over time. Checkland, for example, notes that:

“Since the systems analyst is dealing with a problematique, he is not surprised when the eventual outcome of his work strays somewhat from what he anticipated in his initial problem formulation. His process of inquiry will itself educate, and thus possibly lead to changes in outlook or modified values, even changes in the situation itself. The situation may also be changed by new external factors emerging during the course of the work. However, if the analyst has made his initial

formulation clear and explicit, then it will be possible to adjust both the problem boundaries and the crucial issues realistically and coherently. It is in the nature of systems analysis that the process of carrying it out continually enriches the perceptions of the problems.” (Checkland, 1980)

Even though change had been anticipated and it was felt that the original objectives would be maintained throughout any changes I feel that the termination of the course was probably timely. The mapping techniques I was introducing would provide detailed analysis of texts and possibly a useful ontological database but would have progressively moved the activity away from the students – and they are what education is about. I could have produced endless conference and journal papers from this research direction but would have lost focus on the students.

Cunningham (1999) notes that:

“In the varied topography of professional practice, there is a high, hard ground overlooking a swamp. On the high ground, manageable problems lend themselves to solution, through the application of research-based theory and technique.

In the swampy lowland, messy, confusing problems defy technical solution. The irony of this situation is that the problems of the high ground tend to be relatively unimportant to individuals or society at large, however great their technical interest may be, while in the swamp lie the problems of greatest human concern. The practitioner must choose. Shall he remain on the high ground where he can solve relatively unimportant problems according to prevailing standards of rigor, or shall he descend to the swamp of important problems and non-rigorous inquiry?”

The direction of travel of the course was from the swampy ground to the high ground. Had the course continued, and had I continued to move in this direction, the course would have become a failure. It would have detached itself from the students and become a supporting act for my own research. This is the antithesis of my educational philosophy.

7.6 The thesis as a system

A thesis can be considered as a system, that is, a collection of parts that together have some purpose. The approach taken to the physical writing of this thesis oscillated between holism and reductionism. I was trying to keep the ‘big picture’ in my head but also needed to take a reductionist approach to manage the day-to-day writing. This latter approach led to some ‘guesstimates;’ of likely chapter length, number of sections, balance of sections, boundary points and so on. The greatest surprise was in Chapter 2 where the ‘Communicating ISDMs’ section was anticipated to be in the order of 3500 words. It quickly expanded to around 10,000 words when I started the serious writing process. At first this produced some concern but I later realized, through the process of writing, that this was a more crucial area than I had anticipated and this process caused a re-think of much of the rest of that chapter and indeed other parts of the overall thesis. The section

could have been further developed, but at the risk of changing the entire path of the thesis. Of all of the material presented here I feel that it is the section that will generate most of the subsequent papers that emerge from this thesis.

The thesis grew to 120,000 words at one point. This clearly exceeded the target length and severe cuts were carried out. This has resulted in much of the original richness being lost. Should I undertake similar research in the future I would be much more clinical rather than passionate in my writing.

7.1 Speculation on the place of the ISDM course

The ISDM course is no longer offered at the University of South Australia. Although I feel that this represents a loss for students I appreciate that it was an outlier in a school of computer and information science. In fact, I believe that many of the courses that came from the old IS school are now located in an uncomfortable position. I firmly believe that IS should be located in the business area of education but evidence from around the world suggests that IS is being absorbed by IT. Having said that I do believe that courses such as the ISDM course described here, that is the original design rather than the one that it was metamorphosing into, should have a place in a school of IT. Providing students with multiple perspectives that place IT in the context of the business world gives them an opportunity to consider alternate career paths. In the session at the end of the course where students were asked to reflect on where they had mapped themselves on the Bell and Wood-Harper grid at the start of the course they very often showed a change of position. Some did not, of course, and these tended to be the ones who had a clear image of themselves in computing or engineering roles. Those who did express a change of view tended to gravitate towards the systemic/focus on the business quadrant and indicated that they were considering a wider range of career options than they had at the start of the course.

As indicated, in the current Program structure within the school the ISDM course was an outlier. I believe it would be possible to create a new Program that would include both hard and soft aspects of systems development, combining critical thinking with employable 'hard' skills. The impact of governance on IT departments in large organizations will need people who can bring management and technical capabilities together in a creative and flexible way. I also believe that the ISDM course would be an appropriate course for an MBA program where it could serve to challenge established practitioners to reflect on their day to day activities.

7.2 Contributions

Seven objectives were identified in Chapter 1 and these are considered below from the perspective of their contributions to ISDM education, research and practice.

7.2.1 Objective 1

Objective 1 was stated as a “Critical review of the history of ISDMs, emphasising the business and computing influences and the difficulty in placing boundaries upon developmental eras.” Chapter 2 identified some of the historical aspects of ISDMs and demonstrated how they had developed from business and computing domains. The popular literature considered in Chapter 2 could be seen as implying methodological displacement but Chapter 6 argued that considering history through the lens of periodisation produced a view of patterns of development as comprising a mixture of the modification of existing patterns combined with the emergence or re-emergence of variants. The contribution of this alternative view of increasing variety rather than displacement of existing methodologies is that it represents a more accurate account of ISDM history that recognises the continuing co-existence of a wide range of ISDMs and the dynamic nature of the field as new methodologies emerge. The significance of this contribution for students is that it provides them, as would-be practitioners, with a broader understanding of the geography of the ISDM space and helps them to better appreciate the notion of methodological pluralism. This appreciation should encourage them to examine the relative attributes of a range of ISDMs with a view to selecting appropriate tools and techniques to support specific development environments and systems rather than simply accept a given ISDM. It also encourages students to recognise the issue of boundary setting and how this process can create differing interpretations of a data set. This approach of challenging the subject area is significantly different to that adopted in more traditional ISDM courses that focus upon the mechanics of using specific ISDMs and should provoke the students to adopt a critical view of the subject area.

7.2.2 Objective 2

Objective 2 was stated as the “Identification of ambiguities in the language used in the literature describing ISDMs that have arisen from the historical development of the field.” The conflicting use of words such as ‘method’, ‘methodology’, ‘approach’, and ‘paradigm’ was identified in a wide range of literature and it was noted that this linguistic ambiguity causes concern for a number of commentators, although they do note that it would be extremely difficult to remedy this situation. Requiring students to use language with some

precision significantly contributes to their future involvement in research as well as helping them engage in critical debate.

7.2.3 Objective 3

Objective 3 was stated as “Critical examination of the problems that lie in the communication paths that link ISDM originators or practitioners with other interested parties, particularly via publication routes and the development of strategies for helping students deal with such problems.” Chapter 3 identified a number of mechanisms that could introduce distortions into communication paths and the contribution made by this analysis is that it reveals differential distortion in the tacit (philosophical) and explicit (tools and techniques) elements of the signals describing ISDMs. Being aware of and understanding such distortions places learners in a position where they can take appropriate actions to remedy such distortions and so have a richer understanding of the totality of ISDMs. Such awareness should significantly help those parties interested in ISDMs to take communication distortions into account during their research and writing.

