DOCTOR OF BUSINESS ADMINISTRATION

An investigation into enterprise structure and ERP implementations

a contribution to praxis

Ola-Dapo Ajayi

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AN INVESTIGATION INTO ENTERPRISE STRUCTURE AND ERP IMPLEMENTATIONS

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Doctor of Business Administration

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Thesis Summary

This professional doctoral research reports on the relationship between Enterprise Systems, specifically Enterprise Resource Planning Systems, and enterprise structures. It offers insights and guidance to practitioners on factors for consideration in the implementation of ERP systems in organisations operating in modern enterprise structures. It reports on reflective ethnographic action research conducted in a number of companies from a diverse range of industries covering supply chains for both goods and services.

The primary contribution is in highlighting areas in which clients, practitioners and ERP software vendors can bring a greater awareness of internet era enterprise structures and business requirements into the ERP arena.

The concepts and insights have been explored in a focus group setting, comprised of practitioners from the enterprise systems implementation and consulting fraternity and revealed limitations and constraints in the implementation of enterprise systems. However, it also showed that current systems do not have the full capabilities required to support, in use, modern era enterprise structures, as required by practitioners and decision makers.

Keywords: Contingency Variables, Core Competencies, Enterprise Resource Planning, Enterprise Structure, Extended Enterprise, Grounded Theory, Organisation Structure, Template Analysis, Thematic Analysis, Virtual Enterprise

This thesis is dedicated to the memories of

Alhaji Liadi Oladipupo AJAYI (1932 – 2009)

Babatunde Olatunde OKUNUBI (1939 – 2008)

and

Dr. Gracie Ekeria BOLA (nee. Ebadan) (1964 – 2009)

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

List of acronyms commonly encountered in ERP implementation environments.

AIM	(Oracle) Application Implementation Method
AMCIS	The Americas Conference on Information Systems
API	Application Programming Interface
APICS	American Society for Production and Inventory Control (The Association for Operations Management)
ARIS	Architecture of integrated Information Systems
BAM	Business Activity Monitoring
BCM	Business Control Model
BFM	Business Function Model
BI	Business Intelligence
BOM	Business Organisation Model
BPE	Business Process Engineering
BPEL	Business Process Execution Language
BPM	Business Performance Management
BPM	Business Process Management/Model
BPMN	Business Process Modelling Notation
BPR	Business Process Reengineering
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CIMOSA	Computer Integrated Manufacturing Open System Architecture
CIO	Chief Information Officer
COO	Chief Operating Officer
CPM	Corporate Performance Management
CRM	Customer Relationship Management
CSFs	Critical Success Factors
CTO	Chief Technical Officer
DBMS	Database Management System
DEM	Dynamic Enterprise Model
EAI	Enterprise Application Integration
EAM	Enterprise Asset Management

List of acronyms commonly encountered in ERP implementation environments.

EDI	Electronic Data Interchange
(E)DP	(Electronic) Data Processing
EDRM	Electronic Document and Records Management System
EIS	Enterprise Information System
EIS	Executive Information System
EPM	Enterprise Performance Management
ERP	Enterprise Resource Planning (System)
ES	Enterprise Systems (aka Enterprise Wide Systems)
ESD	Enterprise Structure Diagram
FM	Financial Manager
GERAM	Generalised Enterprise Reference Architecture & Methodology
GUI	Graphical User Interface
HCM	Human Capital Management
HR	Human Resources
HRM	Human Resources Management
ICIS	The International Conference on Information Systems
ICT	Information & Communication Technology
IS	Information System
IT	Information Technology
KPI	Key Performance Indicator
LOB	Line of Business
MIS	Management Information System
MOSS	Microsoft Office SharePoint Server
MRP	Materials Resource Planning
MRP II	Manufacturing Resource Planning
ODBC	Open Database Connectivity
OLAP	Online Analytical Processing
OLTP	Online Transaction Processing
OUM	Oracle Unified Method (Oracle's successor to AIM)
PACIS	The Pacific Conference on Information Systems
PEAS	Packaged Enterprise Application Software
PIEE	Post Internet Era Enterprise

List of acronyms commonly encountered in ERP implementation environments.

PLM	Product Lifecycle Management
QI	Quality Improvement
R&D	Research & Development
ROI	Return on Investment
SaaS	Software as a Service
SCM	Supply Chain Management
SCP	Supply Chain Planning
SME	Small and Medium Enterprises
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
SQL	Structured Query Language
SRM	Supplier Relationship Management
TCA	Trading Community Architecture
TQM	Total Quality Management
UML	Unified Modelling Language
VC	Variable Cost
VERAM	Virtual Enterprise Reference Architecture & Methodology
XML	eXtensible Markup Language

GLOSSARY

Term	Meaning
Alignment	Fit between variables such as strategy, information systems, structure and culture.
Analysis and Design	The stage of analysing what users and business functions require of an information system, and designing of the system to take account of them.
Application Service Provider	A company providing business applications such as e-mail, workflow or groupware to other companies under contract.
Autonomy	Degree of freedom a person has in deciding how to do their work
Back-office Systems	Administrative processes or systems that companies can often centralise in specialised processing centres or outsource to other companies.
Bottom-up Approach	The practice of developing the IS plan by concentrating on the current and expected problems as expressed by people at the operating level of the organisation.
Business Alignment Strategy	The IS strategy is generated from the business strategy through techniques and models such as those suggested by Porter (Porter and Millar, 1985) or Treacy and Wiersema (1993).
Business Information Systems	Information systems used to support the functional areas of business such as sales, marketing and human resource management.
Business Intelligence (Systems)	The process and the systems that are designed to mine the vast amounts of data residing in ERP databases.
Business Process Innovation	Identifying new ways of carrying out business operations, often enabled by new information systems.
Business Process View	Sees satisfying customers' requirements as central to the process of developing a supply system that will operate without waste. The orientation is towards speed of response and two-way flow of information.
Business-to-Business (B2B)	Using the Internet to conduct commercial transactions between organisations.
Centralisation	This occurs when a relatively large number of decisions are taken by management at the top of the organisation.
Centralization	The degree to which formal authority to make discretionary choices is concentrated in an individual, unit, group, or level.
Cloud / SaaS / On Demand	Describes a software application delivery model, based on consumers accessing remote computers for their software systems and in the main are licenced on a 'pay as you go' basis.
Competitive Advantage	Arises from discovering and implementing ways of

Term	Meaning
	competing that are unique and distinctive from those of rivals, and that can be sustained.
Complexity	The degree of horizontal, vertical and spatial differentiation in an organisation.
Configuration	Redesigning a piece of software to suit the needs of a particular business.
Contingency Approaches	Express the idea that performance depends on an organisation having a structure appropriate to its environment.
Customer Relationship Management (CRM)	The process of maximising the value proposition to the customer through all interactions, both online and traditional. Effective CRM advocates developing one-to-one relationships with valuable customers.
Customisation	Adding non-standard features to the software by adding or changing program code.
Data	Raw facts, figures and events that have not been analysed.
Decentralisation	When relatively large numbers of decisions are taken lower down the organisation and in operating units.
Decision Support Systems	A computer-based system, almost interactive, designed to assist managers in making decisions.
eBusiness Suite	Oracle Corporation ERP software.
Electronic Business (e-business)	When all information exchanges, both within an organisation and with external stakeholders, are conducted electronically.
Electronic Commerce (e-commerce)	When all information exchanges between an organisation and its customers are conducted electronically.
Enterprise (Organisation) structure	Way in which an enterprise/organisation organises it use of people, processes and technology to carry out the tasks necessary to achieve its objectives.
Enterprise Resource Planning (ERP)	An integrated process of planning and managing all resources and their use in the entire enterprise. It includes contacts with business partners. Also described as "fully integrated process-driven systems that operate over the Internet. ERP is identified as an extended enterprise management system that integrates traditional ERP applications (manufacturing, distribution, financials, human resources, marketing, and sales) with supply chain management (SCM), customer relationship management (CRM), and B2B e-commerce applications", "fully integrated process-driven systems that operate over the Internet" (Radovilsky, 2004).
Enterprise Software	Integrated software that supports enterprise computing and ERP. The most notable examples are SAP R/3 and Oracle eBusiness Suite.
Enterprise	An entity, regardless of its legal form, engaged in economic

Term	Meaning
	activities.
	Forms of Enterprise or business entity include:
	Sole proprietorship
	Partnership
	Joint stock company
	Limited liability partnership
	Limited liability company
	Business cooperative
	Lease enterprise/Franchise
	Production cooperative
	Social enterprise
	State and municipal bodies
Enterprise Member	Individual companies consisting of one or more enterprise modules that contribute value through the delivery of their competencies to one or more specific tasks of a collaborative activity within an enterprise.
Enterprise Module	An autonomous cross-functional part of an individual company consisting of highly task specific competencies that determine its value proposition complemented by lower task specific relational interface capabilities that enable the unique competence to be deployed within a collaborative activity of an enterprise.
Enterprise Management	The coordination of the delivery of tasks and activities between enterprise members.
Enterprise Structure	The model of roles, responsibilities, processes, functions and controls amongst the enterprise leader and enterprise members.
Enterprise Design	Enterprise design involves the evaluation of potential value members for participation in an enterprise, the allocation of the value member to tasks in the collaborative activity, and the selection of an appropriate relationship strategy and structure with the value member based on its engage-ability.
Enterprise Leader	The enterprise member who possesses the unifying competence for enterprise design and management.
Enterprise-wide System	An information system (IS) that encompasses the entire enterprise implemented and integrated on a network.
Extended Enterprise	A coalition or self-organizing network of firms that combine their economic output, by concentrating on their core competencies and buying in other inputs, to provide products and services to the market.
Formalization	The extent to which jobs within organisations are standardized.
Horizontal differentiation	Competitive advantage derived from offering different features rather than different functions.

Term	Meaning
Implementation	Configuring and putting a system into use within an organisation.
Information Architecture	A conceptualisation of the manner in which information requirements are met by the information system.
Information Economics	An approach to cost-benefit analysis that incorporates organisational objectives in a scoring methodology to assess more accurately the value of intangible benefits.
Information Resources Management	All activities related to planning, organising, acquiring, maintaining, securing and controlling IS resources.
Information System Plan	A document that describes how the company will realise the information vision by allocating time and resources to it.
Information System	A set of people, procedures and resources that collects and transforms data into information and disseminates it.
Information Systems Management	The planning, acquisition, development and use of information systems.
Information Technology	The processing of data by computers, including the management of information and the development of computer science.
Information	Useful knowledge derived from data.
Inter-organisational System	Information system that links organisations electronically.
Job enlargement	Enhancing what a job entails by increasing the duties, responsibilities and authority vested in the role.
Organisational Structure	The ways in which tasks are divided and coordinated within an organisation.
Organisation design	The definition of roles, business processes and reporting hierarchy within an organisation.
Phishing	This is the criminally fraudulent process of attempting to acquire sensitive information such as usernames, passwords and credit card details by masquerading as a trustworthy entity in an electronic communication, such as an email or mobile phone text message.
Relational Embeddedness	Refers to the nature and strength of ties organisations develop in the extended enterprise and hence provides a guide to their level of commitment.
Requirements Engineering	Process of identifying stakeholder needs for software or business applications.
SAP	Name of the leading ERP vendor and application: System Analysis and Program Development and later Systems Applications and Products in Data Processing (Systemanalyse und Programmentwicklung, Systeme, Anwendungen und Produkte in der Datenverarbeitung)
Software-as-a-service (SaaS)	Provision of software by subscription. Along with its sibling cloud computing this is a way for organisations, small and medium-sized businesses, to access applications and

Term	Meaning
	technology that they could not otherwise afford.
Spatial differentiation	Situation in which competitors cite their physical location as a means of competitive advantage, usually eliminated by having a strong "web presence" and strengths in eCommerce.
Stakeholders	People and groups with an interest in a project and who can affect the outcome.
Structural Embeddedness	The extent to which organisations do not just have relationships with each other but also with the same third parties; thus, many parties are linked indirectly by third parties, creating a network of collaborations.
System Approach	Looks at the different parts of an interacting set of activities as a whole and considers the best way for the whole to function.
System	A set of interrelated parts designed to achieve a purpose.
Technological levelling(-out)	Elimination of competitive advantage acquired through deployment of superior technology.
Technological matrixing	Combining core competencies that represent different expertise in software engineering.
Top-down Approach	A top-down approach develops the IS plan by identifying those applications that senior management believe would be most helpful to the organisation.
Vertical differentiation	Competitive advantage derived from offering different functions rather than different features.
Virtual component	Product or service that can be delivered electronically; usually refers to something that is software related.
Virtual Enterprise	A temporary alliance of organisations that come together to share skills or core competencies and resources in order to better respond to market opportunities
Vertically Integrated Enterprise	An enterprise comprised of companies in a supply chain who typically are commonly owned.
Virtual Organisations	Virtual organisations deliver goods and services but have few, if any, of the physical features of conventional businesses. A typical example is a Shared Services Centre.

1. INTRODUCTION

The purpose of this introductory chapter is to outline the shape and boundaries of this doctoral research project. This DBA study, whilst being for a research degree, is focused on addressing a practical management issue, and it is the management issue that is, the basis for, the research question. As a practitioner actively engaged in the area the DBA is the preferred research vehicle as it satisfies the Association of MBAs criteria;

> *The thesis should make a contribution to the enhancement of professional practice in management as well as a contribution to knowledge via the application and development of theoretical frameworks, methods, and techniques. (AMBA, 2009)*

The 'gap' such as it is, is to make a contribution firstly to management practice and secondly contribute to academic knowledge about management practice. The management issue in this instance is a look at the relationship between enterprise resource planning systems and enterprise structures, both concepts are explained further in this chapter. The chapter is presented in two sections.

Section 1.1 outlines what the study is about, the rationale and overall aim of the study. Section 1.2 outlines the foundations for the research design and methods, and summarizes the main study findings. The chapter concludes with Section 1.3 giving brief summaries of the other chapters that make up the body of the thesis.

1.1. Research Domain

The popular conception of ERP systems is that of packaged software used by business for advanced data processing, and mainly for processing financial transactions. Whilst this is broadly accurate, ERP in the current era goes far beyond that simplistic view. A practical definition of ERP is that it is a software application that takes "computer systems in finance, human resources, manufacturing and the warehouse" (Koch and Wailgum, 2007) and combines their functionality into a single unified system, subdivided into software modules". Such systems are "comprehensive, packaged software solutions [that] seek to integrate the complete range of a business' processes and functions in order to present a holistic view of the business from a single information and IT architecture" (Gable, 1998). Both of these

definitions appear to be more focussed on the achievement of a "single" technical solution. A more practitioner and user centric definition is that ERP systems "integrate organisational processes through shared information and data flows" (Seddon and Shanks, 2000). Davenport (1998b) highlights the fact that the reference to "shared" is not bounded by physical location or business function; whilst Morton and Hu (2008), point to the fact that any integration is capable of being extended to business partners. From these definitions it can be seen that ERP, is, at once, a technology or system and a component of information management strategy.

When originally conceptualised, the setting for ERP systems implementations was always thought to be a single unitary organisation (Alwabel et al., 2005), though not necessarily a single legal entity, it was always an identifiably single organisation under single management. This study follows the premise that, this scenario, whilst still valid, is no longer the only one applicable. Increasingly, the importance of collaboration between different types of organisations within an enterprise, has gained currency (*Deloitte Research*, 2002). One definition of enterprise describes it succinctly as "A business organisation or company". With that it is taken that, the enterprise may be a sole trader, a large corporation, a charitable organisation or a government department; the 'a' retains unitary significance. In this context the study uses an alternative definition for the word 'enterprise' – an enterprise is considered to be parts of different organisations working together as a single entity. The study explores how ERP systems can be used to effect changes in enterprise structures and *vice versa.*

This alternative concept of enterprise has gained new prominence in management circles in recent years as a way for an organisation to go about achieving its corporate objectives by focusing strategy on core competences and placing business critical operations outside its own direct control through outsourcing, alliances, and licensing or other arm's length collaborative arrangements. Amongst the critical success factors for such enterprise according to Sappenfield and Miller (2003), are reliance on the existence of sound Information and Information Systems these are; high quality information and a flexible IT infrastructure. These are required on the grounds that information exchange is central to supporting the enterprise strategy and to understanding the processes required to bring that

strategy about. Despite the increasing popularity of the enterprise as an operational organisational model, infrastructural support such as information systems are only just being marketed to support this way of working.

The central premise of this study is that without the requisite information management and information systems an enterprise's chances of success are undermined. The objective here is to design a way of determining in advance the likely outcome of an intended enterprise relationship. This will be through an analysis of the information systems, and their capabilities, in existence at the outset, or planned to be put in place to support any particular venture. By choosing to implement an ERP system in an enterprise context, an organisation is seeking reinforcement for its organisational structure design decisions.

The research question, therefore, is:

How can knowledge of enterprise structures be used to improve the benefits derived from implementing ERP systems into an enterprise?

1.2.   The aims of this study

The interest to conduct a study in this area stems from action research conducted in several ERP implementations over recent years and discovering how this impacts upon 'the body corporate[1]'. The aim of this thesis is to contribute to the dialogue of practitioners, clients, consultants, ERP software vendors and academics.

From this action research, and data collected, analysis will be presented that goes towards answering the research question. The rationale behind the chosen research methodology is described in more detail in Chapter Three. The study devises a means for measuring as objectively as possible the impact an enterprise's structure has on ERP system implementation and use. To collect data related to ERP implementations, the study will:

- develop a means for measuring implementation outcomes enterprise structure related issues
- identify ways to supplement implementation methodologies with techniques to improve issues related to enterprise structures.

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[1] In English Law, body corporate is the legal term for a corporate body, i.e. a corporation or company.

1.3. Chapter Outlines

- **Chapter 1** - This chapter sets out the rationale for the study and introduces the thesis structure represented graphically in Figure 1-1 below.
- **Chapter 2** - This presents a review of literature on the ERP, organisation design, organisation structures and extrapolates these to relate to enterprises. The review seeks to capture what is known about the ways in which enterprise structures affect ERP implementations.
- **Chapter 3** - This chapter describes the rationale adopted for the study design, research approach and expected outcomes. A review of relevant research philosophies is conducted and the choice of case studies and action research is explained. The methodological position is outlined, the fieldwork settings are described and the rationales for case selection are addressed. This chapter also describes the research design and principal findings.
- **Chapter 4** - This chapter relates what is known from the literature to some selected cases. For each case there is an examination of its structure from a post Internet era perspective, along with an evaluation of how this has affected its implementation of an ERP system.
- **Chapter 5** - This chapter takes the form of a cross-case analysis in which the cases are compared and contrasted with regards to ERP implementations and enterprise structure.
- **Chapter 6** - This chapter identifies what this study has found in regard to enterprise structures, it presents its unique contribution to both knowledge and praxis.
- **Chapter 7** - This chapter draws together all the strands of the study; the extent to which the study aims and objectives have been achieved, as well identifying its limitations and areas for further study.
- **References and Appendices** - These are presented at the end to complete the thesis.
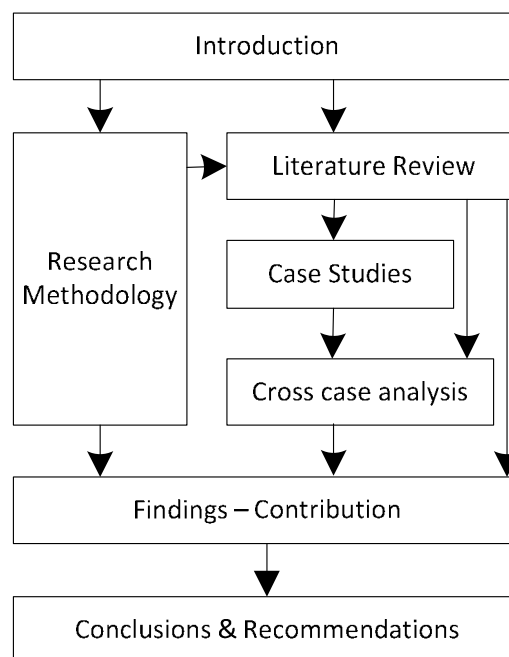
Figure 1-1 - DBA Thesis Schema

2. LITERATURE REVIEW AND RESEARCH ISSUES

2.1. Introduction

This chapter presents a review of the extant and pertinent literature as a means of placing this study in context and aid its attempt to contribute to the understanding of information systems, particularly Enterprise Resource Planning (ERP) systems, their impact on enterprise management and the use of an understanding of enterprise structure to aid ERP implementation practice. It is essential to understand what is already known about a subject, before any study can claim to make a contribution to any given subject area. Space constraints preclude an exhaustive review of all published articles on ERP and enterprise structure, so focus is given to key articles that have been recently influential in covering the issues more pertinent to practitioners in the field.

The year 2000 represented a watershed in the realms of ERP adoption, when many companies chose to implement ERP systems as a way of overcoming the 'Year 2000' (Y2K) bug; which meant many legacy systems would not be able to handle the new millennium. However, by the same token, many organisations made the conscious decision to eschew implementation of ERP systems at that time until after the millennium (Davenport, 1998b).

Much research effort has been directed towards consideration of generic critical success factors of ERP implementation (Allen et al., 2002, Hong and Kim, 2002, Peffers et al., 2003, Al-Mashari et al., 2006, Soja, 2006, Finney and Corbett, 2007, Ramayah et al., 2007, Wang et al., 2008), and some of the genre have directed that effort towards examining the issue of " organisational fit" (Hong and Kim, 2002, Morton and Hu, 2008, Motwani et al., 2008), a focus on issues relating to enterprise structure is not central to any of these studies. Furthermore, few of these studies, Soja (2006) excluded, have addressed the area from the practitioner perspective.

The literature on ERP systems has grown steadily in recent years, this growth has meant that compilation of annotated bibliographies have become major research undertakings in their own right (Moon, 2007, Esteves and Pastor, 2001, Botta-Genoulaz et al., 2005, Møller, 2006, Esteves and Bohorquez, 2007). These bibliographies served as a starting point from which to

identify relevant literature for review. One notable finding in looking through this literature is the realisation that ERP and the literature relating to it is still very much practice based rather than an academic based. Consequently the majority of articles do not appear in what may be considered journals with a high impact factor. One article (Moon, 2007) shows that only 16 per cent of the 313 articles appeared in what can be considered 'world leading[2]' journals, with a further 16 per cent in 'internationally excellent' journals.

The review starts with a consideration of current research efforts in the realm of enterprise structure as applied to ERP systems and their implementation, examining what is the current understanding of ERP and Enterprise Structure, and key approaches to understanding their significance. The review further seeks to gain an understanding of the extent to which an understanding of enterprise structure is incorporated into the implementation process and what implications this may have for ERP implementation practitioners. The second part of this chapter examines the ways in which consideration of Enterprise Structure been brought into the ERP implementation process. Finally, brief consideration is given to how ERP implementers and practitioners can incorporate an understanding of Enterprise Structure into the implementation process and thereby achieve an improved and more positive outcome for clients. These questions suggest that as the implementation of an ERP system is deemed to be a major intervention activity for any enterprise (Davenport, 1998a), it should follow that the structure of that enterprise will be a major factor in the success or otherwise failure of the implementation effort. ERP and most corporate systems are traditionally designed for use by what would be recognised as a conventional organisation, wherein the organisation is a bounded legal entity. As a conventional organisation it has a legal form and employs all its own employees, and is responsible for all the premises from which it conducts its operations, and the licensing of software it uses. New organisational forms present difficulties - the nature of which the software vendors are only just coming to terms with. The difficulty has come in catering for the enterprise, how to not only design an ERP system to cater for this, but then how to configure and implement the resulting application and its constituent modules. An additional complexity is where a company is part of multiple

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[2] Aston Business School Journal League Tables 03 March 2008. (See Appendix X)

enterprises – how can one ERP system cater for the multiple enterprises which it may belong to?

2.2. The Concepts

2.2.1. ERP – What is it?

The popular conception of an ERP system is that of packaged software used by business for advanced data processing, and mainly for processing financial transactions. Whilst this is broadly accurate, ERP in the current era goes far beyond that simplistic view. A practical definition of an ERP system is a "computer system in finance, human resources, manufacturing and the warehouse…" which "…combines their functionality into a single unified system, subdivided into software modules" (Koch and Wailgum, 2007). Such systems are "…comprehensive, packaged software solutions [that] seek to integrate the complete range of a business' processes and functions in order to present a holistic view of the business from a single information and IT architecture" (Gable, 1998). Both of these definitions appear to be more focussed on the achievement of a "single" technical solution. A more practitioner and user centric definition is that ERP systems "integrate organisational processes through shared information and data flows" (Seddon and Shanks, 2000). Davenport (1998b) highlights the fact that the reference to "shared" is not bounded by physical location or business function; whilst Morton and Hu (2008), point to the fact that any integration is capable of being extended to business partners. From these definitions it can be seen that ERP, is, at the same time, a technology and an information management strategy.

Less than ten years ago, ERP systems were described as "the most important development in the corporate use of Information Technology (IT)" in the, then, 1990s. (Davenport, 1998b). Few, if any major organisation today has not implemented an ERP system. They are in use in all industries, government departments, public sector, educational and not-for-profit organisations as evidenced by the fact that all the major vendors, (for example SAP and Oracle) list these organisations as customers and by ERP research studies conducted on such organisations (Davenport, 1998a). The Y2K (Millennium) bug is also held responsible, in some circles, for the boom in interest in ERP, as it gave many companies the justification to

invest in replacing rather than fixing their legacy systems. By the end of the 1990s, most of the Fortune 500 US companies had installed an ERP system (Shanks and Seddon, 2000) and it's safe to assume the same proportion of the UK's equivalent (FTSE 100) organisations will have done the same.

ERPs, once the preserve of leading enterprises, equivalents of the FTSE 250 in commercial terms, is increasingly being embraced by more and more enterprises to improve their information management and business process management (BPM). A final industry standard definition appears in the APICS Dictionary (2008) which describes it as "a framework for organising, defining and standardizing the business processes necessary to effectively plan and control an organisation so the organisation can use its internal knowledge to seek external advantage". This definition serves to capture the more managerial aspects of the ERP concept, the ERP implementation agenda and anticipated benefits from the successful adoption of both.

Increasingly these systems are simply dubbed 'Enterprise Systems'. However, using another definition it can be seen that the term enterprise system is not synonymous with ERP, but represents a range of applications of which ERP is just one. This definition states that, "Enterprise Systems (ES) are configurable, off-the-shelf software packages that provide an integrated suite of systems and information resources for operational and management processes across a broad range of business activities. The range of ES available is growing and includes enterprise resource planning (ERP), customer relationship management (CRM), supply chain management (SCM) and, most recently, enterprise portals" (Ward et al., 2005). However, for the purposes of this study the two terms will be used interchangeably with explicit attention drawn to instances when a distinction needs to be made.

The definitions afforded ERP are manifold and every writer on the subject attempts to place their own slant on a definition see *inter alia* (Shehab et al., 2004, Howcroft et al., 2005, Moon, 2007). However, for this researcher, in as much as the exact definition of a car is no longer of importance, it can be argued that ERP systems have been around long enough for a precise definition to be similarly unimportant. What is significantly more important is what ERP systems stand for and how an enterprise can make best use of that knowledge. In this regard, this study agrees with having a broader conceptual view of ERP as adopted by Klaus,

Rosemann and Gable (2000). In their conceptual analysis of ERP they suggest three perspectives from which to perceive ERP:

- o as a commodity, a computer software product

- o as a development objective of mapping all processes and data of an enterprise into a comprehensive integrative structure; and

- o as the key element of an infrastructure that delivers a business solution.

It is the third of these that this study adopts as being of most relevance to a study investigating the relationship, if any, between ERP and enterprise structure ERP.

Several studies on ERP systems have documented the history of these systems and charted their evolution from humble Materials Requirements Planning (MRP) systems or HR systems to the present day (Gupta and Kohli, 2006, Shehab et al., 2004, Umble et al., 2003). What is evident from these studies is that in the space of little more than ten years these systems have evolved from being simple software solutions being used by a few manufacturing organisations to complex integrated business solutions. Current ERP systems have developed from the early Inventory Management and Control systems of the 1960s, to the MRP systems of the 1970s, to the Manufacturing Requirements Planning (MRP II) systems of the 1980s through to the Enterprise Resource Planning (ERP) systems of the 1990s. Nowadays, in the 2000s, these have given way to what are now called ERP II or Extended ERP systems, with their additional functionality that takes in the whole business network, including customer and supplier relationship management and e-commerce.

This study looks to learn from the whole implementation process from an action research perspective to analyse the findings and elicit learning and knowledge. In contrast, much research on ERP systems has focussed on the technology, the database architecture and the interfaces between legacy and third party systems, whilst these are important topics in their own right, this study will only consider them in passing.

2.2.2. Contemporary Issues in Information Systems Research

A recurring theme in the current IS literature is the question of whether Information Systems is worthy of study as a subject in its own right. One question often muted is whether IS is simply a net importer of knowledge from other disciplines (Keen, 1980). In some studies IS research is accused of not addressing the information question at all (Orlikowski and Iacono, 2001). In response Webster (2002) argues that in its short history it has already developed from classification systems to conceptual frameworks by stating that, "In the 1970s, it was considered pre-paradigmatic, today, it is approaching the level of development in empirical research of other management fields, like organisational behaviour". By way of example it is noted that in contrast to many other areas of management research, the first dedicated IS journal, MIS Quarterly only began being published in 1977. Steinbach and Knight also point to the relative youth of IS research, but argue in favour of its on-going relevance as a subject of managerial relevance worthy of singular exploration (Steinbach and Knight, 2006). Table 2.1 below shows the main elements to have emerged within the domain of IS research over the last 30 years. The full extent of this debate is not covered in this research study.

Bodies of Knowledge relating to Information Systems	Examples of Concepts, Theories, Processes and Applications
Information systems management processes	• Strategic planning for infrastructure and applications • Evaluation of IS in the organisation • Management of IS personnel • Management of IS function and operations
Information systems development processes	• IS project Management • IS project risk management • Project Organisation and participation • Technical and social requirements • Application acquisition • Systems implementation • Training acceptance and use
Information systems development concepts	• Methods concepts • Socio technical concepts • Speech act theory for collaborative development • Rational decomposition concepts for requirements • Social construction for requirements

Bodies of Knowledge relating to Information Systems	Examples of Concepts, Theories, Processes and Applications
	• Error and error detection concepts • Testing concepts for complex socio-technical systems • Quality concepts for IS
Representations in information systems	• Database, knowledge base concepts • Representations of the "real world" • Coding • Storage, retrieval and transmission • Tracking events • Representing event changes • Representing system structure
Application systems	• Knowledge management (KM) • Expert systems • (Group) Decision Support Systems (DSS) • Collaborative work and virtual team systems • Telecommuting and distributed work systems • Supply chain management systems (SCM) • Enterprise Systems (ES) • Enterprise resource planning (ERP) systems • Intra-and inter-organisational systems • Computer based training systems (CBT) • Electronic commerce systems (eCommerce) • Customer support and customer relationship management systems (CRM) • Human resource management systems (HRMS)

Table 2-1[3] - Information Systems Bodies

2.2.3. Enterprise Structure – What it is?

This section presents key ideas in the literature regarding enterprise structure design and their implications for ERP implementation and use. Insofar as once implemented an ERP system forms part of the environment in which an enterprise operates, enterprise structure design is important in determining if an enterprise has embraced the optimal structure

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[3] Bodies of Knowledge: Concepts, Theories, Processes and Applications Unique or Somewhat Unique to Information Systems BASKERVILLE, R. L. & MYERS, M. D. 2002. Information Systems as a Reference Discipline. *MIS Quarterly,* 26**,** 1-14.

appropriate for its tasks, objectives and operating environment. Whilst much of the literature refers to "organisation", this study uses the term "enterprise" to reflect the current phenomena whereby business activity is not always carried out by a single legal entity for or by itself; this is explained further in this review. To this end the review adopts the following definition; an enterprise...

> ".. is considered to be any entity in an economic activity, irrespective of its legal form. This includes, in particular, self-employed persons and family business engaged in craft or other activities, and partnerships or associations regularly engaged in an economic activity." Official Journal of the European Union (OJEU)(European Commission, 2003)

An allied definition that will also be used to guide this study is provide by William B Rouse (2005).

> "An enterprise is a goal-directed organisation of resources – human, information, financial, and physical – and activities, usually of significant operational scope, complication, risk and duration. Enterprises can range from corporations, to supply chains, to markets, to governments, to economies."

2.2.4. Forms of enterprise structure

Whilst the literature identifies many forms of enterprise structure, Binder and Clegg provide a good summary of the different terms used (Binder and Clegg, 2007b). For this study the phrase, "irrespective of its legal form.." in the OJEU is pertinent, as the central proposition offered is that as the form of an enterprise changes so it's IS strategy must also change.