7.2.4 Objective 4

Objective 4 was stated as “Identification and understanding of the way in which an underlying philosophy influences the design and operation of a higher education course designed to explore information systems development methodologies.” Chapter 5 explored the philosophical underpinnings of the ISDM course and the author identified himself as leaning a constructivist and emancipatory direction. The ‘emancipatory’ aspect came as rather a surprise to the author, and was only realised as a result of a deeper than normal reflection that was a result of writing the thesis. As educators we may make assumptions about our philosophical approaches that may be incomplete and a significant contribution to teacher education is to reinforce the necessity to regularly incorporate deeply self-critical reflection that provides a clearer understanding of the way that we enact our teaching practice.

7.2.5 Objective 5

Objective 5 was stated as “Development of tools and techniques that promote critical, reflective and problem-based learning within the underlying philosophy.” This area was detailed in Chapter 6 and one significant new tool was developed here, namely the ternary matrix for considering project outcomes. This was based upon previous interactions with project management students who had reacted emotively to the word ‘failure’, typically adopting the view that as long as the project had some chance of achieving merits in the

medium or long term it was a success. The contribution of this ternary view is that it allows critical, impersonal or multi-perspective views to be applied to project outcomes.

A number of other tools were used to support this objective including role play to help strengthen understanding of tacit elements of ISDMs, metaphor, analogy, parallels with the fields of art, music and literature and so on. The contribution here is to demonstrate that learners can gain positive learning benefits by drawing upon a range of approaches that may typically be considered ‘unconventional’ in an ISDM course to enrich their learning experience. The evidence for the claim that the ISDM students benefited from this eclectic approach was apparent in their in-class discussions and their high reported satisfaction (via both formal and informal channels) with the course.

7.2.6 Objective 6

Objective 6 was stated as “Monitoring and critique, through reflective practice, of any changes that occurred in the authors’ philosophical positioning as a result of the adoption of specific tools and techniques.” The realisation that the author was moving in a more positivistic direction as the course developed was achieved through reflection-in-action and reflection-on-action. The use of action learning and autoethnography as approaches to achieve this objective support existing educational literature. The approaches appear to offer significant benefits for those researching educational practice.

7.2.7 Objective 7

Objective 7 was stated as “Critique of the course development approach and implementation within its specific development environment” and it was noted that although this was not an original research objective, as noted above, it emerged as a significant point during the research process. The contribution that arises from the attainment of this objective is that it highlights the potential difficulty in implementing a course that has what may be regarded as a liberal arts flavour within a computer and information science environment. The students were expressing satisfaction with the course but various factors within the school, and external to it, meant that the course was ultimately abandoned. The significant point that arises here is that simply because a course is functioning well is insufficient grounds to ensure its survival. The political nature of the environment within which it is operating needs to be carefully considered and appropriate efforts made to ensure that it appears to fit within the local environment. As individual educational courses, and indeed full programs, come under pressure from the emerging educational tensions that include academic freedom, increasing focus upon fitting students

for commerce rather than society there will be a need for individual faculty to make difficult decisions in course design and implementation.

7.3 Holistic view

A course is a system and, in common with any system, attempts to examine each of its individual parts in isolation is problematic. The objectives above address discrete aspects of the course, and the research, but it may also be useful to attempt to consider the significance of the course as a whole. The significance of this course is that it set out on a path that was deliberately quite challenging for students and faculty. Instead of promoting answers it promoted questions. It took engineering and computing students outside their perceived zones of comfort by exposing them to ideas that were, for them, novel. It was enacted within a learning environment characterised by faculty and staff working collectively on a significant real world problem that has no tangible solution. This could be perceived as a risky strategy, but it produced learning gains for both faculty and students. As students become labelled as consumers and are required to pay higher fees it seems likely that they will become more demanding of the courses that are offered to them. Many ISDM courses offer skills in specific approaches but these may not be the approaches that employers desire. Governance of IS and IT will mean that there will be a potential need for systems developers to demonstrate that their choice of ISDM was not a contributory factor in the loss of millions of dollars when systems fail to deliver anticipated outcomes. Ad hoc and agile methodologies appear to be becoming more common and need individuals who can react quickly, think creatively and deal with unanticipated problems in a measured way rather than follow an instruction manual. All of these factors mean that ISDM courses within higher education will need to take account of the changing world and provide students with more than mechanical skills. I would not advocate that this course is the solution to the challenges facing ISDM educators. I would see it as one significant part of the total provision that will be required, perhaps in conjunction with design and analysis skills, understanding of the business-IT-IS relationship, governance, ethics and other related areas.

7.4 Future directions

If I were to nominate an element of this thesis to take forward for further investigation it would be the 'seeking signatures' aspect. The idea that texts contain signals that can be analysed using objective tools to generate the basis for the comparison of ISDMs is challenging, involving semiotics and ontological engineering. This, however, would be a major project and it is more likely that I will continue to reflect on educational issues and

develop some of the material in the communication and course implementation chapters for publication.

7.5 Concluding Comments

The process of writing this thesis led to some unexpected discoveries. I would probably have previously described myself as an inquiry or discovery based teacher, with an interest in critical thinking and constructivism. It was surprising to find that I have some affinity with the emancipatory area. I find that the writing about education in the 1960s and 1980s has more appeal for me than modern writing. The focus on students as learners rather than customers and education as a contributor to future society rather than another form of business resonate with my own views of education.

A key question that was asked at the start of this thesis was:

Can a liberal arts approach be justified in the implementation of a course that is located within a school of computer science and that has as its focus ISDMs which are essentially used to develop computer-enabled systems?

As I was pondering this question and wondering how to close the thesis I received an email from a colleague in Australia. His message alerted me to an email sent on AISWorld listserv seeking papers for a special issue of the Information Systems Journal (ISJ) with a focus upon “New Trends in Information Systems Development”. In this message the Guest Editors express the view that Information Systems Development (ISD) “is arguably at the core of the information systems discipline”. They note the continuing poor performance of systems development and go on to say:

“There is a general paucity of ISD research; theory and studies of longitudinal processes of organization, specialization and institutionalization in ISD are needed. Little ISD research goes beyond ISD methods; there is a need for theory and studies about social behaviour and processes of communication, negotiation, and learning and their relation to the broader historical, political and social context of ISD. Finally, there is a paucity of ISD research that relates individual knowledge, learning and sense-making to the broader context; this kind of theory and studies is also needed. We therefore encourage research addressing questions such as: What are the different types of ISD relating to social, commercial, organizational and technological contexts? How is this diversity dealt with? What are the different kinds of knowledge and skills needed in different types of ISD contexts? What new organizational structures have evolved to address the new ISD? What are the individual mechanisms for dealing with the diversity of environments and applications? How does learning and sense-making take place in the new social, commercial, organizational and technological contexts? For this special issue we call for rigorous research examining the effectiveness of approaches to ISD, including associated managerial aspects, using sound theoretical frameworks and appropriate research methods.” (Sent: Wednesday, 8 September 2010 5:44 PM, To:

aisworld@lists.aisnet.org, Subject: [AISWorld] Information Systems Journal (ISJ) –
Special Issue “New Trends in Information Systems Development”)

The questions asked here are clearly ones that we need to seek answers to, not only as researchers but also as educators working with students who can contribute to asking relevant questions and exploring potential solutions. I believe that the ISDM course that formed the focus for the research in this thesis has provided a platform for students to experience the type of issues expressed above and I have no doubts that faculty and students working together in a flexible, challenging, creative and supportive learning environment could make significant contribution to this area of concern. On this basis I believe that the ISDM course explored in this thesis has the potential to be further developed, probably in a business rather than computing school, and could make a significant contribution to both learning and research in the ISDM domain.