An organisations structure serves multiple purposes. Firstly, it must provide a framework of responsibilities, reporting relationships, and groupings, and it must provide a template for linking and coordinating organisational elements into a coherent whole (Daft, 1998).

In its simplest form, an enterprise's structure is the sum total of the ways in which it organises its tasks and activities amongst its personnel and then coordinates and controls the execution of those tasks and activities (Mintzberg, 1979). This definition is further explained as "the formal pattern of interactions and coordination that links the technology

and systems, tasks and responsibilities assigned to individuals and groups, and human components of an enterprise to ensure the enterprise accomplishes its purpose" (Duncan, 1979). Duncan posits that an enterprise's structure serves two purposes. Firstly, the enterprise structure reduces uncertainty in decision making through the facilitation of information flows through the enterprise. Secondly, the enterprise structure promotes integration through the effective coordination of activities and integration of enterprise behaviour. An enterprise's structure helps to establish a balance between decision making and implementation of those decisions. In practical terms, the enterprise structure is the way in which human resources are organised, how rules and procedures are formalized, how business functions are organised, and how power is invested in the roles that enterprise members are asked to perform at varying levels with the enterprise (Prakash and Gupta, 2008). An information system, which includes ERP systems, needs to "fit" to be an effective business system. It needs to fit the enterprise structure, the environment of the enterprise and the people of the enterprise, both as individuals and as groups (Legare, 2002, Markus and Robey, 1988, Pare et al., 2008).

Duncan's analysis of enterprise structure design pointed to one of two forms of structure being available to an enterprise, from a managerial perspective. An enterprise could structure itself along **functional** lines; wherein activities are grouped together by common function from the top to the bottom of the enterprise (Anand and Daft, 2007). Functions include such activities as financial management, human resources management, engineering, research and development, manufacturing and so on. The other form of structure is the **decentralised** or divisional format. In the decentralised format each division acts like a mini company, with responsibility for its own finance, research and development and so on. Each division then contributes profits to the overall company; hence this structure is also referred to as the 'profit centred' structure.

An alternative view of enterprise structures, more directly applied to traditional organisations (see Table 2-2 below), identifies five structural forms; Simple, Machine Bureaucracy, Professional Bureaucracy, Divisional and Adhocracy. Each is further seen to be formed from five basic components (Mintzberg, 1980). These components are; the strategic apex, the middle line, the operating core, the technostructure and the support structure.

"The core fulfils the primary functions of the enterprise; and is directly supervised by the middle line, and the strategic apex includes senior management and members of the board. The technostructure consists of analysts, technologists and other specialists who are concerned with designing the work processes of others (mostly the operating core), generally to bring about standardization. The support staff provide support to the enterprise outside the flow of productive work -from legal services to canteens, print room to cleaners."(Mintzberg, 1979). The inference from Mintzberg's ensuing analysis is that different organisation structures are suited to different organisational scenarios.

Organisation type	Salient characteristics
Simple Form	• Small, simple • Low formalization • Highly centralized • Unsophisticated technical systems
Machine Bureaucracy	• Perform routine operating tasks • Highly formalized • Relatively centralized decision-making • Automated and integrated technology • Highly differentiated structure • Standardized work processes used for coordination • Operate in stable environments • Regulating, non-automated technical system
Professional Bureaucracy	• Decentralized decision-making • Standardization of skills used for coordination • Highly skilled workers who value autonomy • Non-regulating, non-sophisticated technical system
Divisionalized Form	• Centralized headquarters • Semiautonomous, loosely joined divisions • Little interdependence or close coordination among divisions • Main goal of headquarters is to coordinate goals of divisions with that of its own without sacrificing autonomy • Standardized outputs of divisions used for coordination • Divisions are generally machine bureaucracies • Technical system separated into segments, one for each division

Organisation type	Salient characteristics
Adhocracy	• Operates as a cohesive group working together • Mutual coordination and cooperation • Innovative • Workers are trained experts from different specialities • Ad hoc project teams • Low formalization • Decentralized decision-making • Operate in dynamic environments • Sophisticated and often automated technical system (in the administrative adhocracy)

Table 2-2[4] - Ideal forms of organisation structure

A reference to Mintzberg's work is included here as there is strong evidence from the literature that much work on organisation (enterprise) structure, Daft (1998) and Morton and Hu (2008) for example, are both directly or indirectly founded on that early analysis.

Dibrell and Miller assert that "the different forms of organisational structures reflect the environments within which they operate (Dibrell and Miller, 2002). They provide arguments for why organisations choose to integrate either vertically, laterally or in some cases adopting a matrix form. And in what is one of the earliest definitions of the extended enterprise Miles and Snow (1995) describe a "network form of organization". The network form of organisation represents a significant departure from previous organisational forms. It is the product of a continuing evolution stretching from the small owner- managed firm of colonial times, with its direct personal control, all the way to the global matrix organisation of the 1980s with its complex coordination mechanisms. Successful multi-firm networks combine the resources of two or more firms with complementary competencies. (Miles and Snow, 1995 p.6). In the latter case the commentators were looking at the influence of structure on human resources.

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[4] MINTZBERG, H. 1979. *The structuring of organizations: A synthesis of the research,* Englewood Cliffs, New Jersey, Prentice Hall. adapted from MORTON, N. A. & HU, Q. 2008. Implications of the fit between organizational structure and ERP: A structural contingency theory perspective. *Information & Management,* 28**,** 391-402.

It is important to understand these aspects of structure as they help people to understand where the authority, responsibility and accountability for tasks and activities rest within their work setting (Kerzner, 2006, Nicholas and Steyn, 2008).

2.2.5. ERP Implementation Process

This study seeks to explore the relationship, if any, between ERP implementation and enterprise structure via the ERP implementation process.

The implementation of an ERP system is usually a major strategic change initiative for any organisation. It commands the commitment of a significant level of resources and management effort (Moon, 2007). Being part of an enterprise wide project, the implementation has the potential to be disruptive to the on-going operations of the organisation or wider "enterprise". In the case of the enterprise-then managing disruptions across organisational boundaries gives an added importance.

The implementation process (see Table 2-3 below) is one of several phases along the ERP life-cycle (Esteves and Pastor, 2001). These phases or stages include the:

Phase	Sub Phase	Main Outcome
A Selection	Adoption decision	Recognising a strategic need for a new system
	Acquisition	Search and selection of an appropriate system given the requirement of the enterprise and the objectives of the system
B Implementation	Implementation	The key activity of enabling the system for use by the enterprise
	Utilization	The operationalisation of the system, using it to derive benefits for the enterprise with minimum "down-time"
C Post-Implementation	Evolution	Expanding and extending the capabilities of the system to cover both additional decision making areas and additional business areas. This covers the

Phase	Sub Phase	Main Outcome
		transition from ERP to ES
	Retirement	Covering the necessary divestment and decommissioning of any "tool" that becomes superseded by new technology or business needs such that further utilization or evolution becomes uneconomic

Table 2-3 - ERP implementation phases.

From experience, this author has found that irrespective of the particular implementation methodology adopted for an ERP implementation project, there are generically identifiable stages involved in most implementations:

Project Planning

Business and Operational Analysis (also known as Current State Analysis or AS-IS Analysis)

Business Process Design (sometimes known as Business Process Reengineering or BPR)

Software Installation and Configuration

Project Team Training

Business Requirements Analysis and mapping to software (also known as Requirements Engineering)

Module Configuration

Gap Analysis

Solution Design

Conference Room Pilot

Design, Development and Testing of Customisations and Extensions

Design, Development and Testing of Interfaces and Reports

Future State Process Definition (or TO-BE specification)

Data Conversion

Design and Development of custom and role targeted documentation

End User Training

User Acceptance Testing

Transition planning

Go-Live (Production)

Post-Implementation audit and support

Within that framework, there are further considerations for project planning:

Project initiation – definition, scope, budgeting, risk assessment

Project resourcing – outsource, in-house, mix

Project documentation – standards and authorization

Project control and management – Project Management Methodology e.g. Prince II

Project communication – meetings, briefings

As regards selection, Everdingen et al (2000) quotes surveys that identify that the most important criteria in selecting an ERP System is the degree of "fit" between the current business procedures of the enterprise and the ERP system selected for implementation. However, in this researcher's experience, this presupposes that the organisation intends to stand still until the system is implemented, which is unlikely to be the case. It is more likely that the system will continually have to play "catch up", hence the need for on-going IS technical support.

Taking "fit" as an important factor to consider in the implementation process, though not necessarily with current processes, a key consideration of the actual implementation is what to do in the instance where there is misalignment between the application being implemented and the intended (by design) structure of the target enterprise. The options invariably involve either customising the ERP system or adapting business processes to work with the system "out of the box"; a vanilla implementation.

Following much consideration in the ERP market, two principle vendors have emerged as the mainstream purveyors of these systems: Oracle and SAP. Both organisations have their own methodology for the implementation of their systems; in Oracle's case this methodology

(Table 2-4 and Figure 2-1 below) is called AIM Advantage – otherwise known as Application Implementation Method (AIM)[5] Advantage, whilst the SAP methodology is called MySAP. AIM comprises six phases, and as at the time of writing, eleven processes. The processes are designed to "group related deliverables together" thus implementing them within a phase as appropriate. Consequently, not all processes are applicable to all six phases, Oracle Corporation (1999). SAP's MySAP follows broadly similar phases of; Project Preparation, Business Blueprint, Realization, Final Preparation and Go Live & Support and is supported by a role based by access to tools and resources that are related to the implementation task in hand. Other ERP system vendors such as Microsoft Dynamics (formerly Microsoft Business Solutions) and Infor Global Solutions tend to adopt similar implementation and integration methodologies that are optimised for their specific products and customers. The larger ERP vendors also offer industry specific solutions that ensure the integration and implementation effort caters for the specific needs of certain major industries; such as; Construction, Distribution & Logistics, Education, Financial services, Government and public sector, Healthcare and pharmaceuticals, Manufacturing, Not for profit (e.g. Charities), Professional services, Retail and so on.

Process\Phase	Definition	Operational Analysis	Solution Design	Build	Transition	Production
Business Process						
Business Requirements						
Business Mapping						
Architecture						

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[5] The latest version of AIM is now known as Oracle Unified Method (OUM), to incorporate the best implementation practices from Oracle Inc.'s recent acquisitions such as the PeopleSoft and JD Edwards ERP systems.

Process\Phase	Definition	Operational Analysis	Solution Design	Build	Transition	Production
Design and Build						
Conversion						
Documentation						
Testing						
Migration						

Table 2-4 - Oracle's Application Implementation Methodology
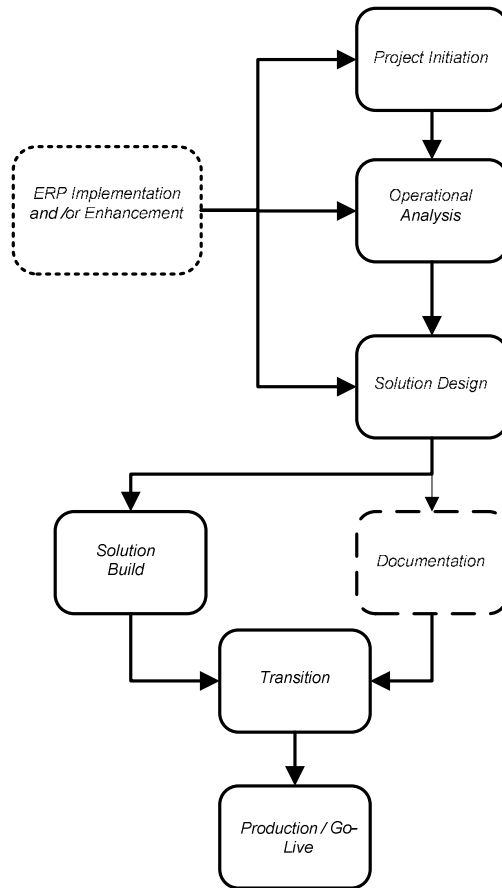
Figure 2-1 – Oracle Corp AIM Flow

2.3.   Impact of Enterprise Structure on ERP Implementation

Anand & Daft (2007), analyse the transition of organisations over time in particular in respect to Duncan's 1979 study. The question this study poses is whether ERP systems have kept pace. Under normal circumstances, an ERP system is licensed for use by a single legal entity which would fit the mould of the traditional "self-contained" structure. They report on work by Duncan (1979) of the self-contained design coming in three forms. Firstly, there is the functional form where operations are grouped according to business function; accounting, human resources, marketing and so on. The second structure is a grouping along divisional lines, where a division may be seen as a company within a company housing its own set of sub-functions and being responsible for contributing to the profitability of the overall organisation or enterprise. A third structure - the matrix "combines a vertical structure with a strong horizontal overlay". In all three cases the emphasis was on hierarchical control as well as functional specialisations. Duncan's work is classed as 'Era 1' organisation design.

The second Era ('Era 2') of organisation design, according to Anand & Daft (2007), started in the 1980s. The focus here was on removing the departmental silos within organisations and instead concentrating on the total satisfaction of customer needs. This was done either by creating self-contained "project" teams or organising alongside process lines, engineering processes so that all the capabilities required for satisfying a customer's needs are "linked-up". With the focus on the project or customer need the important thing was that "no internal boundaries" existed in meeting that need.

Becoming increasingly popular from the late 1990s onwards are what Anand & Daft (2007) call the 'Era 3' organisational forms. For the purposes of this review the terms pre Era 1 and 2) and post (Era 3) Internet eras will be adopted. Era 3 forms include Hollow, Modular and Virtual organisations and share the common characteristics resulting from an opening up of organisational boundaries – both internal and external. Era 3 forms often meant identify functions and or processes that could be better performed by other organisations, for whatever reason, usually due to lower cost or superior competence, and "outsource" that activity. This could include manufacture of a component, a whole product, an entire

business, such as research and development, marketing; or parts of a process such as data entry.

Proposition 1: Whilst ERP systems are comfortably able to support Pre-Internet Era organisational designs, Post-Internet Era forms are not readily supported.

Binder & Clegg (2007b) recognise Era 3 above as representative of new organisational structures, where an enterprise comprises of more than one legal entity, and present a more detailed explanation of this organisational form. Adopting the term "enterprise" as earlier defined to depict instances of structure where different parts of different companies can be brought together to make up a new operation, either for a one-off project or a long-term collaboration. Using a combination of empirical research in the German automotive industry and an examination of literature, their study sought to present a conceptual framework for these enterprises. Principally, the framework advocates that enterprise management should seek to strike a balance between exogenous and endogenous approaches to managing prevailing core competencies within an enterprise. Referring to the practice in which some managers focus on the internal operating environment of an organisation whilst others focus on managing their external resources. They further argue that there is no trade-off between these approaches, but are parts of a strategic continuum on the basis that the priorities of organisational structures are constantly changing and the significance of each participant's role in an enterprise is also under constant change.

The pertinent conclusion that can be drawn from this study is that a single legal entity may find itself being a participant in an extended enterprise, a virtual enterprise or a vertically integrated enterprise and this can be the case either simultaneously or serially. On the assumption that the organisation will not or cannot implement a new ERP system for each role it plays, the question is then how to implement the system in such a way that it is not forced to manage these activities outside of the ERP system.

Proposition 2: ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios.

This review referred earlier to a seminal paper by Robert Duncan (1979), wherein Duncan potentially highlights a distinction between how theorists and managers view structure.

Duncan posited that managers viewed organisation structure in terms of being either functional or decentralized. He cited this as contrasting with views of organisational theorists, principally Weber (1947) and the Aston studies (Pugh and Hickson, 1976) though neither is cited, who view structure as "more or less" formalised, standardized, centralised, hierarchical or specified. Duncan mentions some structural design factors, which whilst relevant for this study, were not addressed in Anand & Daft's review of his work. These are important for an organisation's reward structure, managerial responsibility, managerial authority to make decisions and the need for information flow across operating units – these are what Binder & Clegg (2006) would term endogenous factors. Exogenous factors which Duncan highlights the importance of include; the regulatory framework in which enterprises have to operate, the dynamism of the business environment, the pace of technological change, widening of competitive environment and the ever increasing scarcity of resources particularly capital and raw materials. These factors are equally relevant in the context of ERP systems adoption and implementation.

Proposition 3: ERP implementation must provide management information for the explicit management of enterprise design factors and design types.

2.3.1.   ERP and Change Management

Implementing an ERP system is, for any organisation, a major change initiative. By their nature, a new ERP system involves creating linkages between business processes that had, hitherto, existed in discrete departmental or divisional silos. A new organisation will necessarily emerge and this will result in (Lambert and Peppard, 2003) a change from a functional to a process-based orientation, a need to develop and introduce new ways of working and a need to redefine roles and responsibilities in line with the introduction of the new system.

To be more certain of success, an ERP implementation must be cognisant of and overcome barriers to change. Foremost amongst these is top management support (Young and Jordan, 2008). Agreeing with Young (2008), this thesis argues that it is management that is responsible for overcoming any other identified barriers to change. If top management is not engaged with the whole change process other barriers will be left to hold sway (Jarrett,

2008). Known barriers to change, some or all of which may feature in an ERP implementation include:

- Having an awareness and understanding of what needs to change
- Being motivated to embrace change and modify behaviour
- A willingness to acquire the new skills required to exploit change
- Having the flexibility to overcome practical problems change may bring.

The literature acknowledges that first and foremost the best way for management to show support is to adopt the most appropriate change management style, not just for the whole change initiative but for each change situation. Such an approach means that management will be more effective in ensuring that forces in favour of change overcome those more likely to result in resistance (Aladwani, 2001, Aladwani, 2002).

A key feature of change management, in addition to adopting an appropriate management style, is having the right balance in the project team structure, including the important aspect of where power lies in change leadership. A fully project based team places the balance of the power with the project manager whilst a fully functional team places the balance with the functional and operational management.

2.3.2. ERP and Business Process Re-engineering

The previous section saw the implementation of ERP as a major change initiative requiring top management support and the adoption of appropriate change management methodologies. It is the role of the practitioner to support top management in that regard. Equally important is the need to offer guidance in enabling the necessary business process changes that ERP implementation demands. It is known that unless it is entirely bespoke, no ERP system will be an exact fit for any organisation (Morton and Hu, 2008, Wang et al., 2007, Wu et al., 2007). This necessarily requires change(s) or customisation to the system or re-engineering of business processes.

The practice of business process re-engineering gained prominence in the 1990s (Hammer, 1990, Hammer and Champy, 1993, Hammer and Stanton, 1999), and a vast body of literature has built up from that time (Huq et al., 2006, Koch, 2001, Maull et al., 2003, Yusuf et al., 2006). This slightly pre-dates the time when impetus to embrace ERP was at its peak, around the Y2K bug, by which time Hammer himself had acknowledged that BPR had

become a "euphemism for mindless downsizing" in some aspects. However, BPR is still very much a key management activity, re-branded by the big consultancies as Business Transformation.

Business transformation is the practice by which organisations seek to align human resources, business processes and (information) technology. Here again, the importance of the enterprise structure should be noted. BPR requires identification of a process owner with real power and authority over the design of new or modified business processes (Hammer and Stanton, 1999). The very definition of a process owner means a manager, who no longer views the enterprise as a set of discrete tasks undertaken within finite boundaries, but rather activities that transcend divisional and enterprise boundaries. In the context of the new organisational forms, including enterprises, this means that BPR can result in demanding that changes to be made to the way things are done to those parts of the process that reside in a separate legal entity.

Proposition 4: ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits.

2.3.3. Contingency theory and the Aston studies

Early studies on enterprise structure carried the impression that once adopted an enterprise's structure was rigid, Contingency theory posits that enterprise structure should be regarded as a contingent variable, wherein managers choose whatever structural formation to their prevailing circumstances. There was no concept of the ideal structure. For an enterprise to be effective it must attain an ideal fit between its structure and any number of contextual factors. As these contextual factors vary from time to time, so the enterprise must be structured to each variation as effectively as possible. The Aston Studies (Pugh and Hickson, 1976) found from empirical research that there were 'three' structuring variables (specialization, standardization and formalization)[6] and that these tended to be highly correlated in any enterprise. They identified, amongst others, work-flow bureaucracies (structured but decentralised enterprises), personnel bureaucracies (centralised but

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[6] Variables defining the extent to which work is based on rules, procedures, systems, guidelines and policies, some or all have which can be embedded in an ERP system.

unstructured enterprises). However, they found that size was the most important contingent variable and had a major effect on enterprise structure in that the larger the enterprise the more likely it was that it would adopt a more centralized and structured form. Accordingly, this also has implications for ERP implementations, in terms of knowledge constraints and difficulties experienced in adopting changes imposed by ERP adoption (Laukkanen et al., 2007, Mabert et al., 2003). Other notable contingent variables identified in the literature are technology (Woodward, 1965, Perrow, 1970), the economic, political and social environment (Donaldson, 2001, Khazanchi, 2005),

Proposition 5: Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed.

2.3.4.   Structuration, embedded structures and modelling the enterprise

There is a contrast to another view from the social sciences, wherein researchers give primacy to the power of human agents to influence social phenomena by adapting processes and the researchers that take the view that social structures (context) have profound impact on social phenomena and organisational shape. Structuration theory (Giddens, 1986 , Orlikowski, 1992), takes the view that context and structure are an interacting duality. Agents build, use and reproduce social structures through their actions, but at the same time these actions are empowered and constrained by their structures (Chu and Smithson, 2007). Enterprises considering ERP use would then need to ensure that structural contradictions do not undermine the system. For instance, if a new structure is embedded in the ERP system before that structure had become normalized within the enterprise itself, the system will become a source of both conflict and confusion.

According to Orlikowski technology has been conceptualized as the product of human action, both during its creation by developers, and when it is subsequently appropriated and modified by users (Orlikowski, 1992, Orlikowski, 2000), and this is also true of ERP systems which aim to automate core business processes. They are developed by vendors who draw on their existing sources of knowledge, resources and norms (Soh and Sia, 2004). The extent to which the package embedded structures differ from those of the implementing organisation will depend on differences in their operational and environmental contexts.

Some researchers (Dillard et al., 2005) liken this embedding to inflicting "administrative evil" on ERP users. They assert that administrative evil results from an abdication of responsibility that is fostered by the absence of individual accountability for the ultimate outcome of organisational action. The abdication of responsibility begins with accepting the legitimating authority of the organisation and is reinforced as individuals act and react within the legitimating context. Organisational processes and practices are embedded within, legitimated and facilitated by organisational hierarchy.

As ERP systems gain in complexity, maintenance and upgrades become major tasks in their own right. Often it is not feasible to replace whole ERP systems in a single exercise. The task of "upgrading enterprise systems could be comparable to upgrading physical products" (Wortmann and Szirbik, 2001). It is argued that "current enterprise information systems provide excellent integration between different functional areas (Wortmann et al., 2000). Depending on who the parties involved in a business process, there can be considerable variations for the same business process. For an Internet era enterprise, this complexity is multiplied. To mitigate this, the profession of enterprise modelling has emerged. The enterprise model would provide a map of the enterprise to be ERP enabled, providing details of business process variations and the business functions that are required to fulfil them, organisations that make up the enterprise and the controls that are applicable to each. The main argument in favour of modelling is that the whole system should be capable of referencing the application software run-time, "in order to find the right business processes, organisational structures and resources." System behaviour should be referenced to the model of the entire enterprise. The argument here is that enterprises are dynamic, continually evolving, the fully supportive enterprise system must also continue to evolve.

Proposition 6*:* Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process.

2.3.5.   Enterprise Structure and the acquisition process

The issue of enterprise structure also plays a significant part in the ERP application acquisition (search and selection) process. This process has been broken down into six stages (Verville et al., 2005); planning, search, short listing, evaluation, choice and negotiation

stages. In their study Verville et al identify ten factors critical to the acquisition process, these are grouped as to whether they relate to the acquisition process itself or are related to the people involved in the process. Their research findings suggest that "a clear and unambiguous authority was essential to a successful [acquisition] outcome". This again suggests that structural factors have an ERP impact well before the implementation stage. Factors concerned with how much authority is vested in the acquisition process are highlighted as important, however how other enterprise structural factors interplay in this process are not addressed. Without consideration of all factors, the acquisition team may still inadvertently confer a legacy on the overall project that is not easily overcome during the implementation phase.

2.3.6. Other structural considerations

In recent years organisations have made structural adjustments in other ways. For instance, non-core operational activities are aggregated and either combined into a specialist division or service centre; or in some cases are wholly outsourced to a third party. In some cases these were in response to the trend of creating **lean** organisations, where bureaucracies are 'delayered' and junior positions in the hierarchy are empowered to make and take decisions (Womack et al., 1990). Lean was a precursor to the outsourcing strategies of recent years, where major processes and operations are placed with external partners. Lean enterprises were essentially horizontally designed. Five principles underpin the **horizontal** structure; organisation is around complete workflow processes, hierarchical differences are diminished and work is carried out by teams, team leaders manage processes and coordinate work, team members are customer facing to be able to adapt quicker and finally, access to outside expertise is well facilitated.

The outsourcing phenomenon is a big trend of recent years (Bianco and Anderson Frost, 2003, Engardio et al., 2003, Jonas, 1986, Hagel III and Singer, 1999), where work normally done internally is outsourced to outside partners. This is deemed to embrace three design principles; business processes are reclassified as core and none-core to the enterprise, market forces are harnessed to find the best partner to take over none core processes and an effective and flexible contract is but in place to align incentives between the enterprise and the **outsource services provider**. Outsourcing tends to conform to functions, for

example, logistics, advertising, human resources, and so on. A related phenomenon is where the development of whole pieces of a product are outsourced in what is termed modular enterprise structure design (Sanchez and Mahoney, 1996, Schilling and Steensma, 2001).

Establishing Shared Service centres (SSCs) have gained prominence as half way structural solution between classic structures and using outsource services providers (Janssen and Joha, 2006, Redman et al., 2007). This is particularly the case for large multinational enterprises with business activities on a global scale. More recently enterprises that operate many business units within a single country have also adopted the SSC model. The aim is to improve efficiency by unbundling and centralizing activities, the basic premise for SSCs seems to be that services provided by one local department can be provided to others with relatively little additional effort or resources. It is also argued that the "panoramic view" afforded an SSC greater opportunities for reengineering" (Forst, 2001). The introduction of a SSC is a major decision having a long-term impact on all the participants and is often competing with outsourcing arrangements. Structurally, the promise of a SSC comes from the hybridization of traditional models aimed at capturing the benefits of centralized and decentralized arrangements (Bergeron, 2003). As such it is essential to get a better understanding about the impact the introduction of SSCs for ERP implementation. Implementing an SSC is no simple task and calls for changes in business processes amongst other things, which the ERP system will have to handle (Bangemann, 2004).

Proposition 7*:* ERP systems are sufficiently robust to cater for contemporary organisation structures, provided they are 'designed' into the implementation at the outset.

2.3.7.   Virtual enterprises and extended enterprises

In today's highly dynamic and complex environment with competition on a global scale and rules and regulations changing constantly, few companies can manage to go it alone. The pace of technological change and the need to be competitive being far outstripped by the research and development time lag, companies find that partnering and alliances are the only way to retain or even gain competitive advantage.

A **virtual enterprise** is one created outside its parent, usually in collaboration with one or more partners, a temporary alliance of parts of different companies formed to exploit fast-

changing opportunities specifically to respond to an exceptional and often temporary market opportunity (Brown and Eisenhardt, 1996, Gou et al., 2003, Cao and Dowlatshahi, 2005). This is an enterprise assembled based on cost-effectiveness and product uniqueness regardless of organisation size or geographic location. As a result, costs, skills, and core competences are shared, thus enabling the enterprise as a whole to offer world class solutions to global markets that individually could not have been provided (Whitman et al., 1999). Whitman et al, discuss how the concept of an **extended enterprise** evolved starting with localized shop floor improvements, to improvement and collaboration within supply chain management and finally to the extended enterprise, especially within more complex industries. They argue that a single company can no longer provide maximum value to today's demanding customer and thus propose an extended enterprise model based on the three categories of business processes proposed by Presley *et al* in Whitman *et al*.

Based on their model, the operation of a process oriented and highly flexible extended enterprise mandates that all activities, information, resources and organisational issues be carefully integrated. Extended enterprises should be perceived as transient enterprises formed and dissolved based on dynamic market opportunities (Kanter, 1999). Accordingly, Whitman et al (Whitman et al., 1999) describes the virtual enterprise as a *"temporary relationship with two or more participants which is formed, operated, and dissolved to accomplish specific short term goals and differ from existing inter-organisational models by the degree of shared accountability and responsibility of the participants and the structure by which participants contribute their competencies"*. The key nuance of this description is that the objective of the collaboration is goal specific and short term.

Overall, according to Brunelle (2009) the literature offers three discernible views of virtualness; commercial where all business is conducted over the internet as with Amazon.com; internal where work is organised to be done without conventional offices; and strategic where activities are organised to give the appearance of a traditional organisation structure. Choe (2008) lists certain characteristics of the virtual enterprise to include *inter alia* a focus on participants core competences, legally independent partners and a limited lifespan, though the applicability of the latter to Amazon.com is open to debate.

The **extended enterprise** (Bititci et al., 2005, Krishnan et al., 2007, Tam and Tsang, 2007) is viewed as focusing on medium to long-term enterprise relationships across value chain(s) or partners, an enterprise represented by all those organisations or parts of organisations, customers, suppliers and sub-contractors engaged collaboratively in the design, development, production and delivery of a product to the end user. This includes both inbound supply chain and outbound logistics chain. This is further defined by Jagdev and Thoben (2001b) thus;

> The extended enterprise can be regarded as a kind of `enterprise' which is represented by all those organisations or parts of organisations, customers, suppliers and subcontractors, engaged collaboratively in the design, development, production and delivery of a product to the end user.
> Key suppliers become almost a part of the principal company and its information infrastructures, with frequent exchange of status information. This is echoed succinctly in the definition of extended enterprise given in Jagdev and Browne (1998) as: the formation of closer coordination in the design, development, costing and the coordination of the respective manufacturing schedules of cooperating independent manufacturing enterprises and related suppliers. The keyword in this definition is the `coordination of the respective manufacturing schedules'. This coordination of respective schedules, which includes not only the production schedules but also the dispatch, transportation/delivery and receipt notifications, is supposed to be performed seamlessly through the usage of ICT technologies, is a necessary condition for the formation of extended enterprise. Because, only then one can truly realize the integration of respective IT infrastructures, which again, is a necessary condition for the formation of extended enterprise.

In their paper of 1999, (Browne and Zhang) distinguish between extended and virtual enterprises though concede that both share many similar characteristics – for instance the formation of relationships between individual partners or companies to achieve business success in a competitive business environment.

The virtual enterprise is viewed as being a temporary consortium of independent organisations working together for a short time period to satisfy a niche market demand. This is an enterprise assembled based on cost-effectiveness and product uniqueness regardless of organisation size, geographic location. As a result, costs, skills, and core competences are shared, thus enabling the enterprise as a whole to offer world class solutions to global markets that individually could not have been provided (Galbraith, 2002).

Accordingly, the success of both types of enterprise depends on intensive information sharing. Browne and Zhang further distinguish between the extended and virtual enterprise in highlighting their business focal point – with the extended enterprise focusing on product value chain while virtual enterprise is usually project based.

However, Nayak *et al* (2001) in a white paper, further describe the virtual enterprise in terms related to the types of systems required to support their activities. Production oriented virtual enterprises are intended to support an end to end supply chain, it spans multiple enterprises engaged in either discrete or continuous manufacturing. The other form is project oriented and involves activities such as construction, consulting, movie-making. In project oriented virtual enterprises delivery to the customer is either via the use of a coalition of enterprises as suppliers, often by outsourcing the project to an integrator, or by buying in the services of different suppliers and assuming the role of integrator. Once the project is completed the 'enterprise' is disbanded, but may reform in a different guise for further projects, its composition depending on availability of participants and possibly past experience of performance.

The management and operation of the virtual enterprise will be similar to that of any project. The 'team' will be supported by both application service providers and business service providers, who can be full coalition members or another set of vendors depending on their capabilities, competencies and level of involvement. Equally dissolution of the virtual enterprise could be along project management lines, with a post completion review and other learning actions. Some of what is learnt is how to decide on future compositions of new enterprises. In some cases if the experience has been a positive one, it is not unknown for the enterprise to take on a form of permanence in the form of incorporation or the formation of limited liability partnerships. For the practitioner, implementing ERP into a virtual environment presents problems such as how to allocate responsibilities and what rules to impose on different partners in the enterprise.

Extended enterprises span company boundaries and include complex relationships between a company, its partners, customers, suppliers and market (Martinez et al., 2001). The organisational aspects of an extended enterprise can be summarised as globalisation of exchanges, subcontracting and partnership. Companies in an extended enterprise must co-

ordinate their internal systems (intra-organisational activities) with other systems in the supply chain and further must be flexible. These characteristics are not easily co-ordinated in the context of ERP. This researcher takes the view that as all economic activity must be represented in the participants ERP systems, some of the problems to be resolved prior to its representation in the ERP systems include:

- How to design and allocate roles and responsibilities in the enterprise structure and into partner firms
- Which set of rules to embed in the enterprise system as these may vary from one organisation to another
- What level of autonomy to afford each partner that may access the system
- What communication protocols to adopt between partners or between the enterprise and the customer
- Selection of an efficient control policy of the implementation phases.

Table 2-5 below summarises the key attributes, relevant to enterprise systems, that an enterprise needs to portray to classify as an extended enterprise, presented alongside the attributes for vertically integrated (VIE) and virtual enterprises (VE).

Characteristics	Enterprise structure		
	Vertically integrated enterprise (VIE) (Linked Enterprise)[7]	Extended enterprise (EE) (Partner Enterprise)	Virtual enterprise (VE) (Autonomous Enterprise)
Core competencies	Mature, well accepted, tested and widely usable	Tested to some extent, medium risk, has had some testing, understood by innovators	Newly emerging, speculative, untested, high risk, require many members to spread risk
Main drivers	Control	Focus on outsourcing core competencies. Virtualisation tendencies. Experience of existing partnerships	Profitability as main goal for linking. Core competencies and outsourcing. Can be disruptive
Prerequisites	Large financial resources. Strategic plans for acquisition	Moving beyond supply chain structures. Open-minded management. Strong capability in outsourcing	Operational agility and flexibility for infrastructure commercially, technically and organisationally
Duration of relationship	Foreseeable as permanent as long as competitive	Medium–long-term	Short-term temporary alignment of operations
Scope of relationship	Unity of command and control. Focus on scales of economies rather than on extension and virtualisation	Often spans whole product life cycle across company boundaries. Strategic and pro-active	Project based to quickly exploit specific opportunities across company boundaries Present a unified face to externals. Companies participate in other VEs simultaneously for more power and maturity. Temporary, re-active and loose governance
Operational challenge	Emphasis on removal of legacy systems.	Core competencies must be synergistic to the whole enterprise. Design and implementation of business processes may create future VEs.	Operating in a dynamic and unpredictable environment Decision of allocating resources depends on competitive and comparative

[7] This column has been retained from the original table for the purpose of completeness

Characteristics	Enterprise structure		
	Vertically integrated enterprise (VIE) (Linked Enterprise)[7]	Extended enterprise (EE) (Partner Enterprise)	Virtual enterprise (VE) (Autonomous Enterprise)
	Standardisation and corporatisation	Compatibility among partners' IT systems and cultures critical. Look for market opportunities - create value members	advantage. Tactical combination of core competencies. Right balance of exploration and control in operations
Facilitators	In-house development of proprietary systems	Advanced IT Effective electronic management. Use of middleware	Integration of IT. High use of intermediaries and trusted third parties
Critical issues	Tend toward industrial dominance	Collaboration, technology and knowledge management becomes critical	No stability. Collaboration (agility, flexibility and leanness) is important
Main features	External trust low. Inflexible. High overhead. Large scale of economy. Tall hierarchy	Common strategy-hollow out the corporation Trust, loyalty and integration high Maturing 'Meta systems'	Low overhead. Flat organisation-no hierarchy. Rapid changes Core competencies must cooperate and compete. 'Meta-systems' are used

Table 2-5 - Characteristics of Enterprise Structures (Binder and Clegg, 2007b)

2.3.8. Critical success factors

The challenge of successfully operating an enterprise comprised of collaborating organisations involves consideration of some of the following factors (Jagdev and Thoben, 2001b);

- The partners in the enterprises are willing to form medium to long-term relationships and treat each other as business partners. Each partner understands and accepts other's requirements and priorities

- Within the scope of collaboration, partners share vision and work towards shared goals

- The decisions are jointly arrived at by making best use of the competencies among the partners

- The primary mode of communication and sharing of information between the collaborating enterprises will always be through electronic exchange of information and communications. It is, therefore, important to have available advanced ICT tools to support the extended enterprise (Thommessen, 1996, Choe, 2008)

- The efficiency of the extended enterprise is greatly determined by the speed and efficiency with which information can be exchanged and managed among business partners. Efficient collaborative engineering, production and logistics require effective electronic management of engineering and production information. Thus it

is important that the participating enterprises have sufficiently sophisticated IT and decision support tools and mechanisms to make the integration possible. It is also important to have the maximum degree of compatibility among partners' IT systems

- Day-to-day communications between the respective IT systems of two enterprises will always be real-time and on-line and without human intervention. For example, if there are production schedules' perturbations by the `customer', these changes will (and should) be automatically communicated to the `supplier's' enterprise IT systems. Thus, triggering the processes necessary for updating of production schedules at the `supplier' end

- Extended enterprise can occur between any two organisations across the supply chain of any product or service. Organisations across the whole value chain can be involved in the extended enterprise. However, formation of an extended enterprise does not need to comprise the entire supply chain

- Technology permitting, extended enterprise can take the form of a complex network where each organisation can be seen as a provider of valued step in an overall supply chain

- The relationship between collaborators in an extended enterprise can be hierarchical or non-hierarchical

The primary challenge of operating an extended enterprise, and or a virtual enterprise is a managerial one. There is a dynamism in operating such coalitions that calls for agile management; to set the direction for the enterprise, acquire resources, and transform those resources to produce output and result. Whitman et al, explore the development of dynamic models that can provide useful description and analysis of the managerial complexity that extended enterprises present and represent. Chief amongst these complexities is the need to model processes that are performed by other enterprises, but which the extended enterprise is responsible for delivering.

A further challenge common to both virtual and extended enterprises is the role of information and communications technology (ICT) in facilitating, enabling and supporting the coalition. The intensive sharing of information is a vital ingredient in the success of these coalitions. It's essential that the information allows for the transparency of business information which can be kept securely but can also be accessed easily and seamless by any authorised employee of a coalition member.

In the case of the virtual enterprise which Brown and Zhang view as being a more 'quick-creating and quick-dissolving organisation' the ICT need is more critical, where success depends on having transactions processed rapidly and accurately. Nayak et al (2001) expand on this theme by breaking down the technology requirements into categories as follows;

- The technology layer, described as infrastructural technology such as email systems and web application servers

- Business-to-business integration, providing applications that facilitate secured collaboration

- E-Marketplace, where administrative and content-related functions; such as catalogues and market analysis, are supported

- E-Commerce, ICT to support commerce and transaction-related processing functions

- Dynamic E-Business level, where headline services are provided and supported, these centre on the coalition formation and operation, for instance, business registration information

- Collaborative Processes level, providing ICT applications to support business processes across corporate boundaries, for instance collaborative product design, order fulfilment and project planning.

The implications of these definitions for information systems strategy formulation will be reviewed further with an analysis of the key components and issues to be addressed in the review of the literature on that area.

Still a further challenge to be overcome is related to integration of the various organisations. The concept of **organisational integration (OI)**, the extent to which distinct and interdependent organisational components constitute a unified whole (i.e., the enterprise), is as yet not well understood, but its significance is slowly being addressed (Barki and Pinsonneault, 2005). Due to recent advances in information technologies and to heightened competition, today's firms are engaging in unprecedented levels of large scale integration endeavours that take a variety of forms (Markus, 2001). This is further explained by using the process chain of the organisation as an overarching concept to identify different types of OI. A distinction can be made between the integration of the processes that are internal to an organisation and those that are external. In addition, the integration of primary processes (i.e., those that directly produce an organisation's outputs) can be distinguished from the

integration of secondary processes (i.e. those that support the primary activities). That is, an organisation's internal and external processes can be further differentiated according to whether they pertain to the primary activities or the secondary activities of the process chain. External operational processes can also be separated according to whether they are directed forward into distribution and clients, backward into supply, or laterally into partially assembled products or parts.

Proposition 8: Greater effort is required to implement ERP systems to support the virtual or extended enterprise (Internet era enterprises) in its purest form as they are not bounded sufficiently for ERP configuration purposes.

The most cited motive for participating in an extended enterprise was the need for external resources (Greis and Kasarda, 1997, Davis and O'Sullivan, 1999, Prahalad and Ramaswamy, 2000, Stock et al., 2000, Edwards et al., 2001). In addition, concentration on core competences was argued to force companies to acquire production resources from outside the organisation (Jagdev and Thoben, 2001a, Browne and Sackett, 1995, Thoben and Jagdev, 2001). Further, increasing competition was argued to drive organisations to form extended enterprises (Jagdev and Browne, 1998, Rezayat, 2000, Chan and Chung, 2002). The effects of competition were described as the need to shorten launch and lead times, increase flexibility of production, and shorten production runs (Thoben and Jagdev, 2001, Lin et al., 2000, Radovilsky, 2004).

Other motives cited for participating in an extended enterprise were related to changes in organising production. Customer participation in value creation was argued to increase with phenomena such as mass-customization (van der Vlist et al., 1997, Prahalad and Ramaswamy, 2000). Combining these changes with the need to manage the product's lifecycle was considered to drive companies to form extended enterprises (Ferguson and Browne, 2001, Browne and Sackett, 1995). Finally, according to Chan and Chung (2002) the formation of extended enterprises may also be motivated by a need to exercise control outside the boundaries of an individual firm.

Proposition 9: Each participant in internet-era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers.

2.4.   ERP and Enterprise Structure in context

2.4.1.   IT and Enterprise Structure

Lucas & Baroudi (1994) state that it is IT, and by extension ERP, that has made new organisation structures possible. The motivations for management needing to redesign structure include; a merger or acquisition, a major crisis such as a major loss or a product failure, bankruptcy or regulatory or legal imperative, for instance from competition authorities. In most cases the imperative to restructure and return to competitive activities with the minimum of disruption is a design imperative. They point to how IT has made it possible to use EDI (similar to modern day e-commerce) to link to a third party manufacturer such that it can supply inventory of raw materials as it is needed (just-in-time); how electronic mail and video conferencing has enabled links both within and across entity boundaries thereby supporting both teleworking and transnational reporting lines and how IT can be substituted for managerial layers, eliminating some layers entirely, for example in some companies expenses up to a certain amount are approved without any direct management oversight.

Sampler (1996) offers the following perspectives on the relationship between IT and organisational structure:

- IT leads to centralisation of organisational control (Leavitt and Whistler, 1958)
- IT leads to decentralisation of organisational control
- IT has no uniform impact on organisational control, relationship determined by other factors
- Organisations and IT interact in an unpredictable manner
- IT enables new organisational arrangements such as networked or virtual organisations

Proposition 10: ERP can be explicitly deployed to reinforce intentionally restrictive management practices and policies, thereby increasing the scope for collaboration.

2.4.2.   Organising ERP for the Internet Era Enterprise

For the internet era enterprise communication and information sharing plays a major role (Swanson, 2010a). However, ERP application software is traditionally licensed for the use of a single organisation and end users from that organisation, which raises the question of how to organise the use of ERP in an internet era enterprise (Swanson, 2010b, Aston University

Research Committee, 2010). There are key issues surrounding ownership of enterprise knowledge (the ERP database), especially in the event that one enterprise withdraws. These issues include organising ERP infrastructure, controlling access to enterprise data, and decision making with regard to business processes and system configuration. A possible solution is that one organisation must always take the role of broker or organiser, (Clegg and Ajayi, 2009, Meredith, 1998b), with responsibility for policing the ERP rules of engagement of enterprise members. Currently, the main ERP innovation of the internet era is in how ERP software and applications are delivered to customers. Both Oracle and SAP, for instance, have now embraced Software as a Service by offering "On-Demand" versions of their applications, a form of cloud computing, where the software vendor both provides the applications software and manages its use. However, the licensing for these services and products remains as for single organisations.

2.4.3. Enterprise Management and Governance

Enterprise, as defined in this study, can manifest in different "constantly changing" forms (Neubert et al., 2004), whilst Fine et al (2002) point out that competitive advantage is usually temporary; both of which point to the constant need to shape and reshape the enterprise or at least keep its structure under constant review. Managing that review is the role of the broker or enterprise coordinator[8], the only constant likely to exist within the enterprise. Though some studies contend that in due course, enterprise structure emerges (Choi et al., 2001) with no one organisation deliberately dictating its shape, just as the structure of an organisation ultimately emerges regardless of the intended design (Mintzberg, 1979), the existence of an enterprise coordinator, would counter that argument to a degree. Equally, this study argues that managing the information management needs of the enterprise, in particular from an ERP system will also be the domain of the enterprise coordinator. To that extent governance is crucial to the deployment of ERP systems. Governance is about providing strategic direction, planning and controlling the use of systems and people who use them. An understanding of enterprise structure is central to good governance.

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[8] The preferred name adopted by this study.

The Collaborative Enterprise Governance (CEG) is used in this study, as the methodology can be used for analysing enterprise structures and their strategies. The methodology looks at how the design, contingency planning and management needs of an enterprise evolve, and by extension, this study argues, that its information needs from a system such as ERP will similarly evolve. Inherent in each stage of evolution, is a state of uncertainty "leading to the information processing needs of a dyad" (Bensaou and Venkatraman, 1996).

Proposition 11: The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty.

The CEG conceptual framework proposes that an individual organisations core competences are presented to the enterprise as enterprise modules (individually deliverable goods or services), which combine in collaborative activities within the enterprise. A tool, the Enterprise Matrix (Figure 2-2), is used to in map the various enterprise modules from the different value members – (i.e. collaborating organisations). This work suggests that the content of the enterprise module could influence the importance and value of the management information contained in the ERP system.

Collaborative activity:		value stream			
		Process start ⟶			Process end
Enterprise Environment		*Stage 1*	*Stage 2*	*....*	*Stage n*
high involvement ↓ **Value members** ↓ *Low involvement*	*Member 1*	*Enterprise module delivered by member 1 in stage 1 of the value stream*			
	Member 2				
	...				
	Member n				

Figure 2-2- The Enterprise Matrix:[910]

As mentioned earlier, the essence of the post Internet era enterprise is its dynamism, the only constant being the enterprise coordinator, hence a further element of the framework is the understanding that value members can be swapped in and out of the enterprise (**engage-ability**) as the needs of the enterprise change. Equally, the nature of the relationship between enterprise members, both with each other and with the enterprise coordinator is subject to constant review and change. This is also likely to have significant information management consequences and the Enterprise Reference Grid (Figure 2-3) is another tool, from the framework, for analysing the prevailing enterprise structure and dynamic changes within it. The inference from this author is that analysis of the attributes of a competence will influence the extent to which information about the related activities will be desirable to carry in the ERP system, and will influence the level of detail required.

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[9] A tool for mapping value member contributions to an enterprise

[10] BINDER, M. & CLEGG, B. T. 2007c. Designing and managing collaborative enterprises in the automotive industry. *International Journal of Logistics: Research & Applications,* 10**,** 135-152.

Factors of analysis, both internal (endogenous) and external (exogenous) to the enterprise relationship, from the framework are as per the table below (Table 2-6).

Competence attribute	Exogenous and endogenous factors	Impact on engage ability (correlation
Transferability	Competence specificity (endo)	Negative
	Transaction frequency (endo)	Positive
Attractiveness	Marketability (market value) of competence (exo)	Positive
	Uncertainty of competence value (exo)	Negative
	Suitability of competence deployment (exo)	Positive
	Risk of competence deployment (exo)	Negative
Maturity	Advancement and sophistication of competence (endo)	Positive
	Sustainability of competence (exo)	Positive

Table 2-6 - Attributes influencing the engageability of competences in an enterprise

Figure 2-3 - The Enterprise Reference Grid

A further element of the framework gives recognition to the fact that the nature of the dyadic relationships, principally between the enterprise coordinator and enterprise members may also evolve in response to changing industrial (exogenous factors) and or relationship requirements (endogenous factors). The varying mix of these factors will take the nature of the enterprise relationship through an evolving cycle of enterprise structures

of Extended, Virtual and Vertically integrated enterprises[11], as shown in the figure below (Figure 2-4), and reflecting its full dynamism, through to dormancy or redundancy (Figure 2-5). In the event of redundancy, the question of access to enterprise data becomes an issue. Is a dormant or redundant enterprise member still entitled to access data pertaining to the period of their participation in the enterprise? This study will not attempt to address that question.
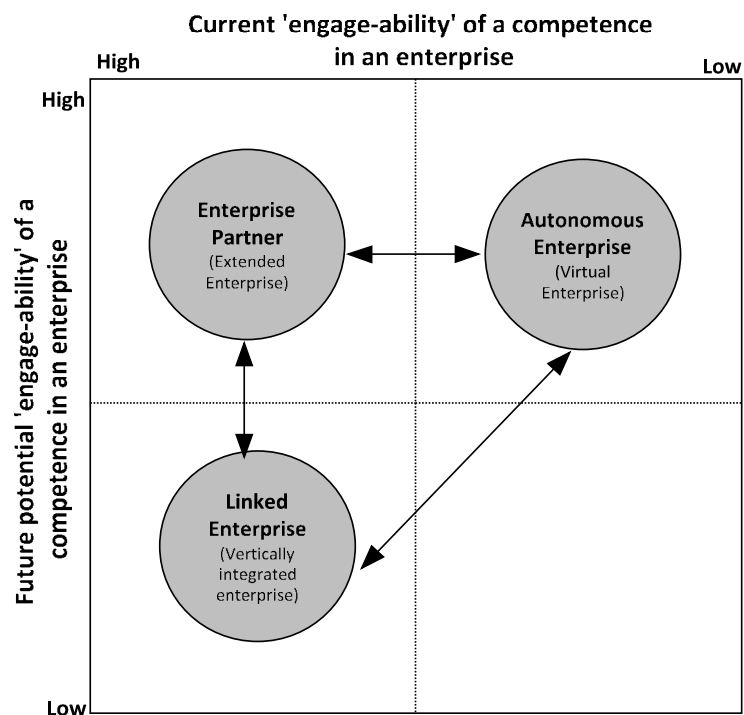
Figure 2-4 –Enterprise Reference Grid (Planned)

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[11] Each of these is defined earlier in this chapter.
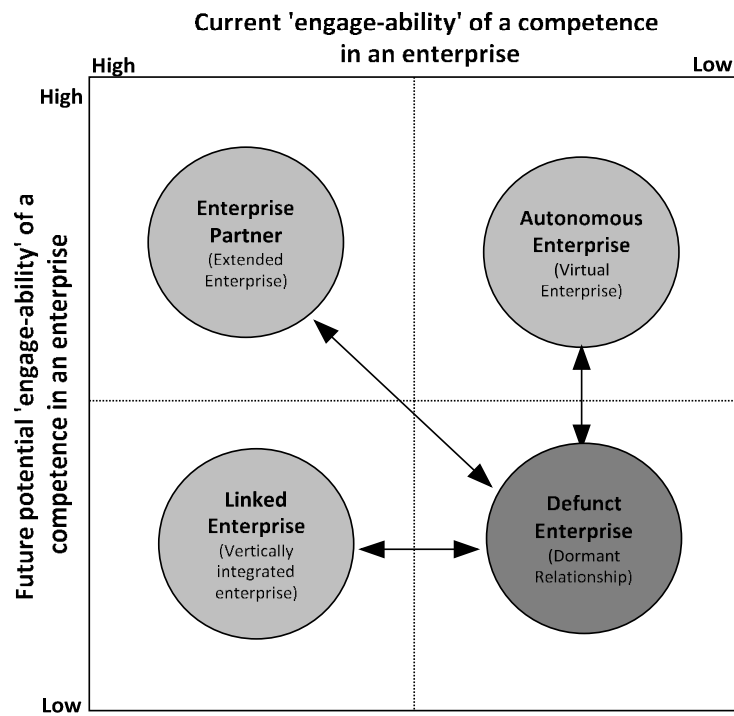
Figure 2-5 –Enterprise Reference Grid (Unplanned)

Conceived as a framework for the design and management of enterprises, the framework also serves as a useful tool for the analysis of enterprise structures for other purposes such as the deployment of enterprise systems, as in this study.

The full Collaborative Enterprise Governance framework, as adopted for this study, is summarised and shown below. Figures 2-4 and 2-5 overlaid, one against the other combine to create the **Dynamic Enterprise Reference Grid (DERG)**, this is shown in Figure 2-6 below as part of the overall Collaborative Enterprise Governance Approach.
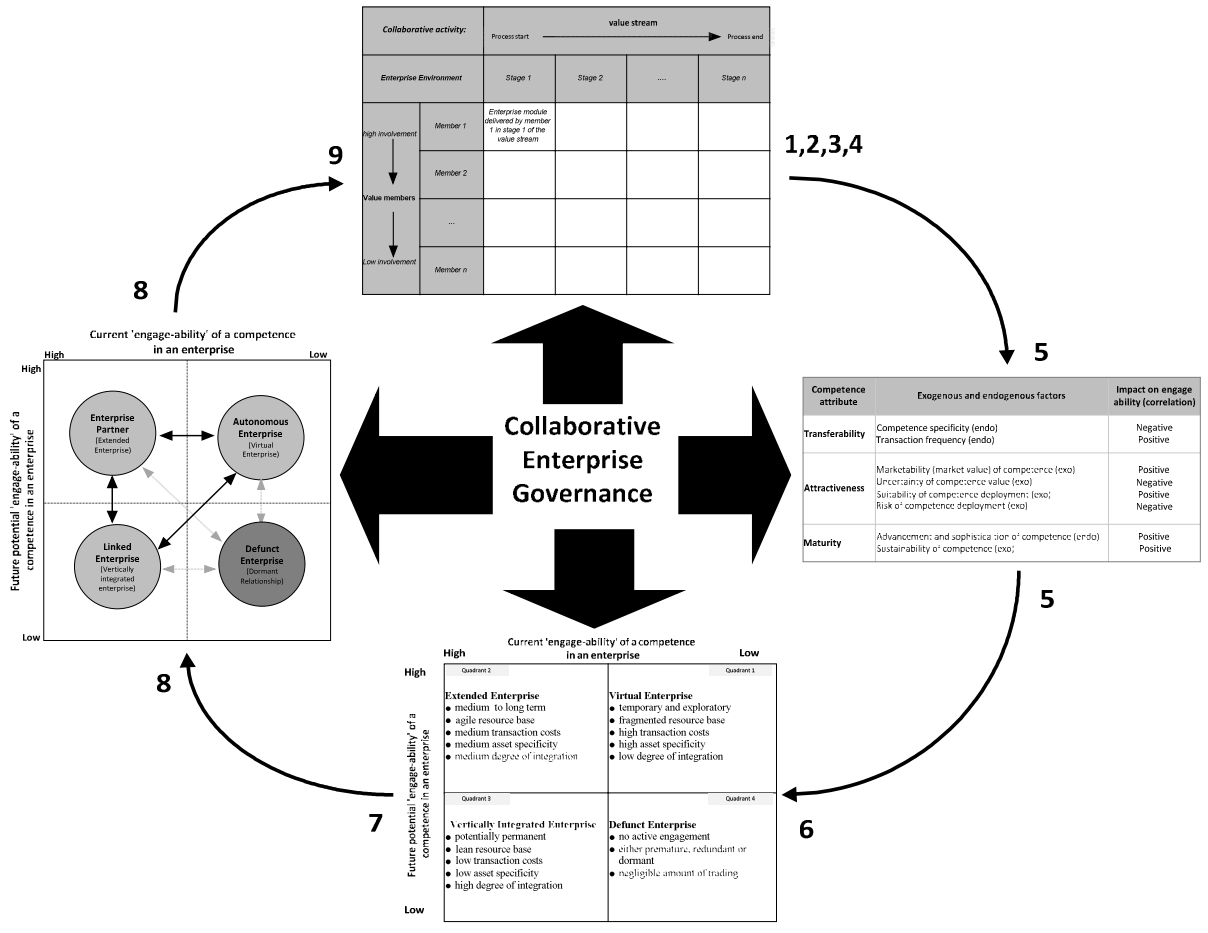
Figure 2-6 - Collaborative Enterprise Governance

Step	Analytical action
1.	Identification of a collaborative activity.
2.	Map value stream and value stream members.
3.	Allocate stages to members (based on value proposition).
4.	Assess engage-ability of value stream members.
5.	Determine engage-ability of value members based on transferability, attractiveness, and maturity of their competencies
6.	Select appropriate enterprise structure for the enterprise.
7.	Manage the enterprise according to selected structure.
8.	Adapt structure to change stimuli (exogenous) and relationship requirements (endogenous).
9.	Re-populate cells in the Enterprise Matrix, according to changed requirements and repeat steps 5–9. Re-evaluate Information management needs.
10.	Repeating the above steps for each new activity in the enterprise.

Table 2-7 - Collaborative Enterprise Governance analysis steps

The model recognises that an enterprise comprises parts of different organisations, each with different levels of significance to the enterprise, and that any relationship is never static. The Collaborative Enterprise Governance is used to explore the relationship between enterprise governance and enterprise structure, characterised by its use of organisation strategy. However, one limitation of the framework is that it does not explicitly look at how the deployment of ERP impacts enterprise structure and governance. By using the CEG as a point of departure for state-of-the-art research in analysing post Internet era enterprise structures this study aims to extend it to be able to reveal how enterprise structures impact ERP systems implementation, if at all, and *vice versa*.

The propositions raised by this literature review are summarised in Table 2-8 and used in this study to evaluate the issues raised taken through some selected cases.

2.4.4. Summary of Case Review Propositions

	Proposition	Informing authors
1	Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported	Anand & Daft 2007,
2	ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios	Binder & Clegg 2006
3	ERP implementation must provide management information for the explicit management of enterprise design factors and design types	Duncan 1979, Binder & Clegg 2006
4	ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits	Morton & Hu 2008; Wang et al. 2007; Wu, Shin & Heng 2007
5	Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed	Laukkanen, Sarpola & Hallikainen 2007; Mabert, Soni & Venkataramanan 2003
6	Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process	Chu & Smithson 2007; Dillard, Ruchala & Yuthas 2005.

	Proposition	Informing authors
7	ERP systems are sufficiently robust to cater for contemporary organisation structures, provided they are 'designed' into the implementation at the outset	Janssen & Joha 2006; Redman et al. 2007
8	Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes	Brown & Eisenhardt 1996; Cao & Dowlatshahi 2005; Gou et al. 2003
9	Each participant in these post- internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers	Barki & Pinsonneault 2005
10	ERP can be explicitly deployed to reinforce intentionally restrictive management practices and policies, thereby increasing the scope for collaboration	Lucas Jr & Baroudi 1994; Sampler 1996
11	The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty.	Bensaou and Venkatraman 1996

Table 2-8 - Overview of ERP enterprise structure propositions.

2.5.   Summary

ERP traditionally, is designed for the conventional organisational form wherein the organisation is bounded, has a legal form and employs all its own employees and is responsible for all the premises from which it conducts its operations. The difficulty has come in catering for the new organisational forms such as the enterprise, how to not only design an ERP system to cater for this, but then how to configure and implement the resulting application and its constituent ERP software application modules. An additional complexity is where a company is part of multiple enterprises. In other words, how one ERP system may cater for the multiple inter-organisational structures. The intended contribution of this study is from first principles (i.e. raw data – case studies) and uses Template Analysis to propose extensions to Collaborative Enterprise Governance and its Dynamic Enterprise Reference Grid specifically from an IS/ERP perspective.

3. RESEARCH METHODOLOGY AND DESIGN

3.1. Introduction

This study combines critical and prescriptive perspectives as a necessary means of making its contribution to the practitioner's toolkit. In addition to the methodology adopted and in recognition that action researchers are actors too, it draws on the author's own experiences as an ethnographic researcher to identify parallels between this researcher's own informing practices and those of the actors being studied. These parallels are intended to challenge the underlying assumptions of management practice. For this purpose an interventionist approach has been taken and a reflective, inductive and phenomenological stance has been taken during the subsequent analysis (that follows in later chapters).

3.2. Research Methodology

3.2.1. Introduction to Research Methodology

This section aims to explicitly explain the philosophical assumptions that underpin the approach adopted; discuss the research philosophy in relation to other available philosophies; explain the research design strategy and the research methodologies selected and develop a research framework from which to analyse the data collected in support of the research objectives. The significance of methodology is aptly put in the following quoted analogy (Sedmak and Longhurst, 2010).

> *"If we compare a research design to a building, then our understanding and views on the nature of knowledge form the foundation of that building, from which we build the rest. So the pertinent question is then: how we see reality and how we can gain valid and reliable knowledge about this reality. This is what is addressed by the method: in what way do we collect the data so that the findings are representative of (the) reality we are aiming to explore."*

3.2.2. Appropriateness of Research

3.2.2.1. Philosophical viewpoint adopted

Researching a subject as presented here can be approached in several different ways, using a variety of research methods. Social science research methods can be placed into two camps; deductive and inductive. Both of these are ways by which researchers' practical experiences can be used to explain or justify theoretical models (Gill and Johnson, 2002). These theoretical models may be developed conceptually and then tested 'scientifically' (deduction, theory building from cause to effect) or alternatively, data may be collected, analysed and theory built from the outcome (induction-theory building from detailed facts to general principles).

A research project has more chance of coming to a successful conclusion when it is started correctly with clear aims and objectives. Its chances of success are enhanced further with the establishment of a clear conceptual and logistical framework. Central to this is research design which involves the selection of an appropriate research method and methodology with which to guide the research effort. These choices themselves are underpinned by the researcher's philosophical assumptions about the value and utility of theory and theoretical models. Theory, from a management perspective, can be used either to predict an outcome based on an analysis of a combination of inputs or theory can be used to describe any given situation, the end game being to gain a better understanding of that situation. This study holds that there is an additional argument that a better understanding of a situation would be an asset in predicting an outcome of placing a similar combination of those inputs into a different, but not too dissimilar, setting.

Research philosophies are grouped by researchers into many varied genres and sub-genres, all pertaining to a world view or perspective from which to construct theory. A useful summary of research philosophies, methodologies and methods common to management research is embodied in "The research process 'onion" (Saunders et al., 2003), which for the purposes of management research identifies three broad groups; Positivism, Realism and Interpretivism. Further the key notion of positivism, also called objectivism, constructivism and naturalism, is that "the social world exists externally, and that its properties should be

measured through objective methods"(Easterby-Smith et al., 2002), the inference being that two equally able people looking at the same data would arrive at similar conclusions as to what they are observing. Realism and Interpretivism are both classed under the single group of Phenomenology by Easterby-Smith *et al*. Phenomenologists hold the view that social situation, such as found in business and management, are functions of a particular set of circumstances, therefore the product of management research should not be scientific generalisations, as these generalisations lack insight into each specific social situation, the culture of the research subject and the world view of the researcher, all of which provide context from which to interpret results and research findings.

Realistic Phenomenologists (also referred to as Quasi –Experimentalists by Gill and Johnson ((Gill and Johnson, 2002)) hold the view that reality is independent of human thoughts and

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beliefs, in this case those of the researcher. The researcher does not influence what is being observed, and different observers of the same phenomena will report similar findings. In my opinion this world view is not at all suited to research in, what would be considered a dynamic changing environment, on the grounds that the same phenomena will not recur in the same pattern, therefore today's findings may not be extrapolated without interpretation, else they be irrelevant tomorrow. Such a philosophy may not at first glance seem suited to the study of a fast paced, ever changing phenomena such as is the extended enterprise, but in the right circumstances the research outcomes would still be worth learning from. The case study is often used as means of carrying out realistic research.

The other branch of phenomenology, is interpretivism and this acknowledges the role of the researcher in influencing phenomena and hence that the outcomes of research are open to interpretation depending on the researchers role in the situation. In effect the researcher becomes a part of the phenomena being studied and this role must be reported upon for analysis and further study. Action research is a form of interpretivist research.