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APPENDIX 1: Tangled, self-indulgent code

The author was asked to consult with a caravan building company in Hull in the 1980s to help them overcome an increasing number of problems that they were experiencing with a stock management system that used dBase III as the programming language. Over a period of time since it had first been introduced the system had become increasingly unreliable. After two years of operation it was noticed that items known to be in stock were not indicated on the system and items indicated as being in stock were not shown. Partial screen over-writes led to unreadable screens and printing problems and the problem was becoming more severe each month.

Documentation was available (approximately 150 pages) and examination of this revealed a large number of poorly developed modules. Local and global variables had been poorly as had upper and lower case variables. Interconnections between modules were complex and tangled and the test data file was far too small to provide a test of a working system.

The documentation contained the following comment:

```
added=.t.
unlock
endif
*****
ENDIF
select a
seek str(istockr,8)
*****
LOK=.F.
DO RELOCK WITH 'KS02B2','MASTER',STR(ISTOCKR,8),LOK
IF .NOT.LOK
RETURN
else
REPLACE QINSTK WITH QINSTK+IQUAN,ACTUALPR WITH ICOST
replace qonord with qonord-qofford
updated=.t.
endif
*****
unlock
SELECT D
USE TEMP
RETURN
*apologies to anyone trying to maintain this code
*I just coded it and debugged it by running, and then
*added further pieces into it as they were needed.
*Anyway, I reckon that the more confusing it looks
*the better it must be !!!!!!!!!!!
```


The programmer they had employed was a newly graduated computer science student and the comment neatly captures the sense of ad hoc and rather flippant approach that was not unusual in the pre-methodology era. Clearly it was still existent in the 1980s.

It was not possible to rectify all of the faults within the system and it was recommended that the system should be abandoned as soon as a replacement could be found. This represented a costly exercise for the organization. This is a case where the initial outcome of the project appeared to be a success but over time the defects emerged and eventually rendered the system unusable. This highlights the difficulty of making success and failure judgements.

APPENDIX 2: Critical Thinking poem

Critical Thinking

A Poem by Ron Hornsby

Human behaviour defies all prediction
It often seems random, devoid of clear rules.
Yet under the surface there lies a conviction
That there are some values more precious than jewels.

Most of us have a covert ideology
That's buried so deep, we don't know that it's there.
It governs our lives; but without axiology,
Which of us knows that it's human welfare?

So all of our work should reside in directions
Of finding out ways of improving our lot,
Removing the causes of life's imperfections,
Because, after all, we are all that we've got.

The way to make progress is to be one's own critic
And never contented with things as they are;
Of seeing no change as being mentally arthritic
And self-satisfaction a thing to abhor.

To criticise means: compare with a standard
And label the differences: kin, good, or bad.
(And those who select the key features to measure
Ipso facto, distinguish the sane from the mad.)

Critical thinking consists of three phases.
When in the right order they form a technique
For use by a scientist each time he appraises
A new situation, to oust the mystique.

An Empirical search is the start of this process
With causal connections the scientist's aim;
Controlling raw nature's his route to real progress,
(With always some prospect of Nobel Prize fame).

When discoveries are made, Hermeneutics takes over,
With true understanding becoming the goal,
Relating the old and the new to each other,
And broadcasting findings without rigmarole.

A full understanding needs collaboration.
When millions of people are given their say
Confusion's dispelled by combined cerebration;
So publish discoveries, don't hide them away.

The third and last aspect is Emancipation
Whose influence is strong even when it's not seen.
It makes us aware of the world's deprivation
And fills us with shame if we won't intervene.

The goals it promotes are: political freedom
To form an opinion and speak without fear;
A deeply felt yearning to cultivate wisdom;
And a need to push outward the mind's own frontier.

Critical thinkers should help to establish
Political systems in which they can thrive:
—Participative, democratic, egalitarian, unselfish
—Whose plain social justice inspires everyone to strive.

Published in System Research and Behavioural Science, 14(4) 1987, pp. 277–278

APPENDIX 3: MSIS 2000 CURRICULUM MODEL

Table 3. Representative Career Tracks and Suggested Courses

Academia (path to Doctorate) <ul style="list-style-type: none"> • Principles of IS Research • Teaching Skills • Statistical Research Methods • Advanced Elective in Teaching 	Knowledge Management <ul style="list-style-type: none"> • Knowledge Management and the Learning Organization • Document Management • Data Warehousing • Data Mining and Knowledge Acquisition
Consulting <ul style="list-style-type: none"> • Consulting in Business • Consulting in IS • Advanced Project Management or Advanced Change Management • Elective in Consulting Area (e.g., knowledge management, ERP, telecom) 	Managing the IS Function (Internal to IS) <ul style="list-style-type: none"> • Role of the CIO • Management of Computer Personnel Operations • Management of Telecommunications Resources • IS Security
Data Management and Data Warehousing <ul style="list-style-type: none"> • Data Warehousing • Knowledge Management • Database Administration • Database Systems Planning 	Management of the IS Function (external to IS) <ul style="list-style-type: none"> • Role of CIO • Telecommuting and Virtual Organizations • Outsourcing • End-User Computing
Decision Making <ul style="list-style-type: none"> • Decision Support and Executive Information Systems • Data Warehousing • Simulation and Modeling • Human-Computer Interaction 	New Ways of Working <ul style="list-style-type: none"> • Telecommuting and Virtual Organizations • Workflow and Collaborative Work • Multimedia • Internet, Intranets, and Extranets
Electronic Commerce <ul style="list-style-type: none"> • Internet, Intranets, and Extranets • Electronic Commerce • WWW and the Value Chain • Consumer Relationship Marketing 	Project Management <ul style="list-style-type: none"> • Advanced Project Management • Advanced Change Management • Outsourcing • Virtual Organization or Telecommuting
Enterprise Resources Planning <ul style="list-style-type: none"> • ERP Systems • Business Processes • Internet, Intranets, and Extranets • Systems Integration 	Systems Analysis & Design <ul style="list-style-type: none"> • Advanced Design Methodologies (e.g., Object-Oriented Analysis and Design, RAD, prototyping) • Advanced Project Management • System Integration • IS Consulting
Global IT Management <ul style="list-style-type: none"> • Transborder EDI and Data Flows • Virtual Organizations • Knowledge Management • Global Cultural Implications for IS 	Technology Management <ul style="list-style-type: none"> • Emerging Technologies and Technology Forecasting • Globalization • Advanced Project Management • Organizational Aspects of Technology Management
Human Factors <ul style="list-style-type: none"> • Ergonomics of Computing • Interface Design • Usability Analysis and Testing • Multimedia Design and Production 	Telecommunications <ul style="list-style-type: none"> • Telecommunications Technology • Managing the Telecommunications Resource • Internet, Intranets, and Extranets • Electronic Commerce

APPENDIX 4: 2008 Course Information Book

The following pages contain extracts from the 2008 Course Information Book issued to every student on the course. The extracts include the preamble giving an outline of the course, details of the assessment used and a Course Calendar showing time line for assessments.



Course information

INFS 5026 (**SP2, 2008**)

Information Systems Development Methodologies

Course Coordinator: David A Banks

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Introduction

Course overview

Learning resources

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This *Course information* needs to be read in conjunction with *Extra course information* available at: <http://www.unisanet.unisa.edu.au/extracourseinformation/>. It can also be accessed from the course homepage.

INTRODUCTION

Welcome

Welcome to ISDM. In this course we will explore a range of issues relating to the development of information systems. The fundamental theme is that of attempting to explain why we see so much evidence for information systems development 'failure' despite the availability of a very wide range of development 'methodologies'.

No single methodology or approach is advocated. We will instead examine ways in which we can develop means of comparing methodologies in such a way that selection of an appropriate development approach, or blend of approaches, can be considered in the light of the development environment and the worldviews of the developers and other parties involved in the process.

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Course

Coordinator

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Course homepage: <http://www.unisanet.unisa.edu.au/Courses/course.asp?Course=01239>

Course overview

Course statement

Development of systems methodologies, rationale for methodologies, systems development life cycle, hard and soft views of the world, prototyping, rapid and evolutionary development models, requirements engineering, soft systems methodologies, viable systems model, cybernetics, total systems intervention, issue based information systems, approaches to consultancy, implementation of methodologies, mapping techniques, hypermedia approaches, CASE tools, modelling and simulation, group collaboration using electronic systems, the real-world context.

Learning objectives and Graduate Qualities

On completion of this course, students should be able to:

On completion of the course students should be able to:

- Appreciate common language and literature used within the field of information systems development (GQ: 1, 2, 7)
- Identify issues of success and failure in the context of information systems development (GQ1))
- Understand how worldviews impact upon the development process (GQ: 2, 3, 5, 6, 7)
- Identify a range of common literature-based and commercial method/ologies (GQ: 4)
- Compare and critically contrast a range of method/ologies (GQ: 3)
- Identify common tools to support the information systems development process (GQ: 1)

Prerequisite(s)/ Assumed knowledge

It is assumed that students have some familiarity with business information systems.

Teaching and learning arrangements

This course is taught through a mixture of lectures, seminars and self-managed learning. Sessions are scheduled as 3 hour blocks.

Unit value of course

4.5 units

Assessment

Form of assessment	Length	Weighting	Due date	Graduate Quality/Qualities being assessed
Mapping: Multiple single page maps with explanations, Rep Grid exercise, critique	250 word explanations to accompany maps, Rep Grid paperwork (group), 500 word critique	33%	See calendar	can work both autonomously and collaboratively, are effective problem solvers
Worldviews: Narrated PowerPoint presentation, plus in-class contribution	6 minutes, plus in-class discussion	12% (PPT 5%) (Discussion 7%)	See calendar	are committed to ethical action and social responsibility, communicate effectively, demonstrate an international perspective
Conference style paper	3000 words	55%	See calendar	operate effectively with and upon a body of knowledge

Assessment details

Details of assignment submission and return are listed under each assessment task. Assignments will be returned to you within two weeks of submission.

All assignments must use the *Assignment cover sheet* (available from your Course homepage)—whether submitted electronically or in hard copy.

You are required to pass ALL assessment components to gain an overall pass.

There are no supplementary assessments

Conceded or terminating passes are not available

Assignment 1—Mapping methodologies (33% total)

Assignment 1 has a number of sub-components, each building on the previous work. Parts a,b,c,d and f are individual pieces of work. Part e will be group work and carried out during the session.

Relates mainly to GQs 1, 2 and 6

Use the overhead slide of the Bell and Wood-Harper map that will be provided. *Make sure that you bring this slide with you at each appropriate session and that you collect it at the end of the session.*

Part a: (6 marks total) Mark the following two locations on the B&W-H map: your own personal location and the location of the given methodology (SDLC). Identify your own location using an 'S'

and the given methodology using 'M1'. For *each* of these locations write a 150 word explanation of *why* you chose the location. (ie a total of 300 words)

Part b: (6 marks) Use the notation 'M2' to mark the location of the given methodology on the B&W-H map. Write a 150 word explanation of *why* you chose the location. Generate a list of keywords that helped you to arrive at your conclusion.

Part c: (6 marks) Use the notation 'M3' to mark the location of the given methodology on the B&W-H map. Write a 150 word explanation of *why* you chose the location. Generate a list of keywords that helped you to arrive at your conclusion.

Part d: (6 marks) This is an in-class group exercise. You will be provided with instructions during the session.

Part e: (9 marks) This is a reflective piece of work that requires you to re-consider your initial choice of personal location and to explain why you feel you may have more affinity with some methodologies than others.

REMINDER: Make sure that you collect your slide at the end of the session so that the next part of the assignment can be recorded on it. Also make sure that you bring your slide for each week it is required – if you do not have the slide with you then you will lose the marks for that element.

These elements build on each other and will be discussed during specific sessions. No extensions will be granted

Feedback on this assignment will be provided on the *Feedback form*, a copy of which is included at the back of this booklet.

Assignment 2—Narrated PowerPoint plus discussion notes (12%)

This assignment explores the worldviews of a number of actors in the broad fields of IS, IT and quality. You are required to develop an understanding of your allocated actor and produce a brief (6 minute) narrated PowerPoint presentation that introduces the actor, identifies their key area of expertise and then considers how that specific actor would (probably) have undertaken a specific development project. The final slide should contain all references used. The PowerPoint presentation will carry 6%. All actors will focus on a single case study, details of which will be available via the course home page. The case will also be discussed in one of the sessions. You will also produce a set of notes that relate to the actor and their possible approach to the case so that you can refer to these during a discussion session. These notes should be handed in at the end of the session. Your notes and contribution to the discussion will carry 6%.

GQ: 1,2,3,5,6,7

Must not exceed 6 minutes or be less than 5 minutes.

There are no extensions for this assignment.

Assignment to be submitted via AssignIT and to the appropriate discussion board on the course home page by the deadline indicated.

Feedback on this assignment will be provided on the *Feedback form*, a copy of which is included at the back of this booklet.

Assignment 3—Conference-style paper (55%)

Assignment question/topic

You will be required to produce a short (3000 word) conference-style paper. (References are not included in the 3000 words) A list of broad topic areas will be outlined during a number of early

sessions for your guidance but you are free (and encouraged) to develop specific topics within the general area of information systems development methodologies. Innovation is encouraged. The paper should be submitted in accordance with the format details that will be made available on the course home page.

GQ: 1, 6

Format/expectations

Precise details of the paper format will be provided on the course web page and must be adhered to. You will be given guidance about the style and possible content during the sessions. The final word count should appear at the end of the paper. (55%)

In this assignment you should demonstrate your ability to take an idea within the area covered in the course and, using appropriate literature, develop a critical argument.