3.2.3. Paradigms in IS Research

Research is conducted from a philosophical perspective, a perspective which underlines the way in which data is to be collected and analysed. All research, Information Systems research included, is conducted within the context of a research paradigm or research perspective. The research paradigm is comprised of factors informed by, *inter alia*; the setting within which a study is carried out, the nature of the study and the role of the researcher(s) conducting the study. These combine to give substance to the research, its findings and the applicability of those research findings. In order for readers to make use of a research study's findings and take usable interpretations from the findings it is important that the research paradigm, which consists of a set of assumptions implicit in the study, the way it was conducted and in the way the results are delivered are well understood. It is these set of assumptions that determine, amongst other things, the issues deemed important to the study, how these issues are shaped, how a method of investigation is chosen and for users how relevant those issues are to their own situation that makes the research findings pertinent. By inference it can be argued that an evaluation of the paradigm underpinning a research study goes a long way in determining the standards of quality by

which that study will be evaluated (Dube and Pare, 2003). It is also the questions surrounding research paradigms that make up the central premise where the debate about the relevance of IS research is concerned (Fitzgerald, 2003), and an understanding of the available research polychotomies are essential to understanding any given study and the results it generates. These are illustrated in Figure 3-2 below.
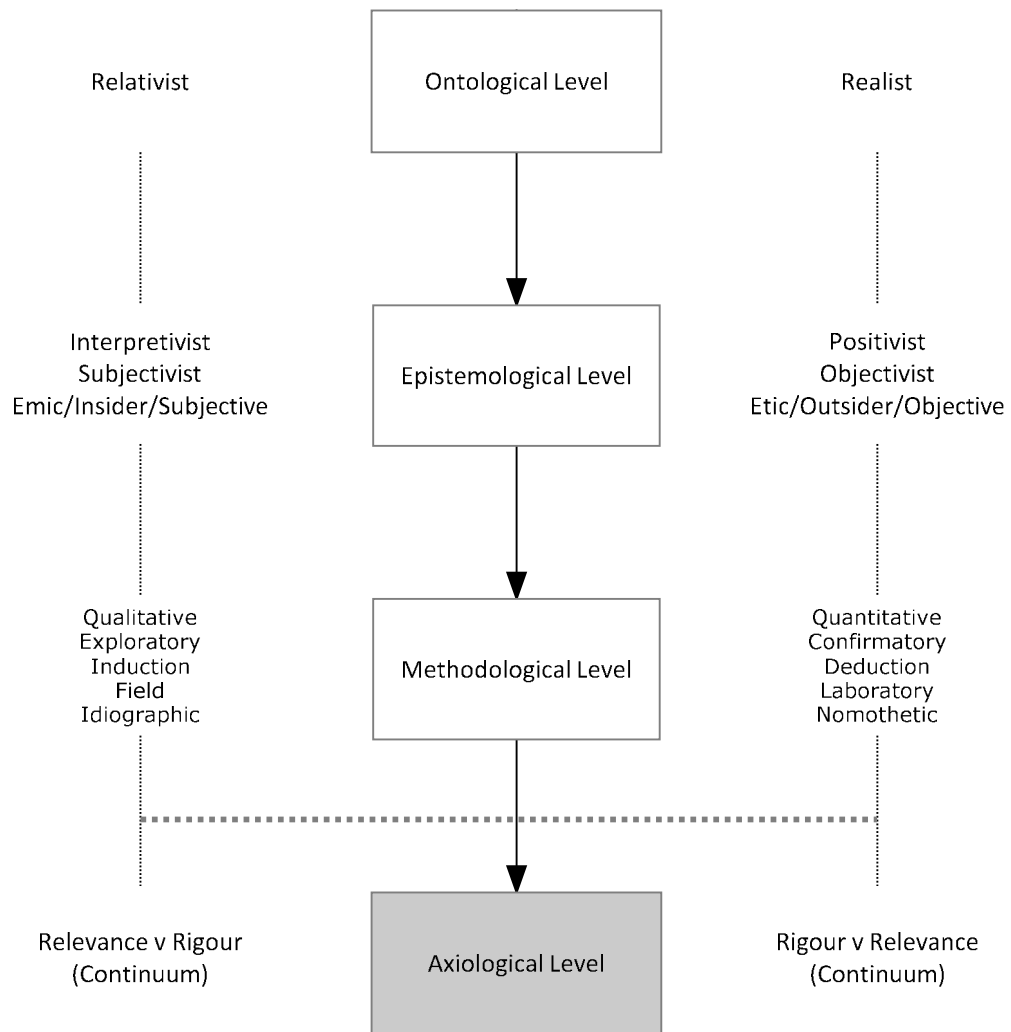
Polychotomies in IS Research

Figure 3-2 - Hierarchy of polychotomies in IS Research[13]

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[13] Adapted from KHAZANCHI, D. & MUNKVOLD, B. E. On the Rhetoric and Relevance of IS Research Paradigms: A Conceptual Framework and Some Propositions. 36th International Conference on System Sciences, 2003 Hawaii.

Within the IS research domain there is an on-going debate as to which methodological assumptions lead to a more accurate expression of the truth. This philosophical debate about paradigms, referred to as "incommensurable" (Kuhn, 1970), takes the basic notion that a scientist will normally work within a theoretical framework – a paradigm – that cannot be understand through the conceptual framework and terminology of another rival paradigm, is well covered in literature dedicated to that debate (Fitzgerald and Howcroft, 1998, Hovorka et al., 2008, Khazanchi and Munkvold, 2003). Kuhn (ibid) referred to paradigms as a researcher's composites of; value judgements, norms, standards, frames of reference, perspective, ideology, myths, theories, concepts, genres, and so on. Kuhn asserts that because paradigms differ in terms of the fundamental assumptions they bring to organisational inquiry, researchers must choose, and commit, to a single set of rules under which they do research from amongst the alternatives available. Though sequential movement between paradigms is, with justification, permissible (Mingers, 2001).

Principally, one of the commonest classifications of research methods is to distinguish between qualitative and quantitative research methods. Quantitative research methods were originally developed for use in the physical and natural sciences to study and understand natural occurrences and phenomena. Quantitative research involves the use of statistical and survey analysis, mathematical modelling, and any methods where "measurements" can be taken such as in laboratory experiments or econometric analysis. The actuarial sciences for instance are a predictive form of quantitative research. This study adopts a qualitative approach to both data collection and data analysis. The study of Information Systems and Information Management are relatively new as subjects in their own right, but as social sciences are well suited to scrutiny from qualitative perspectives. According to some commentators the reasons for this are (Silverman, 1998):

- Qualitative research is best suited to research that is approached from a predetermined perspective, for instance critical, predictive or prescriptive
- Qualitative research is able to focus on actual practice in a real setting
- Qualitative research allows the researcher to focus on how things are done
- Qualitative research can be used systematically to be more than exploratory or anecdotal. Cases studies can be applied to large datasets.

According to Guba and Lincoln (1994) there are four "paradigms of choice" guiding qualitative research; positivism, post positivism, critical theory and constructivism. These

align historically with what they call the 'paradigm eras' (Guba and Lincoln, 1985); pre-positivist, positivist and post-positivist. The main philosophers of these eras are tabled in Appendix 1. The pre-positivist era goes back to the times of the ancient Greek philosophers such as Thales and Aristotle through to the early eighteenth century. Research in those times comprised mainly of passive observation of phenomena and formulating theories from what is being observed or experienced. Since those times other prominent positivists include; Bacon, Descartes, Mill, Durkheim, Russell and Popper.

Positivism, research conducted in the years that followed the pre-positivist era holds that all scientific inquiry has to be tangible, observable and testable against existing knowledge in the field of inquiry, resulting in statements of generalisation in the form of propositions. A primary aim for such research is to derive results that can be used for predicting outcomes in any given scenario and or for controlling that scenario (Guba and Lincoln, 1985). Research paradigms, positivism included, have been tended to be examined at varying levels, ontological, epistemological, methodological and axiological levels (Burrell and Morgan, 1979). Positivists assume, on the basis that reality is stable and can be observed objectively (Levin, 1988) that all research involves a search for abstract principles that can be drawn from one research setting and applied to another with predictable results, this is termed nomothetic inquiry; this assumption operates at the methodological paradigm level. Figure 3-2 shows hierarchically how the major assumptions in the positivist approach are layered. These assumptions have the following characteristics:

- **Ontology**, this is the area of the study of existence. For example, ontological assumptions and inquiry within a paradigm might specifically characterise the nature of reality. It equates to a dialectical relationship between elements and the totality shaped by historical and contextual conditions;
- **Epistemology**, this is a theory of knowledge that deals with the nature of knowledge, its scope and provides a set of criteria for evaluating knowledge claims and establishing whether such claims are valid. It holds that knowledge is socialised, grounded in social and historical practices, such that definitive evidence cannot be obtained and interpreted to prove or disprove a given theory;
- **Methodology**, this is a procedure by which knowledge is to be generated. It involves taking proscribed steps to form a view of any given situation;
- **Axiology**, this is the level where there is an argument that all research involves a trade-off between relevance and rigour, and requires a choice between hard and soft approaches to scientific research.

An additional set of assumptions are proffered by other writers (Orlikowski and Baroudi, 1991) which may be placed across one or more of these levels. These are paraphrased as follows:

- **Rationality**, this assumes that organisations can act to change their social circumstances, but their capacity to enact change is, often, constrained
- **Social relations**, this is the assumption that organisations exist in dynamic environments. Contradictions inherent in an existing setting always lead to inequalities and conflict, from which new social forms emerge.

Axioms concerning	Positivism	Interpretivism/post-positivism
The nature of Reality	Reality is single, tangible and able to be separated.	Realities are multiple, constructed and holistic.
The relationship of the knower to the known	Researcher and researched are independent, a dualism.	Researcher and researched are interactive, inseparable.
The possibility of generalisation	Time and context free generalisations (nomothetic statements) are possible	Only time and context bound hypotheses (idiographic statements) are possible.
The possibility of causal linkages	There are real causes, temporally precedent to or simultaneous with their effects.	All entities are in a state of mutual simultaneous shaping, so that it is impossible to distinguish causes from effects.
The role of values bias	Inquiry is value and bias free.	Inquiry is value bound and subject to bias.

Table 3-1[14] - Contrasting Positivist and Interpretivist Paradigms

At the ontological level, positivists assume an external reality, that what is being studied can be broken down into its constituent parts, and that those parts may be studied, either separately or as a linear whole. In the case of studying something mechanical, this may well hold true, but it is an approach that is hard to justify in the study of complex phenomena involving human or organisation behaviour. Epistemologically, positivists make an assumption that the researcher can be wholly separated from, and be independent of, that which he or she is studying, as if in a laboratory. In the case under review here this assumption is hard to justify; the researcher is conducting an ethnographic inquiry and adopting action research principles, in such circumstances to claim that the researcher has no impact on the researched would be a hard claim to substantiate. Methodologically,

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[14] GUBA, E. G. & LINCOLN, Y. S. 1985. *Naturalistic inquiry,* Bevely Hills, CA, USA, Sage Publications.

positivists aim to derive generalisations by way of 'nomothetic statements about the research situation, this is not the objective in this study and hence this assumption is not applicable, rather the objective is to gain a level of understanding of the situation and be able to make an idiographic interpretation of what is being observed. Finally, the axiological standpoint of positivists is that the research results can and should be free of bias; this again is an assumption that cannot be justified in the context of this study. Table 3-1 provides an alternative summary of the contrasts between Positivism and Interpretivism.

In addition to pre-positivism and positivism, the third paradigm era is that of post-positivism. The main title attached to research of this is era is interpretivism. In summary, interpretivists hold that only through subjective interpretation of and intervention in reality can social situations be really understood. For subscribers to this paradigmatic approach it is more important to study phenomena in its natural setting.

As with the other paradigms mentioned, post-positivistic paradigms also have core assumptions at the four main paradigmatic or philosophical levels. Firstly, there is the ontological assumption that reality is multi-faceted and inquiry can be constructed to reflect that reality, however what is being studied can only be understood in relation to its context (Orlikowski, 2000). This assumption is extended further, with the theory of structuration, which holds that reality is bounded by structure, structure itself is a set of rules and resources (sets of transformation relations) organised as properties of social systems (Giddens, 1986 , Sewell, 1992). As an example, an ERP system can only be studied and understood within the context of the perceived usefulness of the information it is used to process and how that information is utilised. Secondly, at the epistemological level, constructivists argue that it is not feasible to separate the researcher from that which is being studied, as the chance of bias and value judgement influencing the research is unavoidable. Thirdly, post positivists assume that in any inquiry only idiographic, contextual statements are possible. This is allied to the assumption of multiple constructed realities, but argues that the reporting of any findings will be from the individual researcher's perspective. Finally, the fourth major assumption exists at the axiological level and holds that research is value-bound, a recognition from the researcher that the research, the methodology adopted and the values that distinguish the context in which the research is conducted are all

influenced by the researchers own values. These are all values that go to shape the post positivist agenda, described as naturalistic inquiry. (Guba and Lincoln, 1985).

Given the complexity of the real world situation under consideration here, and phenomena relating to ERP systems are acknowledged as representing major complexity (Markus and Tanis, 2000), it is deemed that no single methodology can be deemed best suited to the research situation, an approach also termed monism in that it would call for the singular adherence to a single research method. This approach is adopted on the grounds that the various methods explored have their merits, if used appropriately, the entire study will be richer for adopting a pluralist multi-method approaches where appropriate. As Mingers argues (Mingers, 2001) the real world is ontologically stratified and differentiated, consisting of plurality of structures, hence using different paradigms allows focus on different aspects of a research situation. What is of utmost consideration here is the relevance of the study to its practitioner audience and the rigour applied to using lessons from the study in practice.

Indeed the practice of combining methodologies has been advocated as means of coping with the ever increasing complexity being encountered in Information Systems research. Symbolic Interactionism (Blumer, 1969, Prasad, 1993, Prus, 1996, Rock, 1979, Rock, 2001) commends this methodology as a means for harnessing the complementarity of methodologies. Specifically, in this study, it combines the descriptive strength of ethnography, the ability to focus on theory development afforded by grounded theory and the participation experience from action research (McKay and Marshall, 2001).

3.2.4.   Approach to the Literature Review

This research study aims to contribute to the body of knowledge and practitioner toolkit available to practitioners in the area of information management, particularly Enterprise Resource Planning Systems, by an exploration and analysis of issues relevant to the implementation of such systems in Internet Era Enterprises. The study itself resides within the domain of strategic information management. Within this wide context important sub domains are Information Systems Management and Information Technology Management. When proposing a new study or a new theory, researchers should make use of literature in respected journals (see Table 3-2 below) to serve as the foundation for their research (Barnes, 2005). Doing so ensures the validity of the study and reliability of the results. The

issue of validity and reliability will be explored further in the analysis of the research findings. "Quality literature is one that stimulates additional research studies, which enable validation of the original theory proposed" (Barnes, 2005). Searches were conducted to bring these literature reviews up to date using a number of bibliographic databases including; EBSCOhost (www.ebscohost.com), Science Direct (www.sciencedirect.com, Ingenta Connect (www.ingentaconnect.com), Wiley Interscience, incorporating Blackwell Synergy (www.interscience.wiley.com) and Google Scholar (www.scholar.google.co.uk).

Subject Grouping	Ranked Journal
General and Strategic Management	Academy of Management Executive
	Academy of Management Journal
	Academy of Management Review
	Administrative Science Quarterly
	California Management Review
	Harvard Business Review
	Journal of Business Research
	Journal of International Business Studies
	Journal of Management Studies
	Journal of Management
	Journal of Strategic Change
	Sloan MIT Management Review
	Strategic Management Review
	Strategic Management Journal
Information Systems	MIS Quarterly
	Electronic Journal of Information Systems in Developing Countries
	European Journal of Information Systems
	Information and Management
	Information Systems Management
	Information Systems Research
	International Journal of Information Management
	Journal of Management Information Systems
	Journal of Information Systems
	Journal of Information Technology
	Journal of Strategic Information Systems
	Journal of Technology Management

Table 3-2[15] - Key Information Systems Research Publications

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[15] Based BARNES, S. J. 2005. Assessing the value of IS journals. *Communications of the ACM,* 48**,** 110-112.

Additionally, articles from the practitioner perspective are frequently published in professional journals, some of which were consulted and are listed in the table below.

Subject Grouping	Ranked Journal
Professional and Practitioner Publications	Accountancy Magazine Accounting and Business Business Horizons Business Week Computer Weekly The Economist Financial Times Fortune Management Consultancy Magazine McKinsey Quarterly People Management Personnel Today Project Manager Today Public Management

Table 3-3 - Publications of interest to ERP practitioners and key users

Separate analysis by (Gregor, 2006) points to how IS research is developing

Theory Component (Components Common to all Theory)	Definition
Means of Representation	The theory must be represented physically in some way: in words, mathematical terms, symbolic logic, diagrams, tables or graphs. Other *representation aids include* pictures, models or prototypes.
Constructs	These refer to the phenomena of interest in the theory. All of the primary constructs in the theory should be well defined. Many different types of constructs are possible; observational (real) terms, theoretical (nominal) terms and collective terms

Statements of Relationships	These show relationships amongst the constructs. These may also be of many types. Associative, compositional, unidirectional, bidirectional, conditional or causal. The nature of the relationship specified depends on the purpose of the theory.
Scope	The scope is specified by the degree of generality of the statements of relationships (denoted by modal qualifiers such as "some", "many", "all", and "never" and statements of boundaries showing limits of generalisations.
Theory Component (Components Contingent on Theory Purpose)	**Definition**
Causal explanations	The Theory gives statements of relationships among phenomena that show causal reasoning (not covering law or probabilistic reasoning alone)
Testable propositions (hypothesis)	Statements of relationships between constructs are stated in such a form that they can be tested empirically.
Prescriptive Statements	Statements in the theory specify how people can accomplish something in practice (e.g. construct an artefact or develop a theory).

Table 3-4 - Structural Components of Theory[16]

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[16] GREGOR, S. 2006. The Nature of Theory in Information Systems. *MIS Quarterly,* 30**,** 611-642.

3.2.5. Approach to Data Collection

In the course of conducting this research, the author was a participant in sixteen case settings of varying durations ranging from between four months and up to twenty four months on site. Earlier cases were used to explore and establish the research phenomenon as well as establish the author's credentials as a researcher, by forming a basis for early research techniques training.

3.2.5.1. Techniques used

The empirical work involved the use of unstructured interviews; observation of project operations, project meetings and training sessions; document review; and informal meetings and discussions in each case setting. Note taking from informal interviews and document review were the primary methods used. The author participated in conversations and ad hoc meetings that arose as part of normal project activity. None of these were taped or recorded, though notes were taken either during them or some reflections were written up shortly afterwards. These methods allowed the researcher to develop a historical and strategic context for each case and to establish key themes for later analysis. Reviews of paper and electronic documents, particularly intranet websites and publicly available information, on financial news and business data provision websites such as Bloomberg L.P. and Thomson Reuters, supported the above activities.

3.2.6. Approach to Data Analysis

Significant parts of this study are historical ethnographies (Fetterman, 2010) – brief historical reconstructions of past change efforts that set the scene for consideration of current ones. The fieldwork comprised note taking alongside working as a team member in the ERP project settings being studied. Participating as an observer in current efforts gave an opportunity to test ideas and explore theories elicited from the literature review. Reliance also had to be placed on documents and colleagues memories to back up later data analysis. Also the earlier cases and preliminary analysis provided insights that were useful in the subsequent approach to data collection and analysis of later cases.

3.2.6.1.   Techniques used

In order to be able to compare the cases it was necessary to put them on similar footings, this was done by analysing and coding the data to bring out key themes. This was done by examining interview transcripts, field notes, and documentary records, highlighting key themes. Themes identified in early cases served to inform the data collection efforts in subsequent cases. Historical events were examined in the light of the understanding garnered from current project activities.

3.3.   Research Design and Approach

3.3.1.   Introduction

In previous chapters details have been provided as to the background, literature and philosophical underpinnings to this study on Enterprise Resource Planning and enterprise structure, with particular reference to enterprise as defined in the introduction to the study. This chapter outlines how the study aims and objectives are intended to be realised, by way of a research framework to be followed. The research framework represents the means by which the propositions identified from the literature review are to be tested. A framework is of benefit for several reasons, amongst which are that:

- It acts as a guide for the researcher to follow in the empirical stages of research. These are the stages where data are obtained from direct observation of phenomena
- It provides the reader with a useful guide for following how the research study conceived its ideas, and hence makes it easier to follow how the results have been derived
- It provides a means for explaining the development of any metric devices used in the study. Such metrics as may be used to enable comparisons between different occurrences of the same phenomenon in different settings (cases)

The literature review also presented a synopsis of the Collaborative Enterprise Governance approach, the lens through which this study chosen to examine the main theme of inquiry. Case study research has been chosen as befitting this type of study as it affords a view of the phenomenon in a real life context (Benbasat et al., 1987, Yin, 2008).

Case study research is often criticised for lacking objectiveness, methodological rigor, and external validity (Johnston et al., 1999) and hence lacking in generalisability. To assure the reliability and validity of the research calls for requires a robust research design (Hillebrand

et al., 2001). The aim of this, and the following sections, is to outline the design of the case study research in order to clarify the methodological basis of the study and to demonstrate the reliability and validity designed into the study.

3.3.2.   Research Methodologies Selected

The literature identifies a large number of research methodologies used in published research in the information management domain; Galliers (1991) for example lists fourteen. Before introducing the methodologies deployed in this research study, a summary is given highlighting the key features of these methodologies in the table below, identifying their respective strengths and weaknesses. Those used in this study have been indicated with a cross.

Positivist	Interpretivist	
Laboratory Experiments	Subjective/Argumentative	
Field Experiments	Reviews	
Surveys	Action Research	X
Case Studies	Case Studies	X
Theorem Proof	Descriptive/Interpretive	X
Forecasting	Futures Research	
Simulation	Role/Game Playing	

Table 3-5[17] - Taxonomy of Research Methods

Laboratory experiments	These permit the researcher to identify precise relationships between a small number of variables that are studied intensively via a designed laboratory situation using quantitative analytical techniques with a view to making generalisable statements applicable to real-life situations. The key weakness of laboratory experiments is the "limited extent to which identified relationships exist in the real world due to oversimplification of the

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[17] GALLIERS, R. D. 1991. A scenario-based approach to strategic information systems planning. *A scenario-based approach to strategic information systems planning.*

experimental situation and the isolation of such situations from most of the variables that are found in the real world" (Galliers, 1991).

Field experiments	These extend laboratory experiments into real organisations and their real life situations, thereby achieving greater realism and diminishing the extent to which situations can be criticised as contrived. In practice it is difficult to identify organisations that are prepared to be experimented on and still more difficult to achieve sufficient control to make replication viable.
Surveys	These enable the researcher to obtain data about practices, situations or views at one point in time through questionnaires or interviews. Quantitative analytical techniques are then used to draw inferences from this data regarding existing relationships. The use of surveys permit a researcher to study more variables at one time than is typically possible in laboratory or field experiments, whilst data can be collected about real world environments. A key weakness is that it is very difficult to realise insights relating to the causes of or processes involved in the phenomena measured. There are, in addition, several sources of bias such as the possibly self-selecting nature of respondents, the point in time when the survey is conducted and in the researcher him/herself through the design of the survey itself.
Case studies	These involve an attempt to describe relationships that exist in reality, very often in a single organisation. Case studies may be positivist or interpretivist in nature, depending on the approach of the researcher, the data

collected and the analytical techniques employed. Reality can be captured in greater detail by an observer-researcher, with the analysis of more variables than is typically possible in experimental and survey research. Case studies can be considered weak as they are typically restricted to a single organisation and it is difficult to generalise findings since it is hard to find similar cases with similar data that can be analysed in a statistically meaningful way. Furthermore, different researchers may have different interpretations of the same data, thus adding research bias into the equation.

| Subjective/argumentative research (for example hermeneutics and phenomenology) | These require the researcher to adopt a creative or speculative stance rather than act as an observer. It is a useful technique since new theories can be built, new ideas generated and subsequently tested. However, as an unstructured and subjective form of research, there is a strong chance of researcher bias. |
| Action research | This is iterative and progressive research based problem solving, where the researcher attempts to develop results or a solution that is of practical value for the organisation with whom the researcher is working, and at the same time developing theoretical knowledge. By intervening in problems, the researcher aims to create practical results whilst also contributing to theory and the practical body of knowledge available to the domain being studied. As with case studies, action research is usually restricted to a single organisation making it difficult to generalise findings, while different researchers may interpret events differently. The personal ethics of the researcher are critical, since the |

opportunity for direct researcher intervention is always present.

The settings offered by this study lend themselves to the adoption of a multi-method approach, which has led to the ethnography of action research to develop case studies; each "action" took place in a different "case" setting. These approaches are explained further in the following sections.

3.3.3. Ethnography

Whilst not being entirely ethnographic itself, this study takes the form of ethnography in that the research was conducted in situ. Ethnography is an anthropological research method that relies on first hand observations made by a researcher immersed in a research setting over a period of time. The ethnographic method requires the researcher to participate in the routine of the research setting, whilst at the same time observing and recording the research situation in as much detail as is necessary to derive knowledge and understanding. In some cases parts of the ethnography are historical (McGrath, 2003) in that they bring me up to date with my entry to the research setting. For instance some enterprises will have already made the selection of their chosen applications, whilst another may be at the stage where they are migrating data from legacy systems to their new ERP systems and in one of the cases cited the researcher was involved in the full project lifecycle. Each situation offers differing perspectives for the action researcher.

Ethnography may also be deemed **anecdotal** in terms of research techniques which requires certain guidelines need to be observed, particularly to mitigate the likely presence of cognitive (researcher) bias. These are (Coughlan and Coghlan, 2002):

- Perform background research to help focus observations
- Include sources of information about norms for setting in the references and bibliography
- Include a specific aim to focus on an area and a type of phenomenon
- Include a description of the setting
- Write observation notes as soon as possible to preserve essential details
- Provide a detailed description of the observation

Some recommended qualities, according to Schultze (2000), for good quality ethnography are presented in the table below.

Criterion	Requirement
Authenticity – to demonstrate that the ethnographic researcher was actually immersed in the research setting.	Descriptions of "a day in the life" of actors in the research setting, using their language. Detailed account of researchers, interactions, observations and methods for data collection.
Plausibility – to present the findings in a way that is relevant to the target audience.	Keeping to an academic genre to present knowledge.
Criticality – to cause the target audience to challenge their own innate assumptions.	Challenging self and asking the readers to challenge themselves in a similar setting.
Self-revealing – to disclose the subjectivities in findings due to the researchers situation, highlighting the researcher as a narrator.	Using personal pronouns and revealing a canonical setting.
Interlacing actual and confessional material – to limit findings and revelations to that which is relevant.	Autobiographical where relevant to the study

Table 3-6 - Requirements for a High Quality Ethnography and Confessional Writing

3.3.4.   Data Collection

The empirical work for this study involved the use of observation of operations and decision outcomes, unstructured interviews, attendance at project meetings and training sessions; project document review; and informal meetings and discussions. Interviews and document reviews were the primary methods used for historical ethnography elements of the study.

These methods helped to develop the historical and cultural context the study and helped to identify particular aspects that be focused on later.

The study conformed to Brewer (2000) who describes ethnography as "a style of research rather than a single method" that "uses a variety of techniques to collect data", accordingly this study takes the form of a series of ethnographies. In so doing, data is gathered by means of historical ethnographies (Fetterman, 2010)– where past decisions need to be researched and understood, to set the scene for discussion of present ones – and field ethnographies (Bell, 2010, Bryman and Bell, 2007). These are then used to inform the case studies presented and analysed in later chapters. These data collection techniques are discussed in the following subsections.

3.3.4.1. Ethnographic Participant-Observation

Ethnographical data collection " usually involves the researcher participating, overtly or covertly, in people's daily lives for an extended period of time, watching what happens, listening to what is said and /or asking questions through informal and formal interviews, collecting documents and artefacts" (Hammersley and Atkinson, 2007). Hammersley and Atkinson (2007) explain that ethnography usually has most of the following characteristics:

- Actions and accounts are studied in everyday contexts.
- Data are gathered from a range of sources, with participant observation and informal conversation being the main ones.
- Data collection is relatively 'unstructured'.
- Focus is usually on a few cases.
- Analysis of data involves interpretation of the meaning, functions and consequences of human actions and institutional (organisational) practices.

For this study participant observation, or participant as observer(Moore and Yager, 2011), was a central data gathering method, for what can be considered the field work phases of the study. This was necessary for one main reason. Interviewing would not have been possible, as the researchers main purpose for being in the research settings was not to conduct research, hence observation and note taking as soon as was expedient was the only recourse and because the opportunity was there to observe. It is perhaps worth noting that whilst participant observation is fieldwork, not all fieldwork is participant observation

(Bernard, 2011); other types of fieldwork include surveys and experiments that can be carried out alongside participant observation.

According to (Moore and Yager, 2011) participant observation resides along the continuum of Distance Engagement (see Figure 3-3 below) range of data collection methods which is significant in IS research insofar as IS researchers tend to adopt relatively distant methods. This is helps the reader know the extent to which the researcher and the research phenomena have interaction and hence is a factor to be noted in reading and interpreting research analysis and results.

DISTANCE   ENGAGEMENT

| Analysis of Published Data | Analysis of Text | Survey | Interview | Passive Observation | Participant Observation | Action Research | Consultancy |
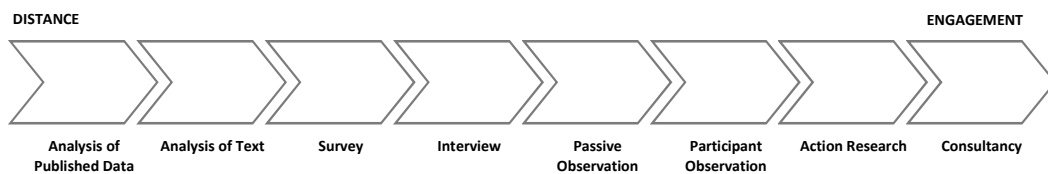
Figure 3-3 - Distance-Engagement Classification from (Nandhakumar and Jones, 1997)[18]

3.3.4.2.   Action Research

Action research is a research method that can be helpful for gathering data to be used in developing a case study. It can also be used as a way of gathering data to be used in developing grounded theory, discussed in the next section. The objective of action research is to analyse and understand the perspectives of others as the basis for action (Stringer, 1999). Hence an organisation seeking to collaborate with others, can research the realities of what to expect by studying accounts of what other practitioner organisations have experienced. An action research account will essentially provide enough information for the user to use in guiding the definition of its own; procedures, plans, projects, services, programs, policies and so on. However, the context of the study is all important, and this influences the applicability of lessons learnt in different settings.

Canonical Action Research (CAR) is an approach that adds some formalization to action research. As this technique has gained in popularity since being developed in 1978,

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[18] in MOORE, J. E. & YAGER, S. E. Understanding and applying participant observation in information systems research. SIGMIS-CPR'11, 2011 San Antonio, Texas, USA. ACM, 126-130..

principles have been put forward with which to add further rigor and relevance (Davison et al., 2004). At least one of the selected cases will be evaluated as a CAR case study.

Table 3-7 below highlights the main characteristics of Action Research and complementary characteristics of Case Study Research. (adapted from (Vreede, 1995)

Case Study Research	Action Research
Researcher is observer.	Researcher is active participant
Research can be exploratory, explanatory or descriptive.	Research is prescriptive and involves a degree of intervention
The focus of enquiry is on "how" and "why"	Has the additional focus on "how to"
May be used for both positivist and interpretivist	Predominantly interpretivist

Table 3-7 - Action Research & Case Study Research (Vreede 1995)

3.3.4.3. Grounded Theory

Because the research and the analysis that goes with it is intended more for dissemination within the practitioner community another possible methodology is that of trying to discover theory from data. This is the broad definition given to Grounded Theory, a method of generating "theory suited to its supposed uses" The use of the Grounded Theory research methodology is best suited to situations where at least four properties apply, (Glaser and Strauss, 1967). These properties are; the theory fits the substantive area in which it will be used, the theory is readily understandable to laymen, it is general enough to be applied to diverse situations within the area and finally, the theory must allow the user sufficient control over those daily situations as they change over time. These are prerequisites to make to the generated theory worth trying out in practice. These properties fit in with the authors aims sought in this research study also. Grounded theory, theory developed inductively, does carry with it the caveat that the researcher, who in many cases is immersed in the research setting, has "retained enough detachment to think theoretically and objectively, about what he has seen" (Burawoy, 1991) and experienced. In my opinion this is often easier said than done, it's often the case that one is so busy fighting the fires of the research situation that pausing to theorise is impractical, and at best is done with hindsight. A further drawback with grounded theory, often described as a pursuit of generalizations and

similarities in situations, is that it tends to repress and overlook the specifics of each situation from which the theory is drawn out.

However a beneficial use of Grounded Theory would be in the ability to "(re)construct" (Konecki, 1997) the conditions that should be taken into account when planning to enter into a collaborative arrangement in the form of an enterprise, specifically where information systems are concerned.

This research study adopts a practical and descriptive perspective as a necessary means of making its contribution to the practitioner's toolkit. This approach is informed by an imperative (Baskerville and Myers, 2004) to start making Information Systems research more relevant to practitioners. This imperative is addressed further in the methodology section of this study. In addition to the methodology adopted and in recognition that action researchers are sometimes also participant actors too, this study draws on the researcher's own experiences as an ethnographic researcher to identify parallels between the researcher's own experience and informing practices and those of the other actors studied. These parallels are intended to complement and challenge the underlying assumptions of management practice. In presenting the final findings the study adopts a confessional style of representation. The primary objective of this chapter is to put this study in an academic context through the review of extant literature. In reviewing the literature and choosing a framework to guide the analysis the aim is to consider the different viewpoints currently being propounded, how each is developing and to make a contribution to management practice by extending one of them into a further domain.