You should start to identify your topic area and focus as early as possible in the course. This will allow you to discuss your idea with the member of staff so that appropriateness, problems, scope etc can be discussed and guidance offered.

There is no re-submission for this assignment.

The assignment should be submitted via AssignIT.

Feedback on this assignment will be provided on the *Feedback form*, a copy of which is included at the back of this booklet.

Exam/Test

There is NO exam for this course.

Course calendar—Study period 2, 2008

Wee k	Dates	Topic	Assessment
1	3–7 March	Course outline, introductions, IS/IT, systems, methodologies, key issues, metaphor, failure, SE, RE, PM, BOKs, language and terminology, holism, maps, assignment briefing, worldviews	
2	10–14 March	Overview of methodologies and methods, techniques, tools, range of approaches available, FURPS+, practical availability, text analysis, KM, PIR, learning and reflection	
3	17–21 March	SDLC, TOP, KM, 'users', complexity, wicked problems, IBIS, intro to comparing and selecting approaches – the issues, process oriented, OO, blended, people oriented, organisational issues	1a: hand in at START of session 2
4	24–28 March	Methodologies, hard and soft views, science/art, evolution/revolution, risk	1b: hand in at START of session 4
5	31 Mar–4 Apr	Engineering views, PM, SSADM, PRINCE, STRADIS, ERP, MRP, quality, CMM	1c: hand in at START of session 5
6	7–11 April	SSM, VSM, ETHICS, Multiview , Case study introduction, Kelly and rep grids	
	<i>14–25 April</i>		
7	28 Apr–2 May	Rep grid work, Discussion of individual conference-style paper topics	1d: Rep Grid exercise (in-class)
8	5–9 May	SODA, Ethical issues, creativity, lateral thinking, deBono, TSI, maintainability, security	2a: Narrated PowerPoint (submit to Course home page no later than 5pm 9 th May)
9	12–16 May	Multiple perspectives – the case study, discussion from a variety of IS, IT and quality perspectives	2b: Class discussion. Hand in any notes at the end of session 9
10	19–23 May	Rapid approaches (RAD, JAD)	
11	26–30 May	Theory v. practice, individuals aspects, corporate governance issues, alignments, techniques	1e: Critique (hand in via AssignIT no later than 5pm May 25 th .)
12	2–6 June	PM techniques, FPA, PERT, social techniques, EMS, ARS, DSS and supporting tools	3: Conference style paper (hand in via AssignIT no later than 5pm June 6th.)

Week	Dates	Topic	Assessment
13	9–13 June	Role play session, Summary, Q&A	
	<i>16–20 June</i>	<i>Teaching/Swot Vac</i>	
	<i>23–27 June</i>	<i>Exam week *Note Mid-year examinations commence Saturday 21 June and include Saturdays throughout the exams period</i>	
	<i>30 June–4 July</i>	<i>Exam week *Note Mid-year examinations end Saturday 2 July</i>	

NOTE: The above topics are indicative only. The time spent on each topic and actual sequence will vary and will be in response to the development of the course with a specific set of students. Extra materials may be introduced as required.

APPENDIX 5: IRMA/DARMA MODEL CURRICULUM

IRMA/DARMA model curriculum

The IRM6 - IRM Design and Implementation course:

Topics:

1. Information Management and Information Systems (15%)

- capturing data
- organizational history and information systems
- organizational information requirements and information systems
- recommended solutions and information systems
- Total Quality Management (TQM) and Information Quality
- Business Process Reengineering
- Intranets and Extranets

2. Systems Analysis of Information Systems (15%)

- system analysis and information management
- systems analysts and information managers
- phases of systems analysis and information management
- differences between systems analysis and information management
- software review and selection analysis

3. Systems Definition of Information Systems (15%)

- systems scope and business requirements
- alternative solutions
- evaluation of alternative solutions
- cost of alternative solutions
- recommended solutions

4. Systems Design of Information Systems (15%)

- logical and physical modeling
- input and output design
- files and database design
- systems and subsystems
- systems hierarchy chart
- input and output format
- system phases and time table

5. Systems Implementation of Information Systems (15%)

- systems installation and testing

- applications development
- conversion plans and implementation
- developing and conducting training programs
- testing and quality assurance

6. Systems Maintenance and Management of Information Systems (15%)

- Evaluating and Improving Systems: ISO 9000 and TQM
- developing systems maintenance programs
- developing systems security programs
- conducting post-implementation review
- adjusting systems errors and needs

7. IRM and Behaviour (10%)

- Processes of adoption and diffusion in IRM
- Cultural and cross-national aspects of IRM
- IRM for teams, groups and collaborative work
- Social impacts of IRM

APPENDIX 6: The SACHA case study

The attached document is a paper that was presented at the 1999 ACIS conference. It reports on the development of the SACHA system and was used as the focus for key parts of the ISDM course. Since the paper was written the project has been terminated, the SACHA CHO Bulletin Volume 1, Issue 1, 17th February 2003 reporting that: 'We had to ask ourselves whether it was appropriate for SACHA to undertake the role of systems developer, or whether indeed, there were better ways to use our limited resources to facilitate the viability of the community housing sector.'

Who Needs Methodologies? A Case Study of the Development of a Web-Based Information System

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Abstract

This case study examines the development of a government sponsored information system project designed to support a large number of community housing organisations in South Australia. The adoption of the web based system is at the discretion of individual users. The development of the project is outlined and a number of problems that occurred are identified. Issues of success and failure are examined and the role of system methodology explored.

Keywords

Case Study, Client-Centered Design, Defining IS Success, IS Implementation, IS Project Management, IS Project Manager, Local Government

INTRODUCTION

This paper describes the development of a large internet based system designed to support the operation of Community Housing Organisations (CHO's) in South Australia. Given the high reported failure rate of IS projects offered an excellent opportunity to observe a fairly large and complex project in order to identify any failures that occurred, to determine the reason for those failures and also to observe the approach adopted to the management of the project. The author was provided with the opportunity to observe the development of this project by attending meetings of user groups and reference groups and having access to all parties involved.

The system is designed to offer on-line services for approximately 135 community housing providers spread representing around 2580 households. The majority of CHO's have housing stock in the metropolitan area, but a percentage are based in regional centres such as Copper Triangle, the Riverland and Mt Gambier. Although the CHO's operate in similar ways they have widely differing client bases and value systems. The system sponsor is a government body (South Australian Community Housing Authority), but, unusually, adoption of the system is not compulsory for the CHO's'.

COMMUNITY HOUSING IN SOUTH AUSTRALIA

The South Australian Community Housing Authority (SACHA) is a statutory body within the State Government Portfolio of Human Services, established under the South Australian Co-operative and Community Housing Act 1991, to develop, regulate and administer community housing in South Australia. SACHA administers the Act and regulations for community housing associations and housing co-operatives. The Authority has experienced relatively rapid growth in the community housing sector in the face of reduced Government expenditures and down sizing of public sector agencies.

Community housing provides medium term rental accommodation to people on low incomes and/or with a special need (eg: disabled, aged, youth, disadvantaged, etc.) that can not be accommodated through the private rental market or other government housing programs. While most CHO's provide housing only, some also have referral and support links with other human service organisations.

A proportion of CHO's have been set up by people from non-English speaking backgrounds, in

particular Spanish-speaking peoples from Central and Southern America. The meetings and documentation of these groups are in the language of that group. There is also a growing number of groups with tenants from South East Asian origins.

Most properties in the program are owned and maintained by the individual Community Housing Organisations and have been entirely or partly funded by the South Australian Government. Some CHO's are also responsible for managing housing which has been funded from other schemes.

THE PROJECT

The need to explore the possibility of using IT in community housing was a combination of CHO's themselves asking SACHA to provide a system, several individual CHO's developing their own systems and SACHA management wishing to assist in this area.

There were a number of problems that existed with the pre-existing IT environment due to the "evolving" nature of the organisations and the different skill bases available. There were a number of well run manual systems in place and a variety of different automated tools used. The degree of effectiveness of the automated tools, however, was more a function of the skills of the people administering them than the appropriateness of the tools themselves. The variety of systems in use ranged from basic word processing and spreadsheets to packages such as MYOB. In particularly the following problems or challenges were identified

- Variety of skill levels of the users
- Regular user turnover (due to changing office bearers)
- Restricted access to systems
- Cost of training people
- A high rent transaction error rate
- Unnecessarily high cost of auditing
- Poor archiving of records
- Inconsistent backup and recovery of systems data
- Poor experience of a previous attempt to implement a common system
- Concern of "tail chasing" in the creation of a new system - if data is easier to collect and report, then more will be asked for.
- "Special needs" and "special issues" associated with larger groups with special client groups
- Security and Privacy of data
- Procedures and business rules varied from organisation to organisation

A feasibility study was conducted in late 1997 with a view to identifying potential solutions to the problems. This study reviewed the current situation within the sector, the systems in place and the transaction requirements and records being kept with a view to investigate the application of available desktop technologies.

The study was undertaken by means of the following mechanisms:

- Key user reference group and discussion forums
- Review and analysis of existing documentation and procedure manuals
- Interview and discussion with key SACHA staff
- The consultant's knowledge of existing systems and procedures

The outcome was a Feasibility Study detailing:

- The information and system requirements of the community housing sector.
- Two alternate system options, based on the two most common implementation models in the market.
- A system specification suitable for tendering by the market.
- A detailed cost benefit analysis that included both development and ownership costs.

- A set of recommendations that provided a direction for the Community Housing Sector to follow with confidence.

The two possible IT models identified were a Microsoft Access based and Visual Basic database system and an Internet HTML Forms based system. After an evaluation of the strengths and weaknesses of both models the Study recommended the Internet based system as this option offered minimum demands on computer power and reduced the day to day computer house-keeping demands. Additionally it allowed access from internet cafes, libraries, university sites etc for those groups that currently do not have computing facilities. It is likely in the longer term that SACHA will attempt to find ways of helping those groups without computers to obtain appropriate equipment at a cost in line with their finances.

The Feasibility Report was presented to the Authority for endorsement to proceed in March 1998. As well as the issues raised above, the increased need for reporting to the Commonwealth government was cited as an argument in support of introducing such a system.

Consultation was carried out primarily through discussion items at the regular regional forums made up of members of CHO's. In addition an Information Paper and one page summary of the Paper were sent to all CHO's seeking comment. Comments returned were mixed and a number of issues were raised, perhaps due to the technical nature of the proposed platform and the profile of the chosen sample population.

Following a consideration of the issues raised by the sector, the Authority approved the development of the pilot project. A project budget was developed which included (in line with the Feasibility Study recommendation) a Project Officer position.

Given the issues regarding user acceptance, it was identified that the Project Officer would need to have a specific skill set which included the ability to build relations with the community sector and a thorough knowledge of CHO operations. This position was filled by an employee who had been working in community housing for several years and was known to the sector.

THE 'PLAYERS' IN THE PROJECT

South Australian Community Housing Authority (SACHA)

A range of strategies have assisted the continued expansion of the community housing sector including the transfer of stock from the SA Housing Trust and the growth of large Community Housing Associations. SACHA also continues to develop a number of additional housing products via Joint Ventures with church and welfare organisations, the Group Self Build Scheme and the establishment of HomeStart Equity Co-operatives for low income mortgagees.

As part of this commitment to the development and improvement of the Community Housing Sector, SACHA undertook to examine the opportunities for the common use of information technology within the sector.

The role of senior management in this project has been that of providing support and enabling mechanisms rather than direct hands-on involvement with the details of the project development. There is a genuine concern to develop systems and strategies to support the CHO community coupled with a trust of the expertise of the Project Manager. Shtub, Bard and Globerson (1994) note that one of the primary factors for successful project outcomes is that of top management support. They comment that:

"The continuous involvement of top management throughout the life cycle of the project increases their understanding of its mission and importance. This awareness, if translated into support, may prove invaluable in resolving problems when crises and conflicts arise or when uncertainty strikes. Therefore, continued, solid communications between the project manager and top management is a catalyst for the project to be a success"

It is clear that there is a high level of commitment to this project on the part of senior management and the lines of communication between the project manager and senior management are close and effective. All of the risk in this project is carried by SACHA in the sense that they are funding

the system development and the CHO's are not required to adopt the system. There are therefore quite small tangible rewards for SACHA but it is felt that this system will provide significant benefits for the community housing sector.

Project Officer

Anderson, Grude, Haung and Turner (1992) list the characteristics of a good project manager as intelligent, proactive, self-assured, a helicopter thinker and communicator and persuasive. Shtub, Bard and Globerson (1994) identify leadership, interpersonal skills, communication skills, decision making skills, and negotiation and conflict resolution as important attributes of an effective project manager. Interestingly there is no mention of domain knowledge, which turned out to be a significant aspect of the skill set of the project manager in this specific case. McLeod and Smith include in their list of attributes 'technically competent, respected and aware' but there is still no mention of specific domain knowledge as a significant factor.

The Project Officer chosen is a well-respected and experienced member of the housing sector with considerable experience of hands-on work in CHO's as well as having sufficient technical skills to be able to liaise with the developer.

Although this project started life as a typical 'technical' project it was interesting to note that the project manager saw it clearly as an information systems rather than information technology project. This view is particularly important for this project given that the CHO's are free to choose whether or not they adopt the final system, leading to a situation that is more complex than purely technical system development. This is certainly an IT-enabled system but the project as a whole could be best characterised as a 'People, Systems and Organisations' type of project (Turner, 1993). PSO projects typically produce changes to people (their numbers, skills and competence), systems (the way the organisation works with and uses its technology and organisations (communication, culture, structure).

CHO

Most CHO's operate solely on volunteer labour that is co-ordinated by a management committee and accompanying sub-committees. In the case of housing co-operatives all of the volunteer managers are the tenants themselves, whereas housing associations usually have members of the community also involved who are not tenants. These community members include staff from welfare agencies and parents of tenants

Some larger associations employ staff to carry out tenancy, finance and general management operations. Each CHO is a separately incorporated organisation and while there is a core set of legal and program requirements, there is some variation in the procedures that CHO's have implemented to meet those requirements. This is particularly the case where the CHO concerned has multiple funding sources and the requirement to report separately.