3.3.4.4.   Case Study Research

Qualitative research usually lends itself to small scale investigations where the researcher is engaged in unstructured interviews, case histories, and observations. Two of the most popular qualitative research methodologies are Grounded Theory and case studies. Additionally, the case study is ideally suited to the needs and resources of the small scale researcher (Blaxter et al., 1996, Sarker and Lee, 2003). "It allows, indeed endorses, a focus on one or a few examples. This might be the researchers place of work, another institution, company or organisation with which they have a connection" However, in writing up a case

study the researcher might deploy a combination of research methods to put the case history together; this may include the examination of documentation linked with interviews and the writing up of details from an action research exercise.

A case study is considered a viable vehicle for management research for three reasons (Benbasat et al., 1987), all of which are valid to this study:

- Case studies all look at phenomena in their natural setting;
- The researcher can ask "how" and "why" questions to gain first hand understanding of the nature and complexity of the processes taking place; and
- Case studies tend to take place in settings where few similar studies will have been undertaken.

Case studies are often criticised for being the weakest method of social science research mainly on the grounds that they lack quantification (Yin, 1984, 2002) and lack the precision that goes with it, they lack objectivity and the lack of scientific rigour is also often cited. However, in this researcher's opinion, and for the purpose of this study, in the context of organisational and management research, the case study has much to commend it. In the situation where the aim is to try to learn the 'hows' and 'whys' of Enterprise Management, giving others the opportunity to learn from practical examples, as in detailed and well researched case histories, the case study as a research method would be hard to rival, especially where the researcher will have had little or no control over the enterprise being studied. Other criticisms are also identified and refuted as misunderstandings (Flyvbjerg, 2006) or ways are identified for making good use of case studies even a single case (Lee, 1989), as an effective medium for research in the Management Information Systems arena. According to Yin (1984, 2002, Yin, 2008), the essence of a case study is that it tries to explain a set of decisions, why they were taken, how they were actioned and with what outcome. This is worth the effort despite the loss of an opportunity to generalize, the time it takes to 'live' the case and the lack of scientific rigour. Understanding the case histories affords the opportunity to "share" experience and knowledge gained as an investigator or researcher. Further support for the case study approach comes from its description as a means for investigating "predefined phenomena" but which "does not involve explicit control or manipulation of variables: the focus is on in-depth understanding of a phenomenon and its context (Cavaye, 1996).

3.3.4.5. Template Analysis

In case study research, researchers typically collect multiple accounts of common research phenomena. In order to develop an interpretation of these data across all accounts, an often used analytical technique is one called Template Analysis (King, 2004). Template analysis is a qualitative data management analytical approach that overcomes the problem of those techniques that rely solely on coding and sorting texts into like units, thereby striping away contextual richness of individual cases (Ayres et al., 2003) King (2004) identifies template analysis as a recent technique to have emerged from other more structured approaches such as Grounded Theory and Interpretive Phenomenological Analysis (IPA)., its principal advantage over these is its flexibility in use and the technique is easier to understand by the researcher working at the axiological level. It also works well in studies that aim to examine multiple perspectives within an organisational context.

The high level themes (Propositions) of this study, are used in such Template Analysis, these propositions have been derived from the literature review, in the previous chapter. The template ensures that cases are treated similarly, objectively and without prejudice, and reduces the criticisms of the case studies approach raised above. The template used in this research and applied to each and every case study is shown in Figure 3-3 below. It is worth noting that not all elements from the template are referenced in every case, however these template elements were significant in the project settings.
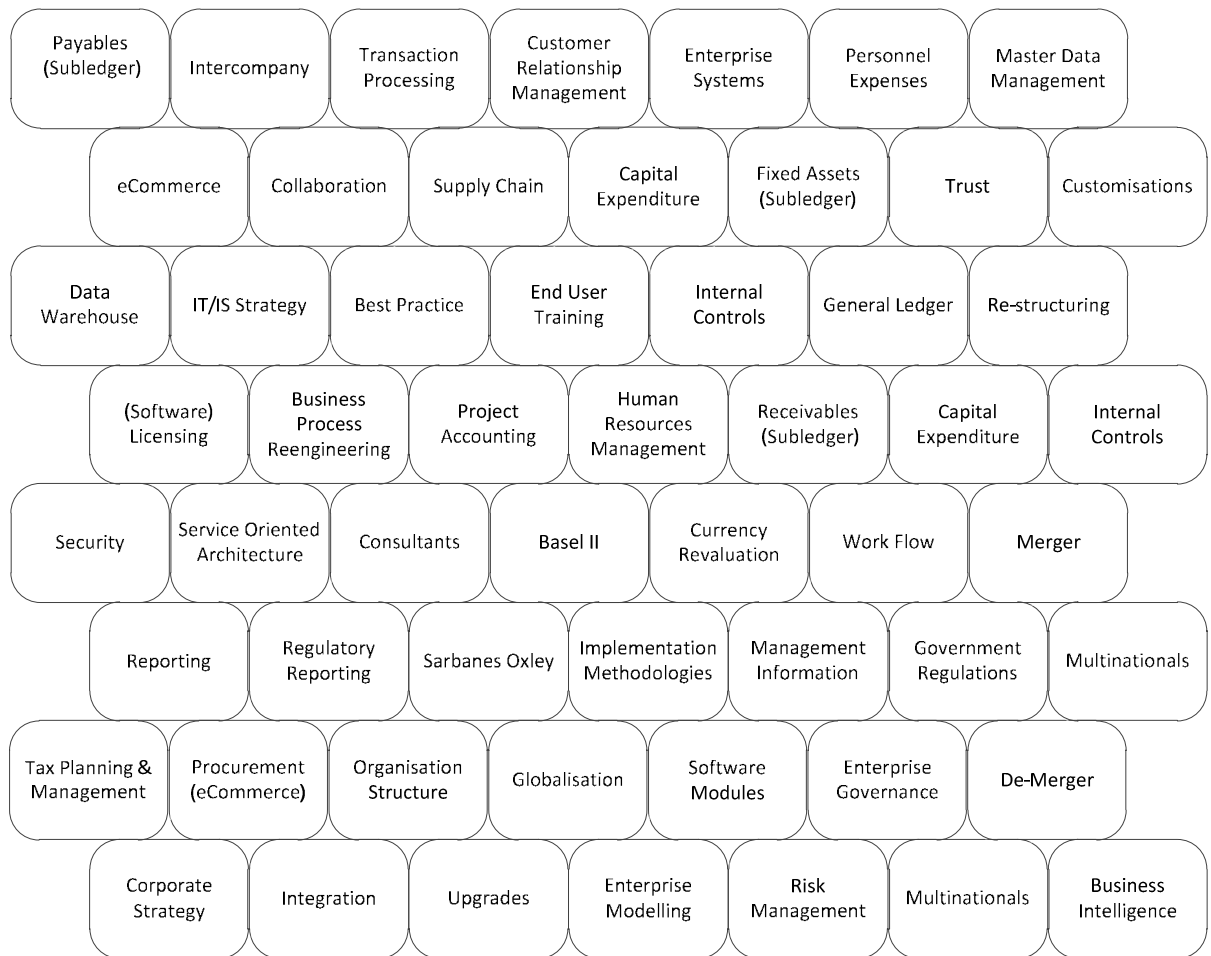
Figure 3-4 - Template for Key Issues with Enterprise Structures and ERP

A possible criticism of Template Analysis is that it bears "little difference from the use of software packages such as Nvivo for analysis of data" (Waring and Wainwright, 2008), but this is a moot point, as it gives similar outputs, achieved more easily from ethnographically captured data, as required in this thesis.. This charge is also countered by the argument that the use of technology can often act as a barrier to the proper immersion in the data, a key element in the analytical process.

3.3.4.6. Case selection

Yin draws a distinction between case studies based upon a single entity and those based on multiple entities (Yin, 1984, 2002). This distinction is considered important with respect to both research design and research analysis. Yin explains further that each type of design is appropriate in specific circumstances, and argues that should circumstances change, then

where possible the study should start with a new design. Based on Yin's principles Table 3.9 below provides a perspective of the different possible approaches to case study design.

	Single –case designs	Multiple-case designs
Holistic (single unit of analysis	TYPE 1	TYPE 3
embedded (multiple units of analysis	TYPE 2	TYPE 4

Table 3-8 - Types of Case Study Design

The study of ERP and Enterprise Structure contained in this thesis follows a Type 4 approach. This may be deemed less than scientific, but the approach is informed by the research objectives and the research circumstances. The common action research activity and unit of analysis was the implementation of ERP systems in different settings (multiple cases). In each instance selected for this thesis the researcher was embedded in the research setting for varying lengths of time. Selection criteria for inclusion in the study were more as a way of demonstrating the commonality of the ERP properties across the varied settings. This approach to case selection is in keeping with what is termed the "information oriented selection" approach (Flyvbjerg, 2006), in this instance cases selected are of the "Maximum variation" type, selected "To obtain information about the significance of various circumstances for case process and outcome (e.g. three to four cases that are very different on one dimension: size, form of organisation, location, budget, and so on). As mentioned the research objective emerged in the cause of the study, as opposed to being well formulated in advance, but it does draw on Yin's suggestion that Type 3 and Type 4 studies should be replicated at each site, with the aim of observing similar or contrasting results. Yin also states, and we follow his advice for this study, 'where cross-case analysis is the major goal of the research, there may be no need for any single-case report; such a study might consist of brief summaries of individual cases, followed by the cross-case analysis.' (Yin, 1981)

The selected cases are also explored using the Collaborative Enterprise Governance approach, comprising several tools for examining enterprise structures and for explaining how and why enterprise structure may change (Binder and Clegg, 2007b, Binder and Edwards, 2010). This serves to map the enterprise structures uniformly and aid cross case comparisons to be made. The enterprise matrix is particularly useful in mapping an

enterprise structure to the internal and external forces that may impact an enterprises structure and thereby allowing the explicit analysis of the impact of ERP systems on those structures. The matrices, along with a data table, for each case are included in the appendices to this study.

The following table summarises the main characteristics that demonstrate that the choice of the case study method is appropriate to this study, based on a summary of Benbasat et al (1987), Pauwels and Matthyssens (2004), Myers (1997) and Yin (2008).

Case Study Characteristics	Applied in this study
Phenomenon can be observed in its natural context	Yes
Data is collected from multiple sources	Yes
One or more entities can be observed (person, teams or organisations)	Yes
The phenomenon is complex and bares exploring in diverse settings	Yes
Situation calls for exploratory inquiry (No known theory exist)	Yes
No experimentation is involved	Yes
Researcher does not determine the constructs	Yes
Inquiry is focused on how and why questions rather than frequency.	Yes

Table 3-9 - Applied characteristics of case studies

3.3.5.   Methodology Application

For the methodology to be applied successfully, the study must consider the case organisations and test the extent to which factors identified are applicable to that particular case. As each research outcome applies separately in the literature any findings from this study will necessarily test the applicability of all variables for any generalizations to be drawn. In this instance each factor (research proposition 1 - 10) will be given a weighting (+5 to -5) according to how relevant it was to that particular case. The results will be analysed across all cases in Chapter 6.

3.3.5.1.   The Cases

The organisations chosen for examination in this study are ones for whom the researcher has participated in an ERP implementation and who meet the researchers chosen definition for Internet Era enterprises. These enterprises are preferred in that they demand the implementation of the modern and latest applications to their fullest extent and for reasons

that are explained in subsequent chapters of this study. None of these organisations were sponsors of this study at a corporate level, a senior manager was always aware that the researcher was actively working on a DBA thesis, and would where possible use non confidential material, notes and observations in any research findings.

- Train Co (Train Co)
- TV CO (TV Co)
- ALU CO (Alu Co)
- Mobile Co (Mobile Co)
- ISP Co (ISP Co)
- Clin Co (Clin Co)

The main criteria for selecting these organisations were that the enterprise coordinator was;

- in the process of implementing or upgrading their enterprise systems
- restructuring major parts of their organisation
- redesigning major business processes
- a large organisation with operations in more than one country
- structured in quasi-autonomous parts
- working closely with other organisations and were attempting to implement cross organisational enterprise systems.

3.3.5.2. Case Analysis

So far various variables have been identified in the literature and arguments made for their applicability to enterprise structures, particularly post internet era enterprise structures. These variables are then examined in the context of the 6 case studies, and are drawn together here in a table to enable examination of similarities and inconsistencies between the cases and possibly find an explanation for these, and inform praxis of their significance.

3.3.5.3. Validity

To test the validity the study, key findings will be subjected to peer review from, focus groups, of fellow practitioners for feedback, to determine if some of the findings are considered too esoteric and of little relevance in practice. Such a review is useful at any

point in a research study, but is most useful for exploratory work (Berg, 2001). The wider debate of validity that is also uppermost in IS research (Pala et al., 2003) is one that this study will return to address in a later chapter. The use of focus groups is explained in greater detail in section 3.3.8 below.

3.3.6. Framework Components

A fundamental assumption in trying to turn research aims into research actions in this study is that the impetus to use ERP, as an enterprise tool, will need to be initiated by the lead organisation in the enterprise. For each case the applicable research components are:

- Propositions developed from the literature review – to aid cross case comparison a measure using a researcher derived scale (+5 - -5) will be applied to each proposition[19]
- Application of the Collaborative Enterprise Governance model
- Case notes and documents

3.3.7. Data Collection

Data collection for this study covered a series of projects that were conducted over a 3 year period. The empirical work comes from assignments involving managing change that is effected and supported using the implementation of ERP systems. At the earliest possible opportunity steps were taken to inform a senior person that part-time research was being undertaken, confirming that the study was unlikely to contain any proprietary information not already in the public domain. Offers were also made to give presentations on the general context of the study, and this was taken up on two occasions. From first deciding to undertake this research the opportunity to take notes and other information was recognised as necessary. The empirical work involved the use of notes from observation and participation in project implementation activities, project meetings, training sessions; some delivered by the researcher and some where the researcher was an attendee, review of project documents and email exchanges. Document review was essential not only in understanding the historical context and background to the project, which needed to be done as part of the researchers ERP project responsibilities, but also informed from a

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[19] As this measure is not based on any independent source, this is not deemed a switch to quantitative analysis, but a way from framing qualitative results for the reader.

research point of view. The primary methods were observation and informal discussions with work colleagues and client employees assigned to the projects. Many of the observations documented and used in this study were unplanned, like issues being raised during a training session or comments made during a meeting. The "water cooler" and coffee machine were also good places for brief discussions. From these it's was possible to get a feeling for what it was like being an actor and a participant in the change process represented by the ERP implementation. These methods were repeated as a natural matter of course in each of the cases cited.

In two of the cases the researcher also had the opportunity to attend annual staff presentations given by senior management to all staff, at which amongst other things, the importance of the ERP implementation was highlighted as a key part of the strategy for change in the enterprise. Again these occasions and "away-days" presented opportunities for informal discussions which gave further insight into the companies and the issues that mattered to participants.

People spoken to were of varying levels within the companies and included operations directors, finance directors, IT directors, help desk operatives, shared service centre operatives, internal audit and other line managers and personnel. Especially when delivering training courses, operational issues would be raised that would highlight conflicts with how the system was being configured. The author was also the participant observer in project progress meetings, user group meetings and on some occasions had to do some work shadowing colleagues as a way of understanding user requirements.

In the early part of this study, a research log was kept, with a view to collecting data that would be analysed to the benefit of IS practice. The research domain was known though the exact research question was not formulated at the outset. The data collected was such that several research questions could be addressed, this is a form of flexible research design (Robson et al., 2002). However, knowing the research would be partly anecdotal; the following principles guided data collection. (Coughlan and Coghlan, 2002).

- Research organisational behaviour literature to help focus the observation
- Include sources of information about norms for organisation behaviour
- Include a specific aim to focus on an area and a type of phenomenon

- Write up observation notes as soon as possible to preserve essential details
- Include a description of the organisation
- Write up detailed description of the observation
- Include details of the organisation behaviour and details of the context in which that behaviour occurs

In summary, multiple sources of methods (instruments) (Yin, 2008) were used to access an assortment of data sources:

- Documents: Management reports, financial reports, business plans, project book, minutes of meetings. The documents were used to corroborate and augment evidence from other sources.
- Observation: Seeing new structures emerge especially with the creation of shared service centres in some cases. The observational evidence provided additional information about the issues involved in enterprise structural transformation.
- Attending pre-arranged and spontaneous meetings concerning the restructuring or business units and processes.
- Interviewing (open unscripted) different users and other actors involved in the implementation process:
- By interviewing multiple actors triangulation was applied to the study research.

These data collection methods resulted in large volumes of qualitative and textual data; comprising meeting transcripts, field notes and document references.

A data table characterising each case study is also given at the beginning of each case, summarising its key features and reason for using it. This helps ensure that each case has been selected correctly and can be easily compared and contrasted later on during the cross case comparison. Additionally, each case study has its enterprise type characterised. Further, each proposition, from the literature review, is explicitly discussed in the context of each case.

3.3.8. Use of Focus Groups

At each site attended, the researcher sought validation of the research study and findings to date through the use of focus groups. Fellow practitioners, consultants, were invited to attend a short presentation about the study, after which there observations were solicited. The invitation was extended on the basis that the study may offer an insight into phenomena of relevance to their own work and practice. Participants were invited to offer their observations as to the relevance of the research questions, from a practitioner's perspective, and the validity of the findings presented to that point. Four such presentation

sessions were held and in each case participants, with the researcher's guidance, were encouraged to make observation of relevance from their own practical experience, with the given assurance that their own and their present or past clients confidentialities would not be compromised, and no direct reference to their comments would be made in the study. The main purpose of the sessions would be to help and guide the data analysis of the selected cases.

Presentations were given in a variety of settings; on one occasion this was in the office after the working day, on another occasion a lunchtime 'brown bag' presentation was given, where attendees brought their own lunch to the session, whilst two sessions were held as part of consultants networking meetings. The same participants did not attend all these sessions.

Whilst the debates and discussions were bounded by the research topic, the participants were encouraged to examine the subject freely. In some instances there was often a need to prevent participants from steering discussions onto the treatment of their own 'pet' subjects, as well as ensuring that one or two individuals did not dominate the sessions, creating an inaccurate view of what users' overall opinions are. Another, difficulty encountered was that in some cases attendees felt that 'it had all been said and felt unable to contribute to the session. This was some people's way of succumbing to 'group think' wherein people expressed an opinion which was in line with the rest of the group even if that opinion was at odds with their personal opinion. Time was a constant limiting factor, especially in the case of the lunchtime session, with little certainty that all contributions that could have been made had done so in the time available. Invitations to submit further comments and observations, to the researcher, seldom yielded anything further.

The groups were used to contribute to the study in several ways; to validate the concepts being presented, to debate the relevance of the study area to practice and to explore the practicability of utilising the research findings for practical purposes. The discussion results helped shape the way in which the case study material was presented and analysed, such that only case material deemed relevant to the research questions were used in the study, as opposed to presenting case studies that represented full project implementation histories or biographies.

When inviting and involving participants, the author sought to ensure that full information about the purpose and uses of participants' contributions was given, recognising that it was best practice to be honest, not pressure participants to speak and manage their expectations fairly as to what the outcome of discussions would be. On the issue of ethics care was taken to assure participants about confidentiality, in particular that no comments would be directly attributed to an individual and that any data obtained from the group would be suitably anonymised before being used.

3.3.9. Epistemological Issues encountered

3.3.9.1. Access difficulties

The settings provided ideal opportunities for ethnographic action research. Tacit approval was obtained from appropriate management within the enterprises being studied, but the primary objective of the researcher was to be a fully engaged team member in the ERP implementation process.

3.3.10. Research Ethics

Research ethics is concerned with the responsibility that the researcher has for the consequences of their research and research outcomes (Iivari, 1991). This study followed the guiding principles set out in the Aston Business School ethical guidelines (ABS Research Committee, 2004, Aston University Research Committee, 2010), both of which conform to the code of ethics developed by the Economic and Social Research Council (ESRC) (Economic and Social Research Council, 2010). In each case an undertaking was given to protect both individual and organisational confidentiality. That protection extends to any publications, including this thesis, that become outputs from the study.

The issue of confidentiality, anonymity and identifiability of the organisations in the study was addressed in a number of ways. Primary organisations are given a pseudonym and any references to the identifying characteristics are general. No key data not already in the public domain was used or referred to in this study. Given these procedures no negative consequences are envisaged in the case of the case companies.

According to Calvey (2008), professional ethics has been centralized around the doctrine of informed consent with covert methodology being frowned upon and effectively

marginalized as a type of 'last resort methodology'. Ethical issues also tend to arise where there is a degree of conflict between the researcher's personal interests and his or her professional interests (Easterby-Smith et al., 2002). In the case of this study the primary ethical issue was that the researcher was working as a de facto employee and research was not an explicit part of the contract. In these circumstances, demanding consent would give rise to what Calvey (2008) terms" the 'consent to what' problem, in that social research is often contingent and all probabilities cannot be covered by the consent form", in such circumstances the easy answer is more likely to deny consent or refuse the researcher the contract assignment altogether. However, in all cases the researcher made his managers aware that he was conducting part-time research and also the nature of that research. As this research was mainly about observations at a corporate level, there was no risk of putting any one individual's, or groups of individuals, jobs at risk. Also there was no intention, or need to quote any person directly, nor was there a need for comment on the behaviour or decisions of post holders.

3.3.11. Summary

The overall research is shown in figure 3-3 below:
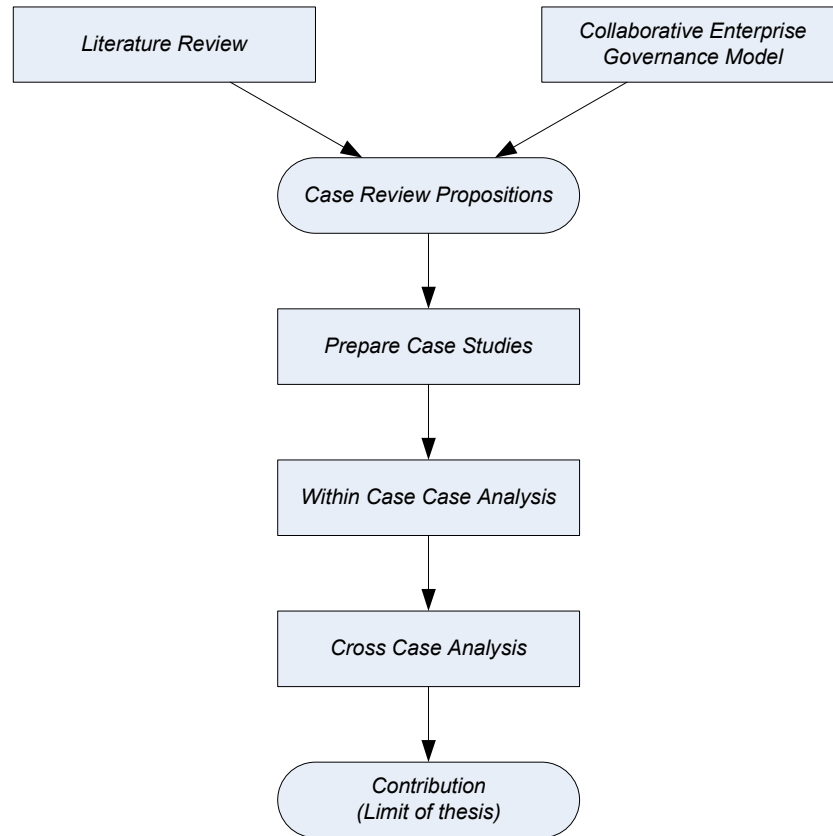
Figure 3-5 - The Research Approach

The benefits to be derived from a research project depends not just on the quality of the research carried out, but on how the research is useable and applicable in settings different to that in which the research was carried out. Central to that is determining the appropriate research method and methodology to use to carry to out the research at the outset and these in step have to be consistent with the researcher's own philosophy or world view. Subject to further literature review and analysis, each of the methods examined in this paper so far appears appropriate to a study of Information Management in the ERP and enterprise structure domain.

4. CASE STUDIES

4.1. Introduction

From the epistemological context outlined in the previous chapter, the purpose of this study is to develop a better understanding of how ERP implementation can affect enterprise structures and conversely the aspects of Enterprise structures that affect ERP Implementation effort outcomes. Previous chapters examined the literature as it related to both ERP and Enterprise structure; presented a model through which the relationships between enterprise structures and ERP implementation could be examined and developed a framework (template) for judging the applicability of the structuration theories through template analysis. The purpose of this chapter is to examine these phenomena using six real case studies.

This chapter presents the six cases, focusing on a detailed description of the enterprise structure per case. Each case concerns a public company. The companies studied are selected on the basis that they offer a sufficiently diverse range of organisations from which to study the relationship between ERP and enterprise structure within the context of the criteria discussed in the review of the literature. The companies selected are from a group in which the researcher was an active participant in projects to effect organisational change using ERP systems as a strategic tool to achieve the desired changes. Five of the companies are predominantly service oriented, though products are also supplied, and one company, though a significant element of its offerings are also in the form in the form of (consultancy) services. The data sources are consistent across all cases being notes recorded in case logs pertaining to observations and informal conversations, semi-formal interviews with key project personnel involved in the projects and examination of project documentation and archive material. Data from published Reports and Accounts were also consulted to provide audited and verifiable organisations structure information.

The aim of this chapter is to describe the characteristics of each company, related to the propositions identified from the literature review. In describing the characteristics we are limited by the data gathered through multiple case study research. The most important

limitation is that the primary method of data gathering was participant observation and hence uses soft data, phenomenological interpretation and inductive reasoning. But, all relevant information gathered is used to be able to characterize as accurately as possible the variables. The resulting characteristics per case are the basis for the cross case analysis, which is presented in the next chapter.

The cases are described using a standard narrative and template. The basis for this standard format is the propositions developed from the literature review. The values related to the variables of the conceptual model will be described per company, based on the observation of those variables in practice, as elaborated in the literature review. Each section starts with some general background of the company. Next we provide an examination of each company in its enterprise setting, comparing its characteristics to those most appropriate for a post internet era enterprise, namely an extended enterprise (Binder and Clegg, 2006). A vertically integrated enterprise has been included to highlight the contrasting characteristics. Finally, the ERP implementation circumstances of each company are discussed, with particular reference to the propositions. A rudimentary score is ascribed to each in the template analysis to provide a basis for comparative analysis

There is no significance to the order in which the companies studied are presented, and each is described in a separate section of this chapter. Whilst, no propriety information is disclosed by this study, the companies are allowed anonymity prior to final presentation of study results.

4.2.   Case One - Project Jupiter at Train Co

4.2.1.   Background

Basic Features	Train Co
Sector	International city to city transfers
Status	Operates a unified management structure. Operations in Paris and Brussels carried out by divisions of the national railway companies.
Owner	2 x 'nationalised' operations, 1 x subsidiary company
Size (Employees) at time of case	Less than 500 direct. Over 1,000 operations personnel, some seconded from the partner operating companies.
Location	Head Office in London; administrative offices in Paris and Brussels
Products/Services	International city to city transfers

Basic Features	Train Co
Competitors	Airlines and Ferry operators
Market	Leisure and Business travellers
Time on Location	12 months (04/2003 – 03/2004)
Role(s) of prime contacts	Finance Director, Head of Finance and Financial Controller
Main project purpose	Set up "unified" company on existing ERP system
Selection Criteria	Major collaborations with other organisations essential to delivery of service, indistinguishable to the consumer. Fit with internet era organisation structure operating as part of an enterprise. Chose to use ERP system as basis for effecting major change in its enterprise structure.

Train Co. operates the high-speed passenger rail service that directly links the UK to the Europe continental mainland via the Channel Tunnel. The service was launched in November 1994 and, at the time of writing, provides up to 17 daily services between London and Paris and up to 10 daily services between London and Brussels. The enterprise targets the business and independent leisure traveller markets with its city centre to city centre services in direct competition with the major airlines and low cost carriers.

4.2.2. Enterprise Structure

Characteristics	Extended Enterprise (EE)	Train Co UK
Core competencies	Tested to some extent, medium risk, has had some testing, understood by innovators	Competence is in marketing and delivering city to city transfers for business and leisure passengers travelling between the UK and the continent. Ability to keep trains maintained and to over a service with over 90% punctuality.
Main drivers	Outsourcing → focus on core competencies. Virtualisation tendencies. Experience of existing partnerships.	City centre to city centre transfers avoiding what is increasingly onerous journeys by aircraft for such relatively short distances.
Prerequisites	Moving beyond supply chain structures. Open minded management. Strong capability in outsourcing.	Services unified under single management, but operations split three ways under 'national' operating structures.
Duration of relationship	Medium - long-term	Relationships are predominantly long term, i.e. in excess of 5 years
Scope of	Often spans whole product life	Strategic and tactical for all

Characteristics	Extended Enterprise (EE)	Train Co UK
relationship	cycle across company boundaries. Strategic and pro-active.	activities other than train operation and maintenance.
Challenge of creation and operation	Choosing core competencies that are valuable to the synergy of the whole enterprise. Design and implementation of business processes → create future VEs. Compatibility among partners IT systems and cultures. Look for market opportunities → create value addedness.	Operations from the UK have yet to make a profit. Different regulatory frameworks in each of the three countries, for instance with regard to safety standards. UK is not part of the Schengen Agreement[20]; this creates its own border and immigration complexities.
Facilitators	Advanced IT Effective electronic management. Use of middleware.	Engineering expertise. Regulatory framework Unified management structure Unified marketing and eBusiness capability. Tracks 'operated' Eurotunnel, a separate company.
Critical issues	Collaboration (strategic dimensions) → Relationship, technology and knowledge management becomes critical.	Fragmented operating structure Political significance. Deregulation will lead to competition from other high speed train operators. Operating information not unified, for instance each operator keeps its own maintenance stocks.
Main features	Common strategy → hollow corporation Trust, loyalty and integration high. Maturing "Meta systems"	Links with other leisure providers such as Euro Disney Actively feeds back into application development ensuring compatibility of applications from different vendors.

Table 4-1 - Train Co UK Internet era characteristics

4.2.3. Discussion of Case Review propositions

Proposition 1: Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported.

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[20] Agreement between countries to gradually abolish border controls for citizens of member states when moving between those countries, creating a "Europe without Borders".

This case demonstrated a unique feature of enterprise structures. In the review of literature we discussed how enterprises can be formed as a way of combining their core competencies in the most optimal combination possible. This was not the case with Train Co; its enterprise structure was not evidently pre or post internet era, as defined in the literature review. The trilateral relationship between Train Co UK, SNCF and SNCB, was to all intents and purposes none hierarchical (Elysium Inc., 2004), however combining the Train Co elements from three systems into one; with their differing cost centre structures, variant sales channels could only have been possible with the functionality and reporting capabilities provided by the ERP system. **(0)**

Proposition 2: ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios.

The argument here is that it was managerial difficulties that presaged the need for the ERP project. On the one hand each of the three operators were making simultaneous contributions to the operations of the Train Co service, however on the other hand it was recognised that the service could not be run in "three ways" at the strategic or even tactical level. Hence from a marketing strategy perspective it was desirable to create a unified enterprise, even if the operational data was being supplied from three different sources. It was also important and desirable to separate out those operational elements, from SNCB and SNCF, attributable to the Train Co service from those of their other domestic and non-Train Co services to provide a single view of Train Co. It was deemed an anomaly that Train Co in the UK was "running at a loss", whilst the French and Belgian operations were profitable (Armitage, 2009, Cave, 2009). **(5)**

Proposition 3: ERP implementation must provide management information for the explicit management of enterprise design factors and design types.

Train Co-operates outwardly as a single enterprise; operationally it is three separate businesses. In such circumstances it is not possible to have a single ERP system to capture all Train Co related management information. **(5)**

Proposition 4: ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits.

For the purposes of this case, business processes affecting all operations of the Train Co brand were specifically excluded. In the case of France and Belgium, these were well interspersed with the domestic operations of each countries national railway. The only recognisable BPR in this instance was in establishing new Train Co wide marketing and sales processes, which would be managed by Train Co Group. **(2)**

Proposition 5: Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed.

Contingency variables such as numbers of employees, levels of ERP user experience, were advantageous to the extent of achieving the project's modest objectives. Users were well versed in ERP, and as the project resulted in more responsibility for the majority of UK users, they would be operating Train Co Group alongside their existing Train Co UK responsibilities, they were also very supportive of the project.

The main management imperative in seeking to restructure the company enterprise was to give the outward appearance of a single entity, but also to provide the means to meet emerging competitive challenges, from both low cost airlines and potential new high speed rail operators, with a unified management focus. **(3)**

Proposition 6: Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process.

It was determined at the outset that this was to be a vanilla project, and no customisations were to be entertained from the outset. Any new functionality required or limitations would be overcome with a business process to work around the problem. **(0)**

Proposition 7: ERP systems are sufficiently robust to cater for contemporary organisation structures provided they are 'designed' into the implementation at the outset.

This case represents an instance where the complexity of the structural changes requiring ERP support was relatively modest; consequently it was relatively simple to design the required changes into the implementation from the initiation stage. **(3)**

Proposition 8: Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes.

Support for the extended enterprise was removed from the scope of the project from the outset. In effect by creating a new organisation to manage non-operational processes such as marketing and ecommerce sales, the existing linkages of the extended enterprise were left in place, with no onus placed on the ERP system to handle them any differently. **(0)**

Proposition 9: Each participant in these post- internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers.

In this case, the use of arm's length cross charges was how the train operating companies coped with operational cross charges, particularly for the maintenance and use of parts stock for the repair of another operating company's rolling stock. Equally, the initial plan was for Train Co Group to similarly charge it operational cost to the operating companies using an agreed allocation algorithm. **(0)**

Proposition 10: ERP can be explicitly deployed to reinforce intentionally restrictive management practices and policies, thereby increasing the scope for collaboration.

There is no evidence of this in the operating companies. However the overriding objective of creating the management company, Train Co Group, was to harmonise not operational activities and business processes. **(0)**

Proposition 11: The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty.

There is no evidence of this in the operating companies. **(0)**

4.2.4. Summary and template analysis

	Case review proposition	Score	Summary evidence from case
1	Whilst ERP systems are comfortably	0	Non-hierarchical structure borne

	Case review proposition	Score	Summary evidence from case
	able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported		out of administrative (and possibly politically negotiated) expediency
2	ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios	5	Using ERP to implement a separate strategic company was the way by which restrictions from Proposition one could be easily overcome
3	ERP implementation must provide management information for the explicit management of enterprise design factors and design types	5	ERP supported the management desire to put the running of the organisation on a quasi-commercial footing
4	ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits	2	Implementation of integrated operations across all operating companies was necessarily designed out of the ERP implementation
5	Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed	3	Only UK contingency variables were given much consideration during the implementation process
6	Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process.	0	The need for customisations were explicitly ruled out of the implementation, irrespective of structural need

	Case review proposition	Score	Summary evidence from case
7	ERP systems are sufficiently robust to cater for contemporary organisation structures provided they are 'designed' into the implementation at the outset	3	Data related to non UK operations were brought into the system as 3rd party information, considered to be externally valid
8	Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes	0	The case offered no evidence to support this factor , as the need to support an extended enterprise was designed out of the system
9	Each participant in these post-internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers	0	It was a requirement that operational interactions were treated as arm's length transactions, each operating company had its own revenue recognition requirements
10	ERP can be explicitly deployed to reinforce intentionally restrictive management practices and policies, thereby increasing the scope for collaboration	0	ERP was deployed as a strategic aid, with no attempt to harmonise operational management practices
11	The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty	0	There is no evidence of this in the operating companies.

Table 4-2 - Template Analysis for Train Co

The ERP part of this exercise was to reconfigure the existing systems to better support the business both currently and in the future, and reflect the structural and operational changes that would result from the Project Jupiter as a whole. The project faced several challenges in that the exact corporate and operating structure for the new organisation had not been confirmed. Also the timescales for the new organisation to become operational was very fluid as it required ministerial assent, as the ultimate ownership of the British part of the business rested with the British government. Hence, the project brief had to be fulfilled in readiness for the first possible opportunity at which that assent could be obtained, and a go ahead for the new structure to become operational. However, the current systems needed to remain operational in a 'business as usual' mode. The initial timescale for the project was eight calendar months. The project team consisted of the researcher on a full time basis, along with secondees, on a part-time basis from various parts of the business. The senior manager from the information systems department was the business project manager.

An additional complexity was the decision, to take the opportunity presented by the project, to implement a Budgeting and Forecasting system to integrate with the ERP system and effectively replace the present system based around spreadsheets. The project was sponsored by the EGL Finance Director and championed on a daily basis by the Head of Finance, with support provided by the company's Financial Controller. The assignment requirements were;

- Define and document current operating processes and procedures
- Facilitate workshops with key operational stakeholders to identify and prioritize operations that would change as a result of Project Jupiter
- Develop a new structure for the business that could be implemented immediately irrespective of a decision on Project Jupiter
- Identify system and process improvements, which could be made to current way of using the ERP system. Implement any 'quick wins'
- Identify and select a suitable cost effective replacement for the current spreadsheets based budgeting and reporting system that would integrate as seamlessly as possible with the ERP system
- Developed process improvement plans for each of the Top 10 quick wins, including client ownership and responsibilities, timelines, and performance targets
- Work in parallel with the information systems technical team to ensure business data that goes into the corporate data warehouse supported holistic business decision making for the business 'as –is' and the proposed new company.

In this case study, the ERP system was configured to allow an existing business and a restructured business to be managed using the same basic systems architecture. No additional training was required to educate users as to the system functionality. The proposed organisation structure was configured on to the system, and it demonstrated how a seamless transition could be achieved if and when the go ahead was given to make the new company operational. Because Train Co. was already operating two legal entities from the same system it was possible to demonstrate how a third could be added with the minimum of disruption.

As an action research case, the actual conduct of the assignment was not a complex exercise. The need for the project itself was subject to a complex regulatory framework and it was conducted without the certainty of ever being implemented. But it serves to demonstrate the flexibility afforded from the use of ERP systems and demonstrates that an enterprise can respond quickly to structural changes imposed on it by the environment in which it operates without the need for complex projects to re-implement or replace existing systems.

This case provided several learning opportunities for the researcher. The need to understand the business environment of the enterprise was very important, as was good technical understanding of the applications currently in use. After nine months it became clear that a quick decision to make the new company operational would not be forthcoming, the decision was therefore taken to complete documentation of the solution, but to leave the new company 'live' on a test environment. The project had been conducted with minimal disruption to the current operations and because of its profile and executive level support had been well received by those actively involved in its conduct.

4.3.   Case Two - Project 21CF at TV Co

4.3.1.   Background

Basic Features	TV Co
Sector	Media company; broadcaster, programme producer and internet content
Status	Public Limited Company
Owner	Shareholders

Basic Features	TV Co
Size (Employees) at time of case	6,000 approx.
Location	Head Office in London; numerous production facilities and studios.
Products/Services	Commercial broadcaster, programme producer (domestic and global) and online delivery of content
Competitors	BBC, BSkyB and other media organisations
Market	Most media and entertainment.
Time on Location	6 months (03/2008 – 08/2008)
Role(s) of prime contacts	Project Director, 3rd party Engagement Directors
Main project purpose	Establish Shared Services Centre for all back office operations and processes
Selection Criteria	Major collaborations with other organisations essential to delivery of service, indistinguishable to the consumer. Multiple collaborations at any one time. Series of mergers and acquisitions had resulted in disparate systems and management practices throughout the organisation. Chose ERP as the basis from which to create new 'single organisation'. Fits with internet era organisation structure operating as part of an enterprise.

This case draws from an assignment that was carried out over the final stages of what was a major business transformation project for TV Co plc. (TV Co). As at the time of this study (2008), TV Co plc. comprised several operating entities, based principally in the UK, but with operations globally, including in the US, Australia and other countries in which the company had operations.

Until 1954, broadcasting in the United Kingdom was a public sector only activity, performed through the British Broadcasting Corporation[21] (BBC, Beebe), which started "public service broadcasting" in 1922, with the aim of informing, educating and entertaining the British public. The Television Act of 1954 made the launch of a commercial television channel possible, in competition to with the BBC, possible. The Independent Television Channel was made up of 15 regional broadcasting regions each owned by a separate company. In 1990 the Broadcasting Act relaxed existing rules and made it possible, in certain specified circumstances, for the regional companies to merge.

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[21] Initially formed as the British Broadcasting Company, the BBC became a corporation in 1927 after being granted a Royal Charter, which gave it independence from government.

4.3.2. Enterprise Structure

Characteristics	Extended Enterprise (EE)	TV CO
Core competencies	Tested to some extent, medium risk, has had some testing, understood by innovators	Competence is in viewer demographics and resultant attraction for advertising revenue
Main drivers	Outsourcing → focus on core competencies. Virtualisation tendencies. Experience of existing partnerships.	Relies on other organisations for analysis of actual and forecast viewer participation key performance indicators.
Prerequisites	Moving beyond supply chain structures. Open minded management. Strong capability in outsourcing.	Operates as the final arbiter on what gets broadcast on the network it controls.
Duration of relationship	Medium - long-term	Relationships are predominantly of mixed duration some long term for a TV series others are one off for a single documentary
Scope of relationship	Often spans whole product life cycle across company boundaries. Strategic and pro-active.	Operational for programming, Tactical for advertising revenue and Strategic for broadcasting technologies.
Challenge of creation and operation	Choosing core competencies that are valuable to the synergy of the whole enterprise. Design and implementation of business processes → create future VEs. Compatibility among partners IT systems and cultures. Look for market opportunities → create value 'addedness'.	Disparate content production and broadcasting businesses were allowed to focus on these activities whilst their back office processes could be combined into a shared services centre.
Facilitators	Advanced IT Effective electronic management. Use of middleware.	TV Co.'s core competence is its access to leading technologies and its domination of the commercial broadcasting landscape.
Critical issues	Collaboration (strategic dimensions) → Relationship, technology and knowledge management becomes critical.	Industry is highly dynamic, volume of merger and acquisition activity is very high. Technology evolves at a very rapid rate. Competition from 'leaner' enterprises
Main features	Common strategy → hollow corporation Trust, loyalty and integration	TV Co has a structural legacy from the way it has evolved resulting in many duplicated

Characteristics	Extended Enterprise (EE)	TV CO
	high. Maturing "Meta systems"	functions Actively feeds back into programme development ensuring popularity of programming as a means of attracting advertising revenues.

Table 4-3 - TV CO Internet era characteristics

4.3.3.   Discussion of Case Review propositions

Proposition 1: Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported.

By virtue of how the company came to be created, through a myriad of mergers over a few short years, this meant that over that time a few problems had accumulated. Overcoming these problems, many of them considered to structural, was a primary objective for introducing a new ERP system to the company. These problems included;

•   There were many and varied business systems still in use, with many customised interfaces created to try and link them together.

•   Similar functions in different divisions were using disparate business processes; equally there was much duplication of effort in data capture and data analysis.

•   The use of spreadsheets and ad hoc reports had proliferated as a way of overcoming the many sources of information.

•   Employee information was held in multiple places depending on how many parts of the business an employee got involved in. There were also multiple payrolls for both employees and contractors.

•   Collaboration activities with third parties had to be conducted as if on an arm's length basis. **(5)**

Prop 2: ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios.

From a managerial perspective, there were no uniform business processes throughout the company. Through the introduction of the new system and the creation of a shared services

centre, the company was able to introduce a uniform face to its third party suppliers and customers. **(5)**

Proposition 3: ERP implementation must provide management information for the explicit management of enterprise design factors and design types.

This factor was evident in the ERP project. Data flowed through common interfaces into a common repository. Most back office systems were made uniform, and there was less need for manual data manipulation. However, not all operational and production systems were able to be harmonised, hence not all data capture could provide common levels of assurance. **(5)**

Proposition 4: ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits.

This was a stated aim for the project, however some processes extended beyond the reach of the ERP system and not all desired benefits could be realised. However, the common platform gave scope for improvements as more and more business processes could be brought within scope of the ERP system. **(5)**

Proposition 5: Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed.

Putting many business processes, such as staff hiring, training and payroll within the realm of the shared service centre meant that many contingency factor related issues could be designed out of the system. The project demonstrated that this factor was present in this case. **(5)**

Proposition 6: Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process.

The objective to aim for a "vanilla implementation[22]" was very evident in this case, and was a high priority of the implementation team. **(5)**

Proposition 7: ERP systems are sufficiently robust to cater for contemporary organisation structures, provided they are 'designed' into the implementation at the outset.

TV CO avoided any embedded structure issues by mandating at the outset that any new systems would be implemented without customisation. The company's structure, and the structure of the enterprise of which it was a part was too fluid for it to impose on any new system.

The commissioning of "content", as programmes and other outputs are called, are organised as projects. A project is usually managed by a commissioning editor, who is ultimately responsible for getting a programme broadcast. The activities involved in producing a programme are further broken down into operations earlier discussed. Any or all of those operations may be outsourced to a partner, just as it is possible for TV CO to produce a programme entirely for a 3rd party broadcaster. Each stage, depending on the size of the production may be further outsourced for instance the studio may hire in props specialists, a specialist producer brought in may insist on using specialist stunts teams, location managers may bring in a specialist catering company and so on in a series of sub projects a programme, fit for broadcast, is put produced. These subprojects are delivered by firms that are typically connected to each other via tried and tested collaborations based on recurrent exchange and mutual trust. In addition, due to interdependencies between activities and tasks required to produce a programme, divisions and departments interlink in collaborative activity, fulfilling the characteristics of an extended enterprise, with TV CO as the core organisation. **(5)**

Proposition 8: Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes.

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[22] ERP implementation with few or no customisation

Project focus was on creating uniform business processes within the boundaries of the enterprise. Through the use of e-commerce, the aim was to eliminate the need for binding collaborators to operate in a uniform manner. **(5)**

Proposition 9: Each participant in these post- internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers.

TV co engaged in multiple collaborations, alliances and partnerships, but for revenue recognition purposes, it 'bought in' much of its content from third party organisations; this factor was considered and designed out of the ERP implementation. **(0)**

Proposition 10: ERP can be explicitly deployed to reinforce intentionally restrictive management practices and policies, thereby increasing the scope for collaboration.

The project had this as a main objective. For example processes related to staff expense policies and approval of payments were harmonized and enforced through the shared services centre. **(5)**

Proposition 11: The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty.

There is no evidence of this in the operating companies. **(0)**

4.3.4. Summary and template analysis

	Case review proposition	Score	Summary evidence from case
1	Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported	5	ERP adopted explicitly as a means to overcome structural problems that had built up as the company evolved to its current state.
2	ERP implementation needs to cater	5	Harmonisation of operations was a

	Case review proposition	Score	Summary evidence from case
	for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios		stated goal of the implementation, with common processes being devolved to a shared services centre
3	ERP implementation must provide management information for the explicit management of enterprise design factors and design types	5	All operational data was brought together into a single business intelligence reporting repository for the provision of management information in a common format
4	ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits	5	The project aimed to introduce common commercial (not operational) processes to all operations
5	Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed	5	Moving to a shared services model was a adopted as a way of diluting the risks posed by constantly changing contingency variable
6	Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process	5	The needs for customisations were explicitly ruled out. Processes that could not be harmonised were deemed operational
7	ERP systems are sufficiently robust to cater for contemporary organisation structures provided they are 'designed' into the implementation at the outset	5	This was demonstrated by the case evidence and was designed into the need for a shared services centre

	Case review proposition	Score	Summary evidence from case
8	Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes	5	Collaborations occurred on a continuous basis and to support what was a relatively fluid operational structure, TV Co chose to implement the complex "Projects" ERP module to support the virtual project organisations that realised short term operational requirements
9	Each participant in these post-internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers	0	Partner operations were dealt with on this basis, as no virtual 'shared' companies were formed. The prerogative to recognise revenue for shareholders reporting dictated this requirement
10	ERP can be explicitly deployed to reinforce intentionally restrictive management practices and policies, thereby increasing the scope for collaboration	5	The adoption of the shared services model served to harmonise many operating practices, for instance in the areas of procurement and staff expenses
11	The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty	0	There is no evidence of this in the operating companies.

Table 4-4- Template Analysis for TV Co

The project proposal, after extensive business process analysis conducted by independent management consultants, was to 'outsource' the processing of financial transactions and

data within TV Co to a 'captive' Business Services Centre. TV Co is a media company that operates regional television broadcasting companies that comprise the 'independent' television network in England and Wales, as opposed to the British Broadcasting Corporation which is effectively a public sector enterprise and quango[23]. The TV Co Network in England, Wales and southern Scotland. At the time of this case the company operates eleven of the fifteen regional television franchises that made up the TV Co Network. The company was created as a result of a series of mergers, commencing in the early 1990s, between the various companies that held independent television broadcasting franchises. The final two companies, Granada plc. and Carlton Communications plc. merged in 2004, to create TV Co Plc. Ignoring the myriad of legal entities that remain subsidiaries of the company. TV Co is effectively made up of three divisions; **Broadcasting** (including online activities), **Global Content** (the part that produces programmes or commissions programmes from independent producers; as well as programme sales) and **Commercial** (advertising sales). Domestically the company's main competition is with the BBC and digital broadcasting from satellite and cable companies. Since that merger TV Co has also commenced digital broadcasting using free to air digital terrestrial broadcasting (Freeview) as well as operating franchised channels on other digital networks.

The series of mergers meant TV Co comprised a disparate array of legacy finance systems and finance business processes supporting the business. It was felt that there were benefits to be realised in streamlining the business processes and implementing integrated systems. This would allow the re-positioning of the finance function as an integrated business partner supporting the business commercially. It was also felt the company would benefit from the creation of an in-house centralised Business Services Centre. The principal expected benefits being improved financial control through streamlined business processes.

The 'transformation' would require the implementation of changes across several key areas, both structural and culturally. The structural changes included realigning the various business units and legal entities that the unified company had inherited, developing a change in focus for the finance function from transaction processing to business support and

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[23] Quasi-Autonomous Non-Governmental Organization

creating a business services centre to take over all transaction processing and non-specialist finance functions. The shared services centre in particular was to bring together several key business functions such as payment processing, procurement and payroll. At a high level the business processes that will be centred on the BSC include:

- Record to Report – Financial and Management Reporting
- Order to Cash – Customer orders, invoices and processing cash receipts
- Purchase to Pay – Supplier orders and payments
- Projects – Programme development (TV Co and 3rd Party)
- Assets – Procurement and management of corporate fixed assets
- Contract to Leave – Personnel (Human Resources) management and payroll.

The project team comprised personnel from 3 different groups

- TV Co staff, augmented by freelance contractors
- Consultants from a specialist Integrator
- Management Consultants from a leading consultancy firm

The project team structure, with its various stakeholders and the extent to which they are involved in its core activities of providing broadcasting, programme production, programme sales and advertisement sales, made for a very complex project environment. Given these complexities, the 21CF Project was a complex and detailed project from the outset. In summary, the project phases were:

The project established some design principles at the outset. These were to create a structure that would;

- Support the capture of data at a single point, such that there will always only ever be a 'single version of the truth'.
- Have rewarding roles and responsibilities that were clearly aligned to the business processes.
- Places work at the place that it can be carried out with the optimum efficiency.
- Promotes ownership and responsibility for new processes, with clearly defined handovers, accountability and responsibility.
- Train people in their roles not the systems.

4.4. Case Three - Global Transformation at Alu Co

4.4.1. Background

Basic Features	Alu Co

Sector	Aluminium and aluminium products manufacturer
Status	European Division of US multinational
Owner	US Holding company
Size (Employees) at time of case	100,000 approx. worldwide
Location	Headquarters in Pittsburgh, USA. European Head Office in the Netherlands. Operations in over 40 companies
Products/Services	Aluminium ore (Bauxite), aluminium ingots, aluminium sheets, automotive products.
Competitors	Rio Tinto Alcan, Rusal
Market	Aluminium products
Time on Location	24 months across 3 principal sites (04/2001 – 07/2002)
Role(s) of prime contacts	Project managers, project directors, senior managers
Main project purpose	Global restructuring and establish cascading shared services centres
Selection Criteria	Major collaborations with other organisations essential to delivery of service, indistinguishable to the consumer. Fit with internet era organisation structure operating as part of an enterprise.

Alu Co came into being in 1888, when the founder, discovered a smelting process that made the extraction of aluminium a commercially viable process. Since that time, the resulting company he founded became the world leader in the production of aluminium, alumina and fabricated aluminium.

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4.4.2. Enterprise Structure

Characteristics	Vertically integrated enterprise (VIE) (Linked Enterprise)	Extended Enterprise (EE)	Alu Co
Core competencies	Mature, well accepted, tested and widely usable	Tested to some extent, medium risk, has had some testing, understood by innovators	Competence is demonstrable all along the value supply
Main drivers	Control	Outsourcing → focus on core competencies. Virtualisation tendencies. Experience of existing partnerships.	Research and development and technological prowess. Scale of operations. Clients outsource to Alu Co, it acts either as an extension to their own R&D departments

Characteristics	Vertically integrated enterprise (VIE) (Linked Enterprise)	Extended Enterprise (EE)	Alu Co
Prerequisites	Large financial resources. Strategic plans for acquisition	Moving beyond supply chain structures. Open minded management. Strong capability in outsourcing.	Support for primary and tertiary research
Duration of relationship	Foreseeable as permanent as long as competitive	Medium - long-term	Relationships are predominantly long term, i.e. in excess of 5 years
Scope of relationship	Unity of command and control. Focus on scales of economies rather than on extension and virtualisation	Often spans whole product life cycle across company boundaries. Strategic and pro-active.	Strategic, especially for organisations seeking new applications for aluminium.
Challenge of creation and operation	Emphasis on removal of legacy systems. Standardisation and corporatisation	Choosing core competencies that are valuable to the synergy of the whole enterprise. Design and implementation of business processes → create future VEs. Compatibility among partners IT systems and cultures. Look for market opportunities → create value addedness.	Sustainability and the environmental impact of operations is a major challenge
Facilitators	In-house development of proprietary systems	Advanced IT Effective electronic management. Use of middleware.	Alu Co.'s core competence is its access to leading technologies and its expertise in research and development.
Critical issues	Tend toward industrial dominance	Collaboration (strategic dimensions) → Relationship, technology and knowledge management becomes critical.	Industry is highly dynamic, volume of merger and acquisition activity is very high. Technology evolves at a very rapid rate.

Characteristics	Vertically integrated enterprise (VIE) (Linked Enterprise)	Extended Enterprise (EE)	Alu Co
Main features	External trust low. Inflexible. High overhead. Large scale of economy. Tall hierarchy	Common strategy → hollow corporation Trust, loyalty and integration high. Maturing "Meta systems"	Alu Co is active and a major factor all along the aluminium value chain; from mining to consumer applications.

Table 4-5 - Alu Co Internet era characteristics

4.4.3. Discussion of Case Review propositions

Proposition 1: Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported.

Alu Co is easily the largest single organisation in this group of case studies. It comprises 100s of legal entities, subsidiaries and has collaborative alliances with many other companies. **(5)**

Proposition 2: ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios.

Alu Co partners and collaborates with many organisations all along its value chain and consequently could be deemed to be part of multiple extended enterprises. A structure currently far too complex to be adequately handled by a single system. The reality was that the implementation threw up many conflicts between the requirements from different enterprises. A structure that was satisfactory to manufacturing would conflict with the requirements of wholesale for instance. **(5)**

Proposition 3: ERP implementation must provide management information for the explicit management of enterprise design factors and design types.

This was the stated aim in the project blueprint (project initiation and system design document). **(5)**

Proposition 4: ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits.

The overriding mandate given to each deployment team was that as far as was possible the core solution was to be adhered to. Requests for enhancements or customisations would

only be considered, again, where legal or strong local business requirements made them necessary. To ensure there were no adverse impacts on existing functionality, as the whole project was on a single instance, testing and regression testing needed to be rigorous. **(5)**

Proposition 5: Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed.

Comprise was necessary at every step as the organisation proved to be too complex to adequately cater for the consideration of all contingency factors. **(5)**

Proposition 6: Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process.

The enterprise proved to be too complex, with many conflicting requirements for a single system, not customising was not an option. **(5)**

Proposition 7: ERP systems are sufficiently robust to cater for contemporary organisation structures, provided they are 'designed' into the implementation at the outset.

It was not possible to fully map out the structure prior to the commencement of implementation, hence the need for adjustments due to structural 'discoveries' were continually being required **(5)**

Proposition 8: Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes.

In many regards this factor was very evident in this case. Structural homeostasis was perpetually out of reach and in this case the effort required for implementation was considerable and is on-going. **(5)**

Proposition 9: Each participant in these post- internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers.

The revenue and profit recognition prerogative again meant that some form of arm's length reporting discipline was necessary. **(5)**

Proposition 10: ERP can be explicitly deployed to reinforce intended management restricting policies.

Almost on a pyramid basis this was evident in this case. The shared service model was deployed incrementally at area level (with a single country), then country level, geographic region and so on as a means to gradually impose managerial policies throughout the enterprise.

The study demonstrates how an enterprise resource planning system emerged as a key component of an enterprise wide IT infrastructure (Weill et al., 2002)It focused only on the ERP although the other elements of the IT infrastructure are acknowledged. The implementation of the ERP system provided a base for the IT infrastructure within Alu Co Europe (EBS).

The scope of ERP system in Alu Co Europe was most of the modules in the manufacturing and order management segment provided by Oracle. These included sales and distribution, production planning, materials management including the inventory management and warehouse management, quality management, and the financial accounting modules. During the use, the module portfolio has increased with the export control and transportation modules for instance. After the implementation in the last site in Brazil, the human resource management module has been implemented. The scope of the implementation was extensive, covering the whole supply chain management and related financial flows.

Although Alu Co Europe has only one instance in use, the actual production system (Prod), several Oracle systems (instances) for different use such as for development purposes, for testing, and for training would be created.

This required significant coordination of resources. In Oracle 11i, the Alu Co organisational and business structure is defined in the enterprise model. This data describes how the focal firm is represented in the ERP system. Authorization is managed separately in on Oracle

environment. It is also used to direct the functionality of the ERP system and to provide the means to restrict the access rights of users to the organisational units that users are responsible for. End users can have access to single organisation, or multiple e.g. country or global accesses. Employees have a user authorization for the productive system of Co A. The majority of the users are from the Alu Co Europe organisation. The number of users changes on a daily basis while the ERP system is introduced into other business divisions, however potentially every employee, consultant and guest from another region could be a system user. **(5)**

Proposition 11: The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty.

There is no evidence of this in the operating companies. **(0)**

4.4.4. Summary and template analysis

	Case review proposition	Score	Summary evidence from case
1	Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported	5	Enterprise structure too complex for a single ERP system, the need to continuously revisit the system configuration due to reorganisations.
2	ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios	5	IT was found that varying roles often yielded conflicting requirements within the one system
3	ERP implementation must provide management information for the explicit management of enterprise design factors and design types	5	This was a stated objective, but demonstrably difficult to confirm as having been attained

	Case review proposition	Score	Summary evidence from case
4	ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits	5	The shared services model was adopted as a means of addressing this proposition.
5	Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed	2	The enterprise structure was far too complex to make pursuit of this aim a top priority, but recognised that the shared service model served to dilute the impact of some of these
6	Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process	0	Following an embedded structure was not possible. It was discovered that different module within the same ERP system adopted differing and conflicting embedded structure. Customisation was a necessity.
7	ERP systems are sufficiently robust to cater for contemporary organisation structures provided they are 'designed' into the implementation at the outset	0	The enterprise structure was far too complex to make pursuit of this aim a top priority.
8	Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes	5	The complexity of this case supports this proposition, greater on-going effort was required for the ERP implementation
9	Each participant in these post-internet era organisation forms will need to configure its input into the	0	The revenue and profit recognition prerogative

	Case review proposition	Score	Summary evidence from case
	collaboration and "account" for its collaborators as arm's length suppliers		
10	ERP can be explicitly deployed to reinforce intentionally restrictive management practices and policies, thereby increasing the scope for collaboration	5	Shared services model
11	The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty	0	There is no evidence of this in this case.

Table 4-6- Template Analysis for Alu Co

This case, which covers activities that preceded and succeeded the author's period of active participant observation, demonstrates how the use of information systems evolved over time. The case also demonstrates how the ERP system implementation was instrumental in supporting multiple enterprise restructures. It not only enabled the restructuring of legacy functions, was vital to the ability of the enterprise to embrace the Shared Services centres concept.

4.5.   Case Four - Global Transformation at Mobile Co

4.5.1.   Background

Basic Features	Mobile Co
Sector	Mobile Telephony
Status	UK division of UK multinational mobile network operator
Owner	UK holding company
Size (Employees) at time of case	70,000 approx. worldwide

Basic Features	Mobile Co
Location	Berkshire, England
Products/Services	Mobile telephony services for businesses and individuals
Competitors	In the UK; O2, Orange, 3, T mobile and other virtual network operators
Market	Mobile telephony
Time on Location	6 months (07/2004 – 12/2004)
Role(s) of prime contacts	Head of Finance, Financial controller, 3rd party supplier engagement manager.
Main project purpose	Major enhancements to newly implemented ERP system
Selection Criteria	Major collaborations with other organisations essential to delivery of service, indistinguishable to the consumer. Grew rapidly in a very short space of time, through the acquisition of many overseas subsidiaries, many of which were in enterprises of their own. Chose to use ERP as a basis for reinforcing central control and rolling out management practices, particularly with regard to acquired collaboration partners. Fits with internet era organisation structure operating as part of an enterprise.

Mobile Co, its name is an acronym for the services it offers over mobile phones, began mobile phone services in the UK in 1985. In the intervening years it pursued a strategy, through successive chief executives, of global expansion through acquisitions, mergers and partner agreements.

4.5.2.   Enterprise Structure

Characteristics	Extended Enterprise (EE)	Mobile Co
Core competencies	Tested to some extent, medium risk, has had some testing, understood by innovators	Company pioneered mobile communications and aims to be an early adopter of key new technologies
Main drivers	Outsourcing → focus on core competencies. Virtualisation tendencies. Experience of existing partnerships.	Aim is to reduce to a few key strategic supply relationships
Prerequisites	Moving beyond supply chain structures. Open minded management. Strong capability in outsourcing.	Company has grown through joint ventures and acquisitions
Duration of relationship	Medium - long-term	The technologies take many years to develop and test – in many cases one company can never bring them to market on its own.
Scope of relationship	Often spans whole product life cycle across company boundaries.	Strategic, spans the supply chain and none core operations like

Characteristics	Extended Enterprise (EE)	Mobile Co
	Strategic and pro-active.	HR.
Challenge of creation and operation	Choosing core competencies that are valuable to the synergy of the whole enterprise. Design and implementation of business processes → create future VEs. Compatibility among partners IT systems and cultures. Look for market opportunities → create value addedness.	New services in the pipeline include mobile commerce (m-commerce) allowing integration with parking meters, vending machines, mobile banking, bill payments, satellite navigation and traffic/travel information as well as television, video and music on demand.
Facilitators	Advanced IT Effective electronic management. Use of middleware.	Move towards single group platform for Call centres, network operations, logistics network, ERP systems, CRM systems, Retail operations systems, data centres and billing systems – Strategy is to design a solution once then deploy it many times globally. Outsource IT Application Development and Maintenance activities Centralise network supply chain management, dealing with fewer suppliers and fewer systems Consolidate data centres by region Reduce group overheads reduced.
Critical issues	Collaboration (strategic dimensions) → Relationship, technology and knowledge management becomes critical.	Market shift from mobile telephony to composite telephony – customers want to buy broadband + mobile communications + fixed line services as a bundle.
Main features	Common strategy → hollow corporation Trust, loyalty and integration high. Maturing "Meta systems"	Brand is key globally. Support and maintenance of 2G (GSM) and 2.5G (GPRS) distracts from need to exploit 3G licences.

Table 4-7 - Mobile Co Internet era characteristics

4.5.3. Discussion of Case Review propositions

Proposition 1: Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported.

A key instrument in Mobile Co.'s strategy for global expansion focussed on growth through a series of mergers and acquisitions. However, in countries where there were fewer opportunities, the company used a series of Partner Network Agreements. From an ERP perspective, this meant the quality of operational data visible to management was considerably less than was obtainable from operations in which an equity stake was held, especially a majority stake. **(5)**

Proposition 2: ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios.

Mobile Co partnered with companies on several fronts, however the complexity of the operations globally, ERP was operated at a national level, with information only being brought together at geographical levels. The pace of growth and the volume of merger activity meant the focus war on growing revenue and not in cost systems the main area of strength for ERP systems at the time. Though ERP systems evolved from manufacturing systems, Mobile Co had no need for manufacturing modules. **(5)**

Proposition 3: ERP implementation must provide management information for the explicit management of enterprise design factors and design types.

There was no evidence in this case to support this proposition at enterprise level. It was only evident at organisation level. **(5)**

Proposition 4: ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits.

There were no ERP led change initiatives evident from this case. **(5)**

Proposition 5: Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed.

Contingency variable were not an explicit consideration in this case **(5)**

Proposition 6: Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process.

This was not a factor that was evident in this case. **(5)**

Proposition 7: ERP systems are sufficiently robust to cater for contemporary organisation structures, provided they are 'designed' into the implementation at the outset.

This was not a factor that was evident in this case. **(5)**

Proposition 8: Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes.

No explicit attempt to support the extended enterprise through the ERP system implementation. **(5)**

Proposition 9: Each participant in these post- internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers.