Developer

Four possible developers were identified as having the skills, experience and credibility to carry out this project. Of the four, three responded with expressions of interest and the final selection was made on the basis of the experience of the company combined with its clear commitment to the human aspects of project development. The company has previously carried out work with the Adelaide Bank, ETSA and a number of other large organisations. The two members of the team directly involved with contact with the users work well together and have between them a mixture of technical and human resource management skills.

User group

This group is drawn from the overall CHO community and its purpose is to work with the developer in the content aspects of the project. Membership is on a voluntary basis. The size of the group has varied through the development process but has typically comprised six members.

Reference Group

A Reference Group comprising representatives of the various stakeholders was established to provide broad project 'process' direction with an emphasis on ensuring CHO input into the

development of the system and addressing any issues that may arise. Membership includes SACHA Board members, the project manager, community representatives and any other expertise as required.

Other Players

As the project has proceeded a number of other players have become involved. These include the banking sector as the system begins to explore electronic banking as an integral part of the system, Centrelink and community, government and private sector areas. SACHA senior management views these players as important for the long term development of the project and is building a relationship with them that will last beyond the project itself.

PROJECT DEVELOPMENT PROCESS

The existence of a formal specification initially suggested that this would be a fairly straightforward implementation task, and the plan proposed was:

- Review/refine system specification
- Design Prototyping Finalisation
- Trial (2-3 months) - August 1999
- Roll-out - November

In fact the review/refine stage became somewhat protracted given the problems of the developers initial lack of domain knowledge of the ways in which the various CHO's carry out their day to day operations as a number of other unanticipated factors. Restrictions in volunteer time availability and changing membership of the user group also contributed to the difficulties. The project manager played a critical role in providing the developer with expert knowledge of the field. The problems which have occurred in the review/refine stage are detailed below.

PROBLEMS EXPERIENCED TO DATE

Intellectual property

The developer was presented with a comprehensive Functional Specification dated 11th November 1998. The document contained a detailed system specification with functional specification, report list, data dictionary and security model and appeared to form a firm basis upon which the final system could be developed. One early problem arose from the section headed "Intellectual Property Rights". This relatively short section was based on the Auditor General's report regarding the State Government policy on intellectual property (IP) in government software. The most difficult clause in the text for the housing system examined here noted that "The software source code and all intellectual property used in the system must be owned by SACHA for future use". This caused significant concern for the developer who felt that given that most code is re-used for similar projects, loss of ownership would clearly lead to an ambiguous situation for future projects. Considerable time was spent in resolving this difficulty and led to a delay in the project development.

User views of the potential value of the system

In the first meeting with the user group it was clear that there were a wide range of views about the potential value of the proposed system. It should be noted here that there is no compulsion for individual CHO's to adopt the system. One large, well established group was already making good use of its own in-house system and commented that "We will look at what you produce and if we like it we may make use of some parts of it. Either way, as you are paying for it is no problem for us what happens". Other groups professed no knowledge of computers at all but felt that it would probably be of considerable use to them. Yet others felt that their own systems had some defects, typically in property maintenance areas, and if the new system provided this function they would be inclined to use it.

Lack of ownership

There was a general feeling that the system 'belonged' to SACHA, that is the CHO's in this stage of the development did not feel any strong sense of ownership. This may be a product of the

development process which only involved this group to any significant degree once the main system had been specified. Stowell and West (1994) comment that:

"One way to address the problems of information systems development is to transfer to the clients the ownership and 'responsibility' for addressing the problem and subsequent development and implementation of the solution. This belief has led to the development of a framework to support the 'client-led' design of computer based systems. ... This notion of client-led is significantly different to that of 'client-centred' where the emphasis is upon placing the clients in the 'consultative' role rather than the 'prescribing, directing, managing and controlling' role."

In this case there was perhaps a hope that the development process could be largely client-led where in fact it could be better described as being more at the client-centred end of the spectrum. The users were not familiar with development processes and were surprised at the time needed to produce a working system. The developer avoided the use of flow charts in an effort to avoid introducing possibly unfamiliar charts to the users, but when these were used the process became considerably simpler.

Level of involvement of users in development

Although there was some discussion among the development team about the need to move back and try to generate a higher level of ownership the time scales for the project mitigated largely against such a step. In terms of levels of participation the specification was developed essentially using 'consultative participation' in which the analyst carries out the major design work and the activity in the user group is more in line with 'representative participation' where users work with the designer. Moving back to the earlier stages of the project would have created 'consensus participation' which offers design decisions determined by staff as a whole, but carries the penalty of difficulty in making quick decisions. The combination of slow decision making process and wide diversity of user population suggests that representative participation was probably the optimum choice. (My role as observer dictated that I could not intervene, but my feeling is that a half day session using the GroupSystem meeting room at the University of South Australia would have been helpful in helping users feel a higher level of ownership by moving towards consensus participation with the benefit of accelerated information sharing and decision making).

Continuity of user group meetings

CHO's are busy people and they are to be admired for the amount of time that they gave up to attend the user group meetings. Despite their commitment the meeting attendance was generally low and, more problematic, the attendance pattern meant that some people attended only one meeting, others joined later meetings and only a small number were present at all meetings. This led to a slight continuity problem with some members appearing to be confused at the start of some meeting about the purpose of the meeting and becoming somewhat detached. The presence of two developers, one with a brief to monitor the process, allowed this problem to be identified and remedial action taken. In an effort to provide continuity and access to minutes of meetings, documents etc and to encourage members to contribute their ideas or questions outside formal meeting times an on-line forum was established. This had the secondary benefit of allowing some CHO's to start to use internet based systems.

Domain knowledge

The time taken to acquire domain knowledge on the part of the developer also proved to be of some concern as the project developed. This was a result of the complexity of the business processes and the variation of process between the individual CHO's. During one meeting with the user group the task was one of clarification of the existing flow chart for the Tenant module of the system. The problems started with the first box on the chart, innocently labelled "New Tenant". It was pointed out that the process was rather more complicated than the flowchart suggested given

that a member may or may not be a tenant and a tenant may or may not be a member. The processing was thus considerably more complex than the developer had originally thought. In fact the box exploded upwards to a full sheet of decision process that fed that starting box. In fact this had little impact on the system as, once fully discussed, it was clear that this was a function that lay outside of the developer's responsibility. Despite the problems the developer maintained good humour and a highly professional approach.

Users' lack of appreciation of development times

Although this is not a major problem it is worth noting that the users were surprised at the amount of time required to develop the system. They have spent up to three hours in meetings poring over detailed flow charts for a single module and making suggestions for changes. The developer has carefully avoided the introduction of sample screens in an effort to prevent the users from thinking that the system is at an advanced state of development.