The ERP system was at this time, implemented purely to process transactions on an arm's length basis. **(5)**

Proposition 10: ERP can be explicitly deployed to reinforce intended management restricting policies.

This was not evident at enterprise wide level. **(5)**

Proposition 11: The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty.

There is no evidence of this in the operating companies. **(0)**

4.5.4. Summary and template analysis

	Case review proposition	Score	Summary evidence from case
1	Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported	3	ERP deployed more for record keeping
2	ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios	3	This was not a stated aim at the outset
3	ERP implementation must provide management information for the explicit management of enterprise design factors and design types	0	The case offered no evidence for this proposition
4	ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits	0	The case offered no evidence for this proposition
5	Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed	0	The case offered no evidence for this proposition
6	Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in	0	The case offered no evidence for this proposition

	Case review proposition	Score	Summary evidence from case
	the implementation process		
7	ERP systems are sufficiently robust to cater for contemporary organisation structures provided they are 'designed' into the implementation at the outset	0	The case offered no evidence for this proposition
8	Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes	0	The case offered no evidence for this proposition
9	Each participant in these post-internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers	0	The case offered no evidence for this proposition
10	ERP can be explicitly deployed to reinforce intentionally restrictive management practices and policies, thereby increasing the scope for collaboration	0	The case offered no evidence for this proposition
11	The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty	0	There is no evidence of this in this case.

Table 4-8 - Template Analysis for Mobile Co

4.6. Case Five - Enterprise Transformation at ISP Co

4.6.1. Background

Basic Features	ISP Co
Sector	Internet Service Provider
Status	Private Limited company
Owner	Independently owned limited company
Size (Employees) at time of case	Less than 500 approx.
Location	Gloucestershire, England
Products/Services	Internet Services and Website hosting
Competitors	Fragmented market with many competitors
Market	Other ISPs and mobile network operators
Time on Location	12 months (02/2007 – 02/2008)
Role(s) of prime contacts	Director of Information Technology, Senior Project manager, subject matter experts
Main project purpose	Implement ERP system following demerger
Selection Criteria	Major collaborations with other organisations essential to delivery of service, indistinguishable to the consumer. De-merged from subsidiary that out grew it (the parent). Sought to use ERP to establish new identity and operating structure, especially to be able to present that to remaining major and some cases much larger partners. Fits with internet era organisation structure operating as part of an enterprise.

ISP Co (ISP Co), formerly part of ML (a pseudonym) Group, is a leading provider of managed "on-demand" technology services to mid-sized businesses and public sector organisations in the UK. It was founded by two brothers, and based in Gloucester since 1995; ML Group comprised of ML, the world's leading provider of messaging security and management services to business and its sister company, ISP Co, which provides managed network and hosting services and secure email networks for all its clients. Formerly ISP Co Technology Group, the company was re-named ML Group in September2004, mainly as a result of the growth of ML outstripping that of ISP Co Technology from which it had been born in 2000. In 2007, ISP Co Technology Services was spun off from ML Group in a Management Buy Out by the management team in situ. The separation of the two firms was designed to make it easier for each to expand in different directions: ML to continue to grow globally and add to

its portfolio of internet filtering and security services; ISP Co to focus on providing connectivity, hosting, email, and security technologies to its target market of small and medium businesses based in the UK.

4.6.2.   Enterprise Structure

Characteristics	Extended Enterprise (EE)	ISP Co
Core competencies	Tested to some extent, medium risk, has had some testing, understood by innovators	Competence is in customer service and focus on small and medium enterprises
Main drivers	Outsourcing → focus on core competencies. Virtualisation tendencies. Experience of existing partnerships.	Clients outsource to ISP Co, it acts either as an extension to their own IT departments or for really small clients, in place of an IT department.
Prerequisites	Moving beyond supply chain structures. Open minded management. Strong capability in outsourcing.	Operates as a de facto provider of outsourced IT services to its customers
Duration of relationship	Medium - long-term	Relationships are predominantly long term, i.e. in excess of 5 years
Scope of relationship	Often spans whole product life cycle across company boundaries. Strategic and pro-active.	Strategic, especially for organisations that operate as eBusinesses.
Challenge of creation and operation	Choosing core competencies that are valuable to the synergy of the whole enterprise. Design and implementation of business processes → create future VEs. Compatibility among partners IT systems and cultures. Look for market opportunities → create value addedness.	The company focuses on small and medium businesses, but increasing the larger competitors are moving into that sector.
Facilitators	Advanced IT. Effective electronic management. Use of middleware.	ISP Co.'s core competence is its access to leading technologies and its expertise in research and development.
Critical issues	Collaboration (strategic dimensions) → Relationship, technology and knowledge management becomes critical.	Industry is highly dynamic, volume of merger and acquisition activity is very high. Technology evolves at a very rapid rate.
Main features	Common strategy → hollow corporation	ISP Co is closer to software vendors

Characteristics	Extended Enterprise (EE)	ISP Co
	Trust, loyalty and integration high. Maturing "Meta systems"	Actively feeds back into application development ensuring compatibility of applications from different vendors.

Table 4-9 - ISP Co Internet era characteristics

4.6.3. Discussion of Case Review propositions

Proposition 1: Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported.

This case demonstrated how ERP implementations can be used to facilitate what was effectively a demerger. The system provided a structure for the separation of the two companies. **(5)**

Proposition 2: ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios.

As a newly demerged organisation ISP Co strove to explicitly build this proposition into its ERP implementation. Specifically, it did this by implementing every single module within the ERP suite that touched on its supply chain. It comprised the smallest enterprise in terms of participants but it implemented the most modules. **(5)**

Proposition 3: ERP implementation must provide management information for the explicit management of enterprise design factors and design types.

This was a stated objective for this implementation. **(5)**

Proposition 4: ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits.

This was identified as a target objective for the implementation. However as a small organisation, in a small enterprise it lacked the structure to support its on ERP infrastructure, resulting in an on-going need for additional freelance resource to support the complex ERP system it was trying to deploy. The system was far too complex for the enterprise size. **(5)**

Proposition 5: Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed.

Contingency variables were not factored into the system design. The enterprise structure was inadequate for a system of such complexity. But consideration of some variables was a stated implementation objective. **(5)**

Proposition 6: Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process.

This case offered no evidence in support of this proposition. **(5)**

Proposition 7: ERP systems are sufficiently robust to cater for contemporary organisation structures, provided they are 'designed' into the implementation at the outset.

The structure was designed into the system, but it yielded a system that was too complex for the size of organisation. **(5)**

Proposition 8: Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes.

The system that emerged proved to require more effort than could be comfortably supported within the enterprise structure. **(5)**

Proposition 9: Each participant in these post- internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers.

The revenue recognition imperative was again in evidence from this case. **(0)**

Proposition 10: ERP can be explicitly deployed to reinforce intended management restricting policies.

This case offered no evidence in support of this proposition. **(0)**

Proposition 11: The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty.

There is no evidence of this in the operating companies. **(0)**

4.6.4.   Summary and template analysis

	Case review proposition	Score	Summary evidence from case
1	Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported	5	The system was used to facilitate a new structure, but extended to encompass the whole value chain, which was primarily technology driven.
2	ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios	5	The company fulfilled multiple roles within the enterprise, but was structurally too small to realise all benefits on its own.
3	ERP implementation must provide management information for the explicit management of enterprise design factors and design types	5	This was a stated objective.
4	ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits	5	This case offers no evidence that this proposition was actively pursued.
5	Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed	5	No evidence

	Case review proposition	Score	Summary evidence from case
6	Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process	0	There was no embedded structure that adequately represented this case in the implementation
7	ERP systems are sufficiently robust to cater for contemporary organisation structures provided they are 'designed' into the implementation at the outset	5	Complex system
8	Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes	5	Required effort was too much for the structure of the enterprise Proposition could not be supported
9	Each participant in these post-internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers	0	No evidence
10	ERP can be explicitly deployed to reinforce intentionally restrictive management practices and policies, thereby increasing the scope for collaboration	0	No evidence

	Case review proposition	Score	Summary evidence from case
11	The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty	0	No evidence

Table 4-10- Template Analysis for ISP Co

4.7.   Case Six - Global Transformation at Clin Co

4.7.1.   Background

Basic Features	Clin Co
Sector	Clinical Research Organisation
Status	European division of US multinational
Owner	US parent company
Size (Employees) at time of case	1800 approx. (900 before project started)
Location	UK Head Office in Sussex, England & Global Head Office in North Carolina, USA (Operations is 40 countries)
Products/Services	Contract Clinical Research Organisation - conduct clinical trials on behalf of the pharmaceutical and biotechnology industries
Competitors	Over 70 competitors globally, with 3 largest companies controlling a third of the market.
Market	Contract Clinical Research Organisation - conduct clinical trials on behalf of the pharmaceutical and biotechnology industries
Time on Location	10 months (05/2009 - 02/2010)
Role(s) of prime contacts	Group Director of Business Systems, Financial Controller, Head of Finance.
Main project purpose	Merge newly acquired operations onto existing ERP system.
Selection Criteria	Major collaborations with other organisations essential to delivery of service, indistinguishable to the consumer. Acquisition of another organisation that was operationally almost equal in size. Extended use of ERP into acquired operations as a ready means for reinforcing own management practices and operating mechanisms. Structure implemented in ERP system first then rolled out operationally. Fit with internet era organisation structure operating as part of an enterprise.

Clin Co is a leading Clinical Research Organisation (CRO), also known as Contract Research Organisation. CROs are service organisations that provide clinical trial research services to the pharmaceutical and biotechnology industry. Such services provide vital support to the research and development processes for new drugs, medical devices and to validating primary pharmaceutical research. Clin Co manages clinical trials in all selected therapeutic areas through the entire drug development and approval process

4.7.2.   Enterprise Structure

Clin Co, which started some 20 years previously as an academic research organisation, operated as a CRO mainly in North America and Western Europe, with a legal presence in 8 countries. Whist it conducted trials for partners across the full spectrum in terms of stages, it had chosen to focus on certain therapeutic areas. Following a strategic review by one of its main competitors, which meant that according the company's chief executive company chose to focus on its "core competencies in Early Stage" clinical trials (Kumar and Puranam, 2011), the opportunity arose to acquire a whole division of that business, an acquisition that would double the company's head count and increase its country presence from 8 to 16 countries, creating an operational presence in a total of 40 countries. The $50m deal was particularly advantageous as it also meant the company gained operations in South America and Asia. A key feature of the deal was that it involved taking on operational staff only, with an imperative that INC move the operations onto its own systems at the earliest possible opportunity. With that in mind INC established a cluster of transition teams to begin executing the integration of the two companies' customers, employees and services, as well as putting its customer-focused business processes into operation. Led by an internal transition management team, the company committed to quickly completing the integration, so the company's primary focus remained on exceeding the expectations of its customers. The ability to move data between the MDS ERP systems to the INC Systems and merge the acquired business into the existing INC structure was vital in completing the "seamless transition" (INC European CFO) without incurring any penalties on the overall deal. Informed by experience from previous ERP projects, the ERP part of the integration established some clear project related imperatives, some of which were structure related imperatives from the outset, with the aim of pre-empting any structure related problems.

- Integrate MDS GCD into Clin Co as one company.
- Leverage our existing infrastructure, processes, and documentation to efficiently integrate on a global scale
- Prioritize this integration effort as a number 1 priority until completion
- Remove barriers and impediments to ensure completion:
- No changes the global model for the acquisition as this is now one company
- No Customisations to the ERP applications beyond current global design, cost too much $$ and time to maintain, and already works out of the box, needs configuration, not customization

Characteristics	Extended Enterprise (EE)	Clin Co
Core competencies	Tested to some extent, medium risk, has had some testing, understood by innovators	Trusted process of clinical research Relationship management Expertise in getting projects underway in the shortest time and in getting trial results to sponsors.
Main drivers	Outsourcing → focus on core competencies. Virtualisation tendencies. Experience of existing partnerships.	Early adopter of Oracle Clinical, ERP integrated Clinical Data Management (CDM) and Remote Data Capture (RDC) Established relationships with other divisions of newly acquired 'partners'.
Prerequisites	Moving beyond supply chain structures. Open minded management. Strong capability in outsourcing.	Process-driven approach focused on the entire stream of study activities from protocol design to the final study report.
Duration of relationship	Medium - long-term	Clinical studies/ trials can last an average of up to 15 years.
Scope of relationship	Often spans whole product life cycle across company boundaries. Strategic and pro-active.	Strategic, tactical and operational. Pre-clinical studies Phase 0 (exploratory studies Phase 1 (initial human trials) Phase 2 (efficacy and dosage tests) Phase 3 effectiveness trials / approval) Phase 4 (Market surveillance).
Challenge of creation and operation	Choosing core competencies that are valuable to the synergy of the whole enterprise. Design and	The company focuses selected therapeutic areas and heightened expertise in Data

Characteristics	Extended Enterprise (EE)	Clin Co
	implementation of business processes → create future VEs. Compatibility among partners IT systems and cultures. Look for market opportunities → create value addedness.	*Capture and Management in chosen areas.*
Facilitators	*Advanced IT Effective electronic management. Use of middleware.*	*Technology Access to therapeutic experts Relationship with high-quality investigator*
Critical issues	*Collaboration (strategic dimensions) → Relationship, technology and knowledge management becomes critical.*	*Long term nature of projects Relationship management Cost of late stage failures. Technology evolves at a very rapid rate.*
Main features	*Common strategy → hollow corporation Trust, loyalty and integration high. Maturing "Meta systems"*	*Established relationships with partners' means less likelihood of sponsor micro management of studies. Trust in the process-driven clinical research approach.*

Table 4-11 – Clin Co Internet era characteristics

4.7.3. Discussion of Case Review propositions

Proposition 1: Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported.

The main data exchange amongst partners was in the form of clinical trial statistics, this was the focus from which sponsors micro-managed the CRO, should they need to. CRO data highly sensitive to competitors, CDM and RDC systems have not reached the stage of granting access to sponsors. **(3)**

Proposition 2: ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios.

ERP goals were established as sticking to a Global Model, hence management expected to be able to manage the operations seamlessly after the ERP project was concluded. The acquired operations were made to fit seamlessly into the existing enterprise structure made possible by the ERP system. **(5)**

Proposition 3: ERP implementation must provide management information for the explicit management of enterprise design factors and design types.

Management established that the company would remain as "one", only bigger and more global. The emphasis was on changes in the scale of the enterprise rather than the structure. Hence more partners in more countries, but the same business processes. **(5)**

Proposition 4: ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits.

This project set out to exploit existing processes that were proven to work and consequently BPR was specifically excluded. **(5)**

Proposition 5: Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed.

Contingency variables were explicitly factored into the project. The system user population was doubling as a result of the integration, and access to the system was vital to the success of the project. In principle the system used a common database of Human Resource data, both for inputting clinical trial results or statistics and accessing expenses systems to reclaim any disbursements they may have made. **(5)**

Proposition 6: Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process.

From experience in prior implementations, the company was determined to avoid the need for customisations, hence the mantra of configuration not customisation. The determination was that structure would have been moulded to what was in the applications should the need arise. Indeed, one country (Italy) required that government defined chart of accounts be used it was determined that accounts would be translated outside of the ERP system to satisfy that requirement. **(5)**

Proposition 7: ERP systems are sufficiently robust to cater for contemporary organisation structures provided they are 'designed' into the implementation at the outset.

This proposition was not tested out during the implementation and, if anything, was designed out of the project. **(0)**

Proposition 8: Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes.

Owing to the time imperative in this project, issues relating to this proposition had also been designed out of the project. There was no effort to attempt extending support for the enterprise beyond what predicated the integration project. *(0)*

Proposition 9: Each participant in these post- internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers or customers.

INC had invested considerable effort in moulding project management software to its own way of working. This consolidated project information, every trial is set up in the system as a project with the sponsor as the customer, into one repository and integrates with its own database and legacy third-party applications, so that a project's impact on the entire enterprise can be readily tracked and analysed. **(5)**

Proposition 10: ERP can be explicitly deployed to reinforce intended management restricting policies.

In this case ERP was explicitly deployed to not deviate from established management processes, hence ensuring that intended management restricting policies remained unchanged. For example, things such as roles and responsibilities or approval hierarchies were handled by ensuring that every person from the incoming business had their role and job title mapped to an INC equivalent, no new roles were defined. **(5)**

Proposition 11: The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty.

There is no evidence of this in the operating companies. **(0)**

4.7.4. Summary and template analysis

	Case review proposition	Score	Summary evidence from case
1	Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported	3	This industry is highly competitive and systems are yet to reach the level where all organisations in an enterprise trust each other equally.
2	ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios	5	There was some evidence of this in that the case organisation played varying roles or was engaged in different stages/phases of disparate clinical trials.
3	ERP implementation must provide management information for the explicit management of enterprise design factors and design types.	5	This proposition is supported by evidence from this case. The case organisation accounted for its different roles on the same ERP system.
4	ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits	5	This proposition is supported by evidence from this case. The case organisation accounted for its different roles on the same ERP system.
5	Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this	5	Contingency variables were factored in, though the systems were not necessarily able to support them in all instances.

	Case review proposition	Score	Summary evidence from case
	gap will need to be addressed		
6	Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process	5	The ERP vendor had designed in industry best practices into the ERP system and the case organisation resolved to adopt these as far as was possible – at least to start with.
7	ERP systems are sufficiently robust to cater for contemporary organisation structures provided they are 'designed' into the implementation at the outset	0	This was expressly avoided in this case.
8	Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes	0	This was expressly avoided in this case.
9	Each participant in these post-internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers	5	The revenue recognition imperative again made it necessary to record transactions as if carried out at arm's length.
10	ERP can be explicitly deployed to reinforce intentionally restrictive management practices and policies, thereby increasing the scope for collaboration	5	The is strong evidence in this case that this proposition was explicitly pursued, aided by the expanded use of the ERP system

	Case review proposition	Score	Summary evidence from case
11	The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty	0	No evidence

Table 4-12- Template Analysis for Clin Co

For this project the implementation team was tasked with implementing the new combined system as expediently as possible. The existing system was laid down as the benchmark "Global Model" from which no deviations would be tolerated. Expressed exclusion of structural impediments had been laid down by management and these were strictly adhered to. After the project went live on time and the integration timetable was successfully achieved, the was occasion for some of the project team to address issues and deploy work-a-round solutions to structural issues that had to be addressed due to fiscal requirements in certain countries, like Italy and Poland.

5. CROSS CASE ANALYSIS

5.1.   Introduction

This chapter looks at the data from across the cases, seeking to provide further insights into the enterprise structure and ERP, and provide further means to draw generalisations for ERP implementations in complex enterprise structure settings. The case characteristics are presented again for reference in a composite table, Table 5-3, at the end of this chapter. The chapter will conclude by considering an emergent theory based on the examination of the cases.

5.2.   Detailed Analysis – Case Review Propositions

Six cases were selected. The projects selected, were ERP projects within enterprises or parts of enterprises, which complied with the selection criteria established. Information was collated from each of the of the project settings on ERP project purpose, enterprise structure and, project owning organisation descriptions The project analyses were developed from this information. In addition to the information about the information collated, observations from the project sites, interviews, and document analyses were used to develop the case studies. The information provided additional confirmation that the projects met the basic selection criteria.

The main benefit of using case studies in this research is that it is an approach that is consistent with recommendations in the literature; namely that, in a field where theory is relatively underdeveloped, researchers should, adopt an inductive approach to the task of identifying issues for inclusion in their research study (Flyvbjerg, 2006). Using the case data to establish themes through a cross-case analysis is an established case study analysis process (Eisenhardt, 1989, Meredith, 1998a). For this detailed analysis the author uses the case studies to examine the propositions derived from the literature.

Proposition 1: Whilst ERP systems are comfortably able to support Pre-Internet era organisational structures, Post-Internet Era forms are not readily supported.

All of the selected cases involved organisations that were undertaking ERP projects that had major structural implications. In all, but one, Case 3, the project owning organisations was transforming itself in such a way that its structure took on a visibly altered state. In the certain instances (Cases 2, 3 and 4) Shared Service Centres emerged from the transformations being undertaken. Case 3 in particular saw the use of ERP as a means for creating a form of post-Internet Era structure within what remained a pre-internet era (vertically integrated) structure, the Shared Service Centre that emerged stood alone as an 'outsourced' administrative entity. ERP supported the organizations strategy of pursuing what was later to be described as the "T-shaped country organization" (Kumar and Puranam, 2011), in that they were able to "localize customer-facing operations", additionally they were able to create global centres of manufacturing excellence. Whilst in others the ERP implementation was a means by which operations could be focused in radically different ways; Case 1 allowed strategic activities to be separated from operational activities, Case 5 used ERP to support an effective demerger whilst Case 6 used ERP to support a merger of operations without increasing administration costs.

In all cases the project owning organisations were recognising that management effort spent on administration was not as value adding as if it were spent strengthening and focusing on what were the organisations core competencies and their main reasons for being in business. The result is that, the organisations status and role within any enterprise could be significantly enhanced, by the greater focus it could afford to those qualities that qualified it for the enterprise.

However, what is not readily apparent from each project is anything new in the nature of their relationship with their enterprise partners. The ability to exchange more and better data and information could be claimed, but within the systems, these relationships were still represented as if with an arm's length customer or supplier.

Proposition 2: ERP implementation needs to cater for the varying roles an entity may play in an enterprise such that management are empowered in all scenarios.

Most of the enterprises sought to benefit from deploying ERP to this effect. In the Cases 2, 3 and 4, by creating shared service centres this effectively removed the bulk of administrative

functions, such as transaction processing, employee administration and so on, from within the scope of operational management. Operational management were then left to focus on their responsibilities with regard to enterprise and third party relationships. Similarly, in Case 1, strategy activities that applied to the entire Train Co brand were separated from operating companies and broad together into a single entity. Case 6 saw the ability to significantly double operations ably supported an established back office function that was underpinned by an ERP system to which the new operations were simply added. Case 5 was a departure from the rest in that ERP was used to support a demerger, how with ERP, this was made to seem as if nothing had changed to existing enterprise partners. Hence, from a part of an organisation being involved in enterprises, a new whole organisation assumed the same role with no change to the operations of the enterprises being evident.

Proposition 3: ERP implementation must provide management information for the explicit management of enterprise design factors and design types.

All the cited cases put better provision of management information as a key driver for their ERP projects. Better information was essential to the evaluation of decisions already taken, for example to demerge, as well as to inform decisions to be taken. Each company engaged in major collaborations with parts of, or all of, other organisations and each had undertaken a major organisational restructuring. The ERP system was the primary means for gathering and disseminating management information as to post restructuring performance. Provided it is implemented correctly and adequately maintained an ERP system is neutral with regard to the efficacy an organisation's structure.

In Case 1, despite no longer being directly responsible for their own marketing, pricing and other key commercial decisions; operations management in each of the 'member' countries still relied upon management information from the ERP system to use in planning activities related to maintenance planning, stockholding and staff levels, as these depended upon sales forecasts from the commercial unit. Case 2 saw the need to provide management with a 'single organisation' view of activities that was as objective as possible, replacing a multitude of systems that required considerable manipulation of data to derive meaningful management information. Case 3 saw ERP providing management information in greater detail to the centre, where previously country or regional management may have been able

to sweeten any bad news this was no longer the case. Also by stripping out administrative back office functions and costs, central management had a better view of what was happening with operations and manufacturing. Case 4, whilst not manufacturing, the managerial benefits were similar to Case 3, in that more information empowered central management, though these were not touted at the outset. With Case 5, we see ERP allowing a company recently demerged from its de fact parent, being able to carry on its business and present a business as usual front to both its customers and its enterprise partners. Similarly, Case 6 sees management double the operations, from 9 countries to 16 countries, for which they have responsibility, ERP meant the increase in operational scale did not require a similar expansion in management information needs as well as making the integration virtually seamless, apart from some slight modifications to the configuration of the existing ERP systems.

ERP systems are a main contributor to corporate data warehouses and the business intelligence systems that mine them for information. Providing the ERP systems implemented are designed appropriately, management information needs can be met irrespective of how enterprise structure and enterprise design factors. However, again none of the cases demonstrated an ability to provide management information uniformly across organisational boundaries to represent enterprises.

Proposition 4: ERP led change initiatives, including those that involve BPR, need to extend their reach to embrace whole processes to yield ultimate benefits.

Cases 1 and 4 exhibited little or no indication that their ERP project was to enable change led initiatives to occur. In the case of Case 1 discrete processes that were handled by the individual operating companies were amalgamated into a unified but still discrete operation, whilst for Case 4 the introduction of a new ERP system was mostly to replace an existing infrastructure. In both these cases whilst business change could be attribute to the ERP project, this was not the primary objective and hence it was not possible to attribute benefits of process improvements directly to the ERP project. It could be argued that a combination of people and processes would have achieved a similar outcome.

In contrast, in Cases 2, 3, 5 and 6, business transformation was at the heart of their ERP projects. Cases 2 and 3 had the introduction of Shared Services as a key initiative; this necessarily meant the disassembling of established business processes and reengineering them to benefit from the introduction of a unit that had administration and transaction processing as its core competence. Whilst with cases 5 and 6 established administrative functions were made to cater for the operations of new operating units, in the case of Case 5, this was more to do with transferring the business processes onto a new platform. In all these instances, it was a required feature of the projects that the affected business processes were re-examined from end to end to establish the impact the ERP system would have on the new structure or of the new structure on existing systems.

As with other propositions the concept of whether an organisation or parts of the organisations were part of a continuum that extended to a third party organisation, by way of an enterprise, was not a feature of any of these cases. However, by default where, a shared service centre has been established, third party organisations will have to make slight adjustments, such as where they have to send invoices and who they have to raise queries with, and who in both cases may be in a different country or legal entity than they are used to dealing with.

Proposition 5: Contingency variables are seldom explicitly factored into an ERP implementation process, but for an optimal implementation project this gap will need to be addressed.

Contingent variables, such as size (Pugh and Hickson, 1976), technology, political environment are by their nature dynamic variables. Organisations always seek to grow or downsize, governments change, and there are always advances in technology. An ERP system is in the main implemented for a prevailing set of conditions, consequently most of the cases; Cases 1, 3, 4 and 5 did not exhibit any evidence of considering such factors in their ERP project implementations.

Case 2 was replacing several legacy systems with a new single system, whilst Case 6 saw the system user base potentially doubling once the project had completed. In both these cases, the next known change in a contingent variable was factored into the project.

Proposition 6: Enterprises that explicitly consider mapping their enterprise structure against that embedded in the ERP application will experience fewer instances where the need for customisation are required early in the implementation process.

In all cases, a primary concern was to minimise the need for customisations to the ERP system. As part of the ERP selection process there is tacit acknowledgement that the systems embody 'best practice' and hence modifications would only be countenanced for legal or strong business reasons. Consequently, only Cases 2 and 6, considered the need to customise the base application. With the latter, there was a legal prerogative to customise, but a business process change was adopted to circumvent this need, and in the former case, customisations were expressly ruled out of the main project to be considered, if at all, as post implementation improvement opportunities. This gives primacy to the argument that embedded structures within technology "are constituted recursively as humans regularly interact with certain properties of a technology and thus shape the set of rules and resources that serve to shape their interaction" (Orlikowski, 2000, Giddens, 1986)

Proposition 7: ERP systems are sufficiently robust to cater for contemporary organisation structures, provided they are 'designed' into the implementation at the outset.

The shared service centre (SSC), where a business unit is established to provide defined services for one or more other business units, was a feature in Cases 2 and 3. In cases 1, 5 and 6 similar services were offered by a department within one unit to the operations of other units. In all these cases it meant that certain business processes could be viewed with a certain amount of certainty as with regards the ERP implementation. Were any reengineering of business processes to be required, processes that flowed into these areas or business units would not require any re-analysis, and there would be no new business requirements. In planning the ERP implementation there would also be little need for a detailed breakdown of processes with the SSC, unless the SSC itself was to be the focus of the ERP implementation. Case 4, also a "vanilla implementation" offered little evidence that enterprise or organisation structure in the context discussed was a factor in the project.

Proposition 8: Greater effort is required to implement ERP systems to support the virtual or extended enterprise in its purest form as they are not bounded sufficiently for ERP configuration purposes.

This proposition is central to this study in that it is about the post internet era structures, that the whole study aims to examine. All the cases bore elements of post internet era enterprises. This included Case 3 that was essentially a vertically integrated enterprise, however it still had a considerable number of medium to long-term collaborations, joint ventures and partnerships throughout its value chain (Bititci et al., 2005, Krishnan et al., 2007, Tam and Tsang, 2007) .

Three of the cases, namely Cases 1, 4 and 6 specifically excluded any consideration for virtual or extended business forms. All third parties were treated as arm's length customers or suppliers.

Case 2 acknowledged the need to consider extended enterprise characteristics, but initial analysis showed conflict would arise in response to decisions made with regard to Proposition 6, in that customisations were to be avoided as far as was possible. Hence, the decision was taken to 'design out' any processes that gave rise to post internet era structure considerations and treat them as arm's length partner issues.

For Case 3 it was determined that the complexity of the business, was such that any consideration for extending systems capabilities to embrace post internet era enterprise features would result in a system that would be so unwieldy as to be unusable, as well resulting in an endless stream of modifications and error (code) fixes.

Case 5 represented a small to medium enterprise (SME). Here, attempts were made to introduce some post internet era system capabilities; having a view of partner stock levels, queuing maintenance for partner employees and so on. However the resultant system bares no relation to what the vendor supplied and hence, is almost unsupportable. Whilst, initially eschewing customisations (Proposition 6), the number of extensions to the system, make it unsupportable in its original guise.

Proposition 9: Each participant in these post- internet era organisation forms will need to configure its input into the collaboration and "account" for its collaborators as arm's length suppliers.

Case 6 involved an organisation that specialised in certain stages of clinical trials for pharmaceutical companies. To complete these trials it needs to collaborate with other organisations, some in earlier stages and others downstream, all in the form of a clinical trials enterprise. This was the only case where the nature of the enterprise was a feature of the ERP project. However, the need to have fewer arms' length relationships was often cited as a motive behind the expansion in operations and the acquisition of operations that afforded participation in more stages of the clinical trials process.

In the other cases, there was a near total disconnect between the ERP projects and the fact that some third parties were more enterprise partners than third party customers or suppliers.

Proposition 10: ERP can be explicitly deployed to reinforce intentionally restrictive management practices and policies, thereby increasing the scope for collaboration.

Cases 2, 3 and 6, were able through the deployment of ERP able to introduce new management practices. An example from the first two was that procurement practices were made more robust and enforced through the newly established shared service centre, which for instance would always require an approved purchase order before processing any invoices for payment. Similarly, established procurement processes were able to be enforced on the members of the incoming operations personnel in Case 6. Similar, opportunities for control were found in enforcing expenses policies and recruitment policies. What these demonstrated was that irrespective of enterprise structure, certain organisational prerequisites prevailed.

Cases 1, 4 and 5 did not have the need to reinforce management policies at the forefront of their ERP projects. However, the presence of the opportunities to secure these as process improvements after the implementations had been completed were often cited as future considerations.

Proposition 11: The greater the level of uncertainty in the business environment, the state of the collaborations or the confidence in joint tasks being undertaken, the greater the level of information required to manage that uncertainty.

In all the cases examined, there was no evidence offered that suggested an explicit link between prevailing levels of uncertainty in the nature of the enterprise. However, the decision to implement an ERP system is often a tactical response to a strategic requirement (Chand et al., 2005, Kalling, 2003), within the project itself there was no evidence that uncertainty and how to respond to it was a factor. A common factor in the cases was the need to have 'a single version of the truth', as stated by the programme director of TV Co, this eliminated uncertainty in the environment by offering a reconciliation of data from disparate sources.

5.3.   Cross Case Analysis

From the cases some practices can be observed in all the projects.

Proposition	Case 1 Train	Case 2 TV	Case 3 Alu	Case 4 Mobile	Case 5 ISP	Case 6 Clin	Total Support for Proposition (out of 55)	Rank
1	0	5	5	3	5	3	21	4
2	5	5	5	3	5	5	28	1
3	5	5	5	0	5	5	25	2
4	2	5	5	0	5	5	22	3
5	3	5	0	0	0	5	13	=7
6	0	5	0	0	0	5	10	9
7	3	5	0	0	5	0	13	=7
8	0	5	5	0	5	0	15	=5

Proposition	Case 1 Train	Case 2 TV	Case 3 Alu	Case 4 Mobile	Case 5 ISP	Case 6 Clin	Total Support for Proposition (out of 55)	Rank
9	0	0	0	0	0	5	5	10
10	0	5	5	0	0	5	15	=5
11	0	0	0	0	0	0	0	11
Demonstrable link between Structure and ERP (% out of 55)	Y (18) 33%	Y (45) 82%	Y (30) 55%	N (6) 11%	Y (30) 55%	Y (38) 69%		
Overall Rank	5	1	3	6	3	2		
KEY: **0** – The case offers no explicit evidence of considering the structural proposition before or during the ERP implementation. **5** – The case demonstrated strong evidence of considering the structural proposition as part of the implementation process. **2/3**[24] – Degree to which the case gave some indication of supporting the structural proposition, with 2 offering less evidence than 3.								

Table 5-1 - Cross Case Template Analysis

Table 5-1 provides a summary of the cases and the extent to which there was evidence in support, or not, of the case propositions. Significantly, only two of the propositions were supported in more than half of the cases. Propositions 2 and 3, relate to how ERP can empower management through the provision of management information. This further suggests that ERP, whilst well evolved, is still not capable enough for the post internet era

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[24] 1/4 specifically not used on the grounds that these measures add nothing to the argument being made.

enterprise. No case demonstrated this assertion as much as Case 4, which was structurally neutral and where the system was intentionally implemented for information management purposes alone. ERP was an enabling tool for a merger in Case 6, for a de-merger in Case 5 and for organisation restructuring in Cases 1, 2 and 3. In all instances the aims were mandated and few involuntary consequences were experienced, except in Case 3 where structural incompatibilities were experience between the finance part of the enterprise, the manufacturing operations and the ERP system that could be implemented without significant customisation for only one or the other, significantly this was a vertically integrated enterprise.

The summary value at the bottom for each case shows out of a total of 55 the extent to which all the propositions are supported. In this regard, it can be seen that the majority of cases considered the structural aspects of the propositions, though more often than not a decision was taken to ensure structure was not allowed to impact the implementation. Finally, though its total scoring was lower than for other cases, Case 1 was qualified as demonstrating a link between ERP and structure, as it showed support for the two propositions with the highest support across all cases. This served to demonstrate, that enterprise management was aware of the possible impact ERP could have, if not at an enterprise level then at an organisational level.

5.4. Cross Case Comments

The table below (Table 5-2) summarises observations and comments about the propositions and how they relate to the case group.

Proposition	Total Support for Proposition (out of 55)	Rank	Comments on score and ranking
1	21	4	This proposition was well supported and a likely reason is that ERP implementers see all relationships as technically at arm's length. The concept of enterprise as used in this does not yet have a role in ERP implementation. This may also be because the ERP system does not have such a concept embedded within the ERP solution.

Proposition	Total Support for Proposition (out of 55)	Rank	Comments on score and ranking
			Relationships in business are principally with trading partners; suppliers and customers.
2	28	1	The study has ranked this proposition as being very highly ranked. It could be argued that management see ERP as an empowering tool, though not necessarily in the enterprise context, more in the organisational setting.
3	25	2	As with proposition 2 the setting may have a large bearing on the ranking attained here. However, such a ranking is most likely in both organisation and enterprise settings. Management would expect to obtain information about their organisation, and their enterprise module from their ERP systems.
4	22	3	In most cases management made reference to process change on the premise that ERP systems were embedded with their industries respective best practices. For this reason decisions were made to change their business processes to avoid having to customise or extend the ERP application; except where the law in the country of operations left them with little choice or business relations with trading partners could be impaired.
5	13	=7	In the context of ERP this proposition was not well supported, except possibly only in the assignment of roles and responsibilities to do with the ERP system. However, both large and small to medium enterprises wanted to benefit from utilising the best practices embedded within the systems, in some cases having to compromise on "division of labour" best practices due to lack of numbers.
6	10	9	Within the cases selected for study, this was the overriding aim; to avoid customisations as far as was possible. However, that could be to embrace best practices, or because their software vendor cannot offer the same level of support over customisation as for their own software.
7	13	=7	Here also there was little evidence of the cases giving this proposition much consideration.

Proposition	Total Support for Proposition (out of 55)	Rank	Comments on score and ranking
			However, the evidence was more that ERP systems made exchanging data and management information easier amongst organisations. None of the implementations looked like there were seeking to enable post internet era enterprise structures to be supported.
8	15	=5	This was seen to be true with regard to the reference to "bounding" within ERP systems. Virtual and extended enterprise systems within the case group, assuming establishing a service support centre is a form of virtualisation, simply traded amongst themselves by paying for "services" rendered to one another.
9	5	10	The comments for proposition 8 are a direct response to this (9) proposition. Members of an enterprise overcame the "limitations" of their ERP systems by treating each other as buyers and sellers of a service rendered to each other. Of all the selected companies, only ISP was able to tell its final customers that it had partners, but that they were the customer's single reference point. Its partners rarely had to send invoices, their "share" of the customer was contractual and the customer did not see an itemised invoice which showed how much its partners were to get.
10	15	=5	There was some evidence of this proposition in the cases from being used as the basic reason for new expenses and travel policies to ensuring there was proper approve before companies were obliged to pay for goods and services.
11	0	11	There was little evidence of this in any of the cases. The important question was whether or not the software integrator would still be in business until the end of the project. Most of the case companies were including one type of Business Intelligence solution, with Business Data Warehouse, none were considering business environment or the state of collaborations and any uncertainty.

Table 5-2 - Comments on case scores and rankings

5.5.   Summary

Overall, the concept of Enterprise as defined and used in this study was not a factor in any of the implementations. If anything the ERP implementations were a factor in reinforcing existing structures or enabling new organisational, but not enterprise structures. Our emergent theory is that ERP systems as they currently exist do not, or cannot, cater for the post internet era enterprise, whereby an organisation submits or contributes part of itself, as an enterprise module to be a part of an enterprise. Enterprise, as described was not a practical feature of ERP implementations. Where used, the phrase (word) 'enterprise' is synonymous with organisation".

	Train Co	TV Co	Alu Co	Mobile Co	ISP Co	Clin Co
Basic Features						
Sector	International city to city transfers	Media company; broadcaster, programme producer and internet content	Aluminium and aluminium products manufacturer	Mobile Telephony	Internet Service Provider	Clinical Research Organisation
Status	Operates a unified management structure. Operations in Paris and Brussels carried out by divisions of the national railway companies.	Public Limited Company	European Division of US multinational	UK division of UK multinational mobile network operator	Private Limited company	European division of US multinational
Owner	2 x 'nationalised' operations, 1 x subsidiary company	Shareholders	US Holding company	UK holding company	Independently owned limited company	US parent company
Size (Employees) at time of case	Less than 500 direct. Over 1,000 operations personnel, some seconded from the partner operating companies.	6,000 approx.	100,000 approx. worldwide	70,000 approx. worldwide	Less than 500 approx.	1800 approx. (900 before project started)
Location	Head Office in London; administrative offices in Paris and Brussels	Head Office in London; numerous production facilities and studios.	Headquarters in Pittsburgh, USA. European Head Office in the Netherlands. Operations in over 40 companies	Berkshire, England	Gloucestershire, England	UK Head Office in Sussex, England & Global Head Office in North Carolina, USA (Operations is 40 countries)
Products/Services	International city to city transfers	Commercial broadcaster, programme producer (domestic and global) and online delivery of	Aluminium ore (Bauxite), aluminium ingots, aluminium sheets, automotive products.	Mobile telephony services for businesses and individuals	Internet Services and Website hosting	Contract Clinical Research Organisation - conduct clinical trials on behalf of the

	Train Co	TV Co	Alu Co	Mobile Co	ISP Co	Clin Co
Basic Features						
		content				pharmaceutical and biotechnology industries
Competitors	Airlines and Ferry operators	BBC, BSkyB and other media organisations	Rio Tinto Alcan, Rusal	In the UK; O2, Orange, 3, T mobile and other virtual network operators	Fragmented market with many competitors	Over 70 competitors globally, with 3 largest companies controlling a third of the market.
Market	Leisure and Business travellers	Most media and entertainment.	Aluminium products	Mobile telephony	Other ISPs and mobile network operators	Contract Clinical Research Organisation - conduct clinical trials on behalf of the pharmaceutical and biotechnology industries
Time on Location	12 months (04/2003 – 03/2004)	6 months (03/2008 – 08/2008)	24 months across 3 principal sites (04/2001 – 07/2002)	6 months (07/2004 – 12/2004)	12 months (02/2007 – 02/2008)	10 months (05/2009 - 02/2010)
Role(s) of prime contacts	Finance Director, Head of Finance and Financial Controller	Project Director, 3rd party Engagement Directors	Project managers, project directors, senior managers	Head of Finance, Financial controller, 3rd party supplier engagement manager.	Director of Information Technology, Senior Project manager, subject matter experts	Group Director of Business Systems, Financial Controller, Head of Finance.
Main project purpose	Set up "unified" company on existing ERP system	Establish Shared Services Centre for all back office operations and processes	Global restructuring and establish cascading shared services centres	Major enhancements to newly implemented ERP system	Implement ERP system following demerger	Merge newly acquired operations onto existing ERP system.
Selection Criteria	Major collaborations with other organisations	Major collaborations with other organisations	Major collaborations with other organisations	Major collaborations with other organisations	Major collaborations with other organisations	Major collaborations with other organisations

	Train Co	TV Co	Alu Co	Mobile Co	ISP Co	Clin Co
Basic Features						
	essential to delivery of service, indistinguishable to the consumer. Fit with internet era organisation structure operating as part of an enterprise. Chose to use ERP system as basis for effecting major change in its enterprise structure.	essential to delivery of service, indistinguishable to the consumer. Multiple collaborations at any one time. Series of mergers and acquisitions had resulted in disparate systems and management practices throughout the organisation. Chose ERP as the basis from which to create new 'single organisation'. Fits with internet era organisation structure operating as part of an enterprise.	essential to delivery of service, indistinguishable to the consumer. Fit with internet era organisation structure operating as part of an enterprise.	essential to delivery of service, indistinguishable to the consumer. Grew rapidly in a very short space of time, through the acquisition of many overseas subsidiaries, many of which were in enterprises of their own. Chose to use ERP as a basis for reinforcing central control and rolling out management practices, particularly with regard to acquired collaboration partners. Fits with internet era organisation structure operating as part of an enterprise.	essential to delivery of service, indistinguishable to the consumer. De-merged from subsidiary that out grew it (the parent). Sought to use ERP to establish new identity and operating structure, especially to be able to present that to remaining major and some cases much larger partners. Fits with internet era organisation structure operating as part of an enterprise.	essential to delivery of service, indistinguishable to the consumer. Acquisition of another organisation that was operationally almost equal in size. Extended use of ERP into acquired operations as a ready means for reinforcing own management practices and operating mechanisms. Structure implemented in ERP system first then rolled out operationally. Fit with internet era organisation structure operating as part of an enterprise.

Table 5-3 - Summary of cases for cross analysis

6. FINDINGS

6.1.   Introduction

This study makes several contributions to both theory and praxis, and across the domains of enterprise management and IS management. These contributions are discussed below and summarised in Table 6-1.

6.2.   Contribution to Theory

This study contributes to theory in several ways. It offers opportunities to extend the models used in the initial enterprise analysis, whilst also showing where there is little to be gained, from these findings, in modifying or extending others. It contributes to existing literature by bringing the concepts of enterprise management and enterprise structures into the domain of IS Strategy at large and ERP implementation strategy and management and vice versa.

A significant contribution is highlighting the gap between IS theory and attempts at the practical applications of those theories. Of the eleven propositions evaluated in this study, albeit at the enterprise level, very few were being proactively channelled into organisation level ERP implementations. This infers that when the ERP tools catch up with the enterprise concept as used with this study, the task of deploying and fully benefiting from the introduction of ERP will be more challenging.

Chapter 5 developed eleven themes that emerged from the analysis of selected cases with regards to the structural aspects for enterprises of ERP systems implementations. Although these constructs were identified in the literature discussed in Chapter 2, some of them were either new to ERP systems studies or provided fresh perspectives on existing literature.

6.2.1.   -Extensions to Enterprise Matrix

The Enterprise Matrix (Binder and Clegg, 2006, Ajayi and Clegg, 2006) allows the analysis of the core competencies of a company and its ability to deliver them successfully to the enterprises in which it takes part. Extending that matrix to examine the criticality of ERP to those core competitors (Figure: 6-1), and assess if those competencies are soon to be undermined. Whilst this is a contribution to theory, it also offers immediate practical value

to practitioners. A possible rendering of that for one of the case companies is given below. It's worth noting that the ERP critical success factors are not limited to three.

Also the enterprise matrix can be extended in this way for reasons other than an ERP implementation, any major change or threat to the homeostasis of the enterprise can be similarly examined against the entire enterprise or against discrete enterprise modules.

Company: ISP Co Product: Internet Service Provider Environment: Continuous Service		Valued Steps Process Start ←———————————————————→ Process End					ERP Critical Success Factors		
		Connectivity	Networking	Website Hosting	Email	Customer Relationship Management	Information Technology	Structural	Enterprise Operations
high involvement	Brit Tel	Provides access to the public phone system							
	Various Cable companies (e.g. V Media)	Provides indirect access to the public phone system							
	ML Co	Provide internet and email security, especially against viruses, spam, and spyware							
Value Members	Microsoft				Provide CRM software (Microsoft Dynamics) licences		e.g. Using the Same customer reference in all systems	e.g Access to same configuration data for customers	e.g. Having the willingness to share sales leads information own planning purposes
					Provide licences for business applications (SaaS), e.g Microsoft Exchange used for email management or Microsoft SharePoint used for managing documents used in a collaborative working environment.				
	J Networks	Provides secure network access infrastructure (routers)							
	CISCO	Provides network and communications equipment and services							
	VMWare		Provide hosting platform and allied services						
	ZyXEL	Provide Modem and other networking equipment							
Low involvement	IBM Tivoli Software	Provide system management software and software licences							

Figure 6-1 - Enterprise Matrix extended for capturing ERP structural considerations

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6.2.2. -Extensions to Collaborative Enterprise Governance (CEG)

By dint of the Collaborative Enterprise Governance model (Binder and Clegg, 2007a) being an iterative model of which deployment of Enterprise matrices is a key part, it is not felt that extension in any other way would be of immediate benefit and practicality for ERP purposes. However, disciplines other than IS may find attempts at extension to be of benefit.

6.2.3. -Extensions to (Dynamic Enterprise Reference Grid) DERG

This study has focused on post internet era enterprises (PIEE), which have been described as being closer to being extended enterprises than any of the other enterprise types examined for the DERG (Dynamic Enterprise Reference Grid). Once PIEE has been so classified it is expected that it will remain within that quadrant of the reference grid. The grid however focuses on the characteristics that provide its core competences to the enterprise and less on the actual structure of the enterprise. Consequently no immediate advantages are apparent from attempting to extend this tool for the purposes of ERP or IS strategy in general.

6.2.4. -Extensions to body of knowledge / literature

The study contributes to the body of knowledge in a number of ways. It introduces the concept of the PIEE (post internet era enterprise), to the domain of ERP systems and IS strategy. The thrust of this contribution is in highlighting the dichotomy of systems developed as if for single organisations, irrespective of actual size and the reality of parts of these single organisations to an enterprise that is principally under a different enterprise management.

It highlights the fact that an entity may have a variety of roles in an enterprise, a variety of roles in several enterprises and also may possibly have several roles in a single enterprise. Each of these scenarios present different challenges to ERP systems and considerable gaps exist, that have to be managed outside the management systems.

The study identifies the need for explicit provision of management information linked back to the enterprise design types and design factors such as the dynamism of the current business environment, the pace of technological change and the need to manage information flows across operating units that may be parts of different enterprises. The fact

that business processes extend through enterprise modules from different entities presents additional challenges for ERP in this context.

The study highlights the fact that ERP implementations rarely analyse and factor into the existence of contingency factors. The systems are generally implemented for the organisation of 'now', significant changes in how those factors interplay usually results in a system that is no longer fit for purpose and the need for a new system or a reimplementation of the old.

ERP systems often come embedded with 'best practice'; however that is usually best practice for a single entity. Entities that have provided enterprise modules to different enterprises will often find the ERP system doesn't work for the whole organisation, let alone the multitude of enterprises they participate in. They either need several systems or outsource the fulfilment of their management information and ERP needs, or end up with a heavily customised system that is unsupportable by the ERP vendor.

The study also highlights in other ways how the ERP system is designed and is fit for purpose in the single organisation setting, but not where the concept of enterprise adopted here is applicable. Such areas include embedded organisation structures that cannot be configured for virtual enterprises not for post internet era enterprises, where there is a need to exert management influence and control in enterprises comprised of modules from disparate organisations or the greater management information needs that ERP in an enterprise setting demands.

It is acknowledged that the vast improvements and innovations in applying business intelligent applications and the fast data warehouse they can access data from is beginning to address some of the issues these contributions bring to the fore.

6.3.   Contribution to Praxis

6.3.1.   Implications for Organisations and Managers
The implications from this study for ERP users are that in contemplating the implementation, or upgrade, of an ERP system, full consideration must be given to the structure of the enterprise as a whole. Enterprise management need to consider what their business

processes at the enterprise level are and have these as their requirements for the entire system, such that the system will enable them to manage across corporate boundaries.

For this to happen, enterprise management must actively engage counterparts from partner organisations at the start of the requirements engineering stage of any new applications.

Conversely to the previous point, the management of organisations have a need to manage certain aspects of their business in such a way that management information is readily compiled from disparate ERP systems in use in organisations that an enterprise module may have emerged from, seamless integration of data, from such systems is a necessity.

6.3.2. Implications for ERP Implementation Practitioners

The aim of this study is to contribute to a rounded and grounded understanding of the Information Systems implementation process, in particular of the Enterprise Resource Planning Systems implementation process. Most studies focus on the mechanics of the ERP implementation process, it is now imperative on practitioners to demand from software vendors what they know the enterprise community would like to take advantage of (*Deloitte Research*, 2002).

In many ways, implementing an ERP for the extended enterprise should be no different to implementing within a single organisation. The structural imperatives remain largely the same in that the configuration of the structure within the system is to represent the tasks that are to be done within the enterprise and to also show how those tasks relate to each other. As with a single organisation, business processes of the enterprise, where corporate boundaries are being crossed, will have both structural and operational elements, and the ERP system must be able to reflect that as well as be able to reflect changes to the structure as and when they happen, which in today's dynamic environments is frequently.

6.3.3. Implications for ERP Application Providers

The primary recommendation for ERP vendors is the need to adopt and embrace an industry wide understanding of post internet era enterprises (extended enterprise). Many of the applications currently available in the market provide the technology for eBusiness and eCommerce, but these enable the exchange of data across corporate boundaries, they do

not fully support business processes to the same extent, or support sections of one organisation working seamlessly with sections of another company in an enterprise.

Software licensing is an extremely complex area, requiring expertise in intellectual property law, contract law, and so on. However, it is incumbent upon application vendors to ensure that nothing in the way in which software is licensed hinders the ability of the extended enterprise to use ERP in an extended enterprise setting, especially in cases where the applications are being made available in a Software-as-a-Service (SaaS) arrangement.

This study also makes it evident that considerable research, development and innovation is still to be done to make ERP systems and, Enterprise Systems in general, more applicable to the enterprise settings described here, whereby business processes and the need to manage them are in the enterprise domain. Firewalls are required for the safe and secure exchange of management information within the enterprise, but secure from the rest of the organisations from which they have provided enterprise modules.

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6.3.4. Summary of Contributions to Theory and Practice

Domains of Contribution	Extent of Contribution		
	What has been confirmed	What has been developed	What has been found that is new
Theoretical Knowledge	Enterprise structures across organisational boundaries, is an area that is relatively under researched.	Developed the concept of Pre and post internet era enterprises.	Applying theories of organisational structure to enterprises comprising the whole of or the parts of disparate organisations. Identified eleven dimensions (or attributes) of internet era enterprises that are needed to be catered for to fully exploit ERP systems.
Empirical Evidence	.	A distinction has been drawn between structure as relates to single organisations and structure as relates to enterprises.	Enterprise structure is not widely addressed in regards to information and enterprise systems.
Methodological Approaches		Extension of organisation structure theories and study methodologies to enterprises.	
Practice		An understanding of what wider thinking is desirable with regard to the deployment of Enterprise Resource Planning Systems in the Enterprise context.	Enterprise systems need to recognise the distinction between enterprise and organisation and not use the two concepts interchangeably.

Table 6-1 - Summary of Contributions to Theory and Practice

7. RECOMMENDATIONS AND CONCLUSION

7.1.   Introduction

This study combined critical and prescriptive perspectives as a necessary means of making its contribution to the practitioner's toolkit. In addition to the methodology adopted and in recognition that action researchers are actors too, the study draws on the authors own experiences as an ethnographic researcher to identify parallels between personal informing practices and those of the actors being studied. These parallels are intended to challenge the underlying assumptions of management practice. The author adopts a confessional genre of representation for this purpose. This chapter aims to explicitly explain the philosophical assumptions that underpin the approach adopted.

7.2.   Validity of this study

Several criteria have been posted in the literature as being necessary to validate case study research (Maffei and Meredith, 1994, Sarker and Lee, 2003, Yin, 1984, 2002, Maffei and Meredith, 1995). Using these criteria, this summary identifies how each criterion has been satisfied or eliminated for lack of relevance.

7.2.1.   Internal validity

This is tested by matching patterns from the case study settings and from finding explanations for the existence or not of observed phenomenon. In this study case review propositions have been empirically observed with evidence cited as appropriate. Elements that go towards determining the degree of internal validity include; the richness of the case descriptions, the degree to which these descriptions appear meaningful and authentic, whether the findings have been replicated in another setting and whether evidence that disproved the findings was actively sought.

The case descriptions in this study are necessarily brief, inter alia for reasons of space. One possible way to enhance the internal validity of this study would be to increase the number of cases used and also by explicitly imbuing the research criteria into a case from the time the case project is initiated.

7.2.2. Construct validity

For construct validity to be present, the applicable criteria are deriving evidence from multiple sources and also having validation from other knowledgeable persons, in this case more than one case study has been selected for study and cases have been reviewed by other practitioners with knowledge of the case settings. Also case data has been derived from notes taken at meetings and from other documentary sources.

7.2.3. Reliability

The main criteria here were creating case narratives as soon as possible after observations were made and creating a case study database comprising verifiable case study notes and documents. The literature review also informed the development of a rigorous case study. However, the evidence in this study was collected ethnographically, by recording events that occurred over a considerable timescale, from multiple locations. This means that there is an inherent possibility of errors in the data collection.

7.2.4. External Validity

The test here was to observe and learn from phenomenon from more than one perspective; this was achieved through the use of multiple cases. However, the primary objective of this study was not to test theories or develop new theories, but to inform practice consequently attention to the external validity criteria is not regarded in the same strength as the other three criteria.

7.3. Limitations of this study

7.3.1. Topical Limitations

Most research occurs under a set of constraints, some imposed by the researcher to limit the scope and hence focus on a narrow set of questions. Other constraints relate to the choice of cases from which to explore the research questions. This study chose to focus on post internet era enterprises, this limits the generalisability of findings to enterprises sharing similar characteristics, and this is reinforced with the contrast in findings from the vertically integrated enterprise to the qualifying post internet era enterprises.

7.3.2. Methodological Limitations

7.3.2.1. Participant Observation

During participant observation in the selected cases the author did not have particular questions for project members. The main purpose for being on the projects was to work as a team member, study observations and case material collection was a by-product of this main purpose. Academic literature guided the author in determining what would later be useful to the study and in structuring the material for further analysis.

However, it would be much more productive if the author could have been more proactive in collecting case material and also in interacting and asking questions of team members with regards to the study. Such kind of active participation rather than passive observation may have given access to richer and more enlightening material and provide a much deeper understanding of the structural aspects of ERP implementations.

7.3.2.2. Sample Size

The research data is limited to large corporate organisations in which the researcher was working as a contract employee. It is also a study of a limited number of companies, whilst revealing and a good sample of the interaction between ERP and enterprise structures, the findings cannot conclusively be generalised to other enterprises.

7.3.2.3. Employee as researcher

The insider status of the researcher is a favourable factor in this study, as this acted as a strong enabler, it is also a limitation because it prevents replication of the findings elsewhere, at the same time. However, the multi-case approach made possible comparable analysis of the settings a mitigating factor.

7.3.2.4. In-Depth Interviews

As well as participant observations in the case settings, informal interviews with the case participants were valuable for the thesis before and during the analysis of the qualitative data. Nevertheless, it would have been much more beneficial if people could be interviewed formally.

It is also a limitation that the research is only from the researcher's perspective. Direct input from the case study enterprises themselves would have further enriched the study. Similarly the observation data concentrated on the enterprise from one participating organisation, with little observation from within partner organisations, observations on the interactions between enterprise partners with each other during the implementation process would have added greater depth to the study.

7.3.2.5. Template Analysis

The data analysis used a form of manual coding based on the authors own devised templates, it is possible that if the study were repeated using software to generate the templates the results may be different.

7.4. Further Research Suggestions

7.4.1. Research Objectives

The aim of this study is to develop a rounded and grounded understanding of the Information Systems implementation process, in particular of the Enterprise Resource Planning Systems. Most studies on the ERP implementation process focus on the mechanics; research is described as simply a method for investigating or collecting information. This study looks beyond the mechanics to see how ERP implementations can be used to shape organisations and enterprises. Deeper studies in single enterprise settings with full support from the enterprises would be a good initial extension of this research.

7.5. Summary

The benefits to be derived from a research project depends not just on the quality of the research carried out, but on how the research is useable and applicable in settings different to that in which the research was carried out. Central to that is determining the appropriate research method and methodology to use to carry to out the research at the outset and these in step have to be consistent with the researcher's own philosophy or world view. Subject to further literature review and analysis, each of the methods examined in this paper so far appears appropriate to a study of Information Management in the extended enterprise paradigm.

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APPENDICES

Appendix A: Binder & Clegg's Enterprise Structures

Characteristics	Enterprise structure		
	Vertically integrated enterprise (VIE)	Extended enterprise (EE)	Virtual enterprise (VE)
Core competencies	Mature, well accepted, tested and widely usable	Tested to some extent, medium risk, has had some testing, understood by innovators	Newly emerging, speculative, untested, high risk, require many members to spread risk
Main drivers	Control	Focus on outsourcing core competencies. Virtualisation tendencies. Experience of existing partnerships	Profitability as main goal for linking. Core competencies and outsourcing. Can be disruptive
Prerequisites	Large financial resources. Strategic plans for acquisition	Moving beyond supply chain structures. Open-minded management. Strong capability in outsourcing	Operational agility and flexibility for infrastructure commercially, technically and organisationally
Duration of relationship	Foreseeable as permanent as long as competitive	Medium–long-term	Short-term temporary alignment of operations
Scope of relationship	Unity of command and control. Focus on scales of economies rather than on extension and virtualisation	Often spans whole product life cycle across company boundaries. Strategic and pro-active	Project based to quickly exploit specific opportunities across company boundaries Present a unified face to externals. Companies participate in other VEs simultaneously for more power and maturity. Temporary, re-active and loose governance
Operational challenge	Emphasis on removal of legacy systems. Standardisation and corporatisation	Core competencies must be synergistic to the whole enterprise. Design and implementation of business processes may create future VEs. Compatibility among partners' IT systems and cultures critical. Look for market opportunities - create value members	Operating in a dynamic and unpredictable environment Decision of allocating resources depends on competitive and comparative advantage. Tactical combination of core competencies. Right balance of exploration and control in operations
Facilitators	In-house development of proprietary systems	Advanced IT Effective electronic management. Use of middleware	Integration of IT. High use of intermediaries and trusted third parties
Critical issues	Tend toward industrial dominance	Collaboration, technology and knowledge management becomes critical	No stability. Collaboration (agility, flexibility and leanness) is important
Main features	External trust low. Inflexible. High overhead. Large scale of economy. Tall hierarchy	Common strategy-hollow out the corporation Trust, loyalty and integration high Maturing 'Meta systems'	Low overhead. Flat organisation-no hierarchy. Rapid changes Core competencies must cooperate and compete. 'Meta-systems' are used

Characteristics	Enterprise structure		
	Autonomous Enterprise	Partner Enterprise	Linked Enterprise
Similar terms and supply chain philosophies	Virtual enterprise, virtual corporation / organisation; agile philosophy	Extended enterprise, keiretsu, clan; hybrid philosophy	Vertically integrated enterprise; Lean enterprise; lean philosophy
Foundation of relationship	Mainly based on technical competence features; Emphasis on high innovation context; Decision of allocating resources depends on competitive and comparative advantage	Mainly based on social competence features Past relationship experience important; Emphasis on strategic sourcing of critical products based on synergy for the whole enterprise	Mainly based on efficiency competence features; Emphasis on transaction costs (prices)
Evolution of relationship based on competencies	Newly emerging, speculative, untested, high risk, require many members to spread risk; high asset specific investments; high transaction costs	Tested to some extent, medium risk, has had some testing, understood by innovators; medium asset specific investments; medium transaction costs	Mature, well accepted, tested and widely usable; low asset specific investments; low transaction costs
Scope of relationship	Project based to quickly exploit specific opportunities across company boundaries; Present a unified face to externals; Partners involved in other collaborative activities simultaneously for more power and maturity	Long-term and holistic thinking in collaborative dimensions; Often spans whole product life cycle across company boundaries	Standardisation of high product volumes and corporatisation of structures; Focus on scales of economies rather than on extension and virtualisation
Longevity of relationship	Short-term temporary alignment of operations	Medium - long-term	Foreseeable as permanent (as long as competitive)
Proximity and depth of relationship	No stability as well as dynamic and unpredictable environment; Collaboration impacts operations directly and immediately (agility, flexibility and leanness); low degree of interdependence and integration	Strategic dimensions of collaboration; Relationship, technology and knowledge management become critical; medium degree of interdependence and integration	Tend toward industrial dominance; Emphasis on removal of legacy systems; high degree of interdependence and integration
Governance of relationship	Loose and flexible environment based on innovator scouting; Temporary, re-active and loose governance; Right balance of control and emergence (i.e. co-opetition)	Stable and strategic environment based on integration through appropriate strategic sourcing and partner development; Design and implementation of business mutual processes; Strategic and pro-active governance	Unity of command and control; Focused on monitoring and control through standardisation and corporatisation
Strategic role and main tasks of enterprise governor	Incubator; Scouting for potential value members; Initiate collaborative activities	Integrator; Coordination of collaborative activities; Support value members in competence development	Incumbent; In-house development of proprietary systems; Relying on power and authority
Strategic role and main tasks of value members	Innovation supplier; Deploying specific competencies for innovating new technologies and solving complex R&D problems	Integrator; Integrating parts to more complex systems and managing and coordinating sub-supply base based on meta-competence	Volume player; Value creation through cost efficient making and delivery of parts in high quality
Collaboration points in product development process	Mainly product planning and concept design	Mainly concept design / pre-series design	Mainly series design

Table 7-1 - Binder & Clegg's analysis of Enterprise Structures.

Appendix B: Sample ERP configuration for an Extended Enterprise

Figure 7-1 - Sample ERP configuration for an extended enterprise.

Appendix C: Journals and Periodicals for ERP and Enterprise research

- Academy of Management Executive
- Academy of Management Journal
- Academy of Management Review
- ACM Computing Surveys
- Administrative Science Quarterly
- California Management Review
- European Journal of Information Systems
- European Journal of Purchasing and Supply Management
- European Management Journal
- Harvard Business Review
- Inform
- Information and Software Technology
- Information Systems Quarterly
- Information Systems Research
- International Journal of Information Management
- International Journal of Management Science
- International Journal of Operations and Production Management
- International Journal of Production Economics
- International Journal of Production Research
- International Journal of Technology Management
- Journal of Information Systems
- Journal of Information Technology
- Journal of Management
- Journal of Management Information Systems
- Journal of Grid Computing
- International Journal of Grid and Utility Computing
- International Journal of Networking and Virtual Organisations
- Journal of Operations Management
- Journal of Strategic Change
- Journal of Strategic Information Systems
- MIS Quarterly
- New Technology, Work and Employment
- Organisation Science
- Organisation Studies
- Sloan Management Review (MIT)
- Strategic Management Journal
- Supply Chain Management Review
- The Journal of Corporate Transformation

Appendix D: Philosophy through the Ages

Key Philosopher	Dates	Main Philosophy (of relevance to this study)
Ancient		
Greek		
Thales	640BC - 550BC	Aimed to explain natural phenomena via a rational explanation that referenced natural processes themselves.
Pythagoras	580BC - 496BC	Believed that everything was related to mathematics and that numbers were the ultimate reality.
Socrates	470BC - 399BC	Championed a form of inquiry and debate between individuals with opposing viewpoints based on asking and answering questions to stimulate rational thinking and to illuminate ideas. Argued that arguing that knowledge is not empirical, but is a matter of memory and divine insight.
Plato	429BC - 347BC	Believed that ideas were far more real than the natural world.
Aristotle	384BC - 322BC	Father of logic and the scientific method.
Medieval		
Augustine	354BC - 430BC	Made the distinction between metaphorical and literal inquiry.
Anselm	1033 - 1109	Proponent of the ontological argument