Possible future problems

Once the system is fully operational there may be some problems in some CHO's adoption of the system given the wide range of computing skills and knowledge. Results from a survey conducted in late 1997 to which 76% of all CHO's responded found that:

- 44% of CHO's do not own a computer
- as most CHO's do not have an office, the level of access to the computer(s) was a key determinant of how much they were used to perform CHO work
- 31% of respondents rated their computer literacy level as 'beginners'
- 48% of respondents rated their computer literacy level as 'intermediate'
- 87% of computers used were IBM-compatible personal computers
- lack of experience and training was cited as the largest reason for computers not being used

(Community Housing Council of South Australia)

It was noted that there is a correlation between the people within CHO's who usually take on the role of financial management and their higher level of computer literacy. A stated outcome of the final System is that a greater number of CHO members would be encouraged to take on these roles due to the System making the tasks easier. (Members typically take on such a role for a fixed period and then hand on to another member)

Possible future benefits

It was interesting to note in the user group meetings that a great deal of knowledge was being shared by people who rarely have the opportunity to meet. The way that individual CHO's managed accounts and paperwork varied considerably and it was clear that it was likely that some groups were efficient than others and could learn 'best practice' from their fellow CHO's. The provision of email and forums on the new system may well lead to the development of closer (albeit virtual) ties between the various groups.

SUCCESS OR FAILURE?

Clearly success and failure in terms of project outcomes are relative views that depend on the observer. It would be possible to take a simple 'tick in the box' approach based on the typical measures of project success, namely does it meet pre-established criteria of time, cost, quality and functionality. However, in a project such as this there will be many views of the relative importance of these criteria and the comments below are a reflection of the current views of the key players.

SACHA - Cost and time would typically be the main criteria for this party. It seems likely that the eventual cost will exceed the original figure to some extent and that the delivery time may be somewhat extended. Current predictions (September 1999) are a revised roll-out date of

February/March 2000 and a 10 - 20% cost over-run. However, the margins are not large for a project of this complexity and the project will in all probability be considered a success from those points of view. A more important criteria may be the number of CHO's that take up the system. One would anticipate a small number of initial CHO's to become users, but that the potential benefits of the system will quickly draw sufficient other CHO's into it to make it a success. The sharing of good practice among the CHO community will benefit all parties. There has been considerable interest shown inter-State in this system both within the housing sector and in health and other community sectors.

Project Officer - Functionality that meets the needs of both SACHA and the CHO's, attained within reasonable time and cost limits would appear to be the major forces driving the project Officer. His credibility in the field should be considerably enhanced and his active examination and critique of possible methodologies to smooth the passage of the project provide him with a valuable measure of success.

The Developer - Time, cost and functionality are all significant for the developer. In terms of cost (or rather profit) this project has a hint of 'failure' given the delays due to the IP problems, some extra unexpected costs and the delays caused by the complexity of the field. However, this has every chance to become a 'portfolio' project that will be a useful springboard to future projects. It is clear that the developer has a very strong view about 'learning organisations' and actively examines each step of the project with a view to finding ways of improving in future. Assumptions were never made and the phrase "If I understand correctly...what you are saying is..." was well used as domain knowledge was explored.

The CHO's - functionality is the only real concern here, given that the system is voluntary and being paid for by another party. There may be some need to make slight changes to their particular ways of working and there may be some feeling that the system should do more (as they see more of the system they are able to see new possibilities that were not initially obvious) but overall the system should allow appreciable savings in administration time and auditing costs. The added bonus of communication with other CHO's may well become a longer term benefit that could become the most successful outcome from the whole project.

METHODOLOGICAL ISSUES

This project still has a considerable time to run and, despite problems, is still staying remarkably close to time and cost targets despite potential changes in legislation which may affect parts of the system and various other 'environmental disturbances'.

One of the key reasons for the success of this project so far would appear to be the combination of skill and knowledge of the Project Officer, the senior management commitment, and the willingness of the developer to pursue the functionality for the users despite probable loss of profit. The concern for the users has moved the project management from the rapid implementation of a specified computer system to a more thoughtful and multi-faceted approach that takes into account more strongly the needs and concerns of the users. If a simple, reductionist or purely technical view of the project had been taken then there would have probably been a very different outcome in which time and cost requirements would have been met, the developer would have achieved acceptable return and the system would have functioned to a reasonable extent - a 'success' from a mechanistic project management standpoint.

Although both the Project Officer and the developer felt that there should be an identifiable "formal" methodology to guide them through this project (and they did spend considerable time debating this issue) they seem to have found a quite natural approach which blends their skills and which should lead to a successful project outcome. The approach adopted could be 'fitted' to a recognised development methodology as it appears to resemble Avison and Wood-Harpers' (1990) Multiview approach. Avison and Wood-Harper suggest that a number of questions need to be asked in order to carry out an exploration of information systems development:

- 1) How is the computer system supposed to further the aims of the organisation installing it?

- 2) How can it be fitted into the working lives of the people in the organisation who are going to use it?
- 3) How can the individuals concerned best relate to the machine in terms of operating it and using it?
- 4) What information system processing function is the system to perform?
- 5) What is the technical specification of a system that will come close enough to meeting the identified requirements?

The question that is raised in reviewing this project so far is that of whether information systems developers need to know about 'methodologies', in the academic sense, or if combination of good project management, problem solving and communication skills is sufficient. In the case outlined here lack of knowledge about formal methodologies does not seem to have been a problem, and it is interesting to speculate about the benefits that formal methodologies would have offered. The problematic areas were in domain knowledge acquisition and transfer of ownership and one could debate how a formal methodology could have alleviated or removed these problems.

Yeates (1991) comments that if a designed information system is to be truly effective and to provide the organisation with cost-effective benefits, then it must normally fulfil a number of important pre-conditions. These are perhaps the points which will allow longer term judgement to be made on the outcome of this particular information systems project:

1. It must obtain the approval and esteem of those who work with it and of those who use it. If a system fails to obtain approval before it is implemented, then most likely the implementation will be resisted...If it fails to satisfy the users once it has been implemented, it may be misused or supplanted by unofficial procedures
2. It must be capable of adapting or of being adapted to meet changing conditions and changing requirements...the failure of a designed system to adapt to change may result in it losing the approval of its users who devise alternative and unofficial systems to cope with the new environmental conditions
3. The various components of the information system - the designed and undesigned, the official and unofficial, the formal and informal - need to operate in harmony and be used to provide mutual support to the users of the system

The 'people' side of information systems projects is echoed by Stowell and West (1994) when they comment that

"Introducing a technology into any enterprise creates a disturbance which may engender a feeling of insecurity in those most affected. This feeling may result in a reluctance to change which, in turn, may reduce the effectiveness of the technology."

CONCLUSION

Has this project been a 'success' so far? In terms of systems development it may be slightly over budget and delivery time and has certainly consumed more of the developers and project managers time than it ideally should have done, and in the strictest traditional sense of judging projects it may therefore be argued as being a 'failure'. However, in the broader view the system will be functional, will offer the sponsor and users benefits and forms a platform for future development and enhancement. It will be some time before the system is deployed and the impact it has on CHO operations and culture can be observed. These human issues will form part of a longer term piece of research as will a more complete reflection on the development process once the project is completed.

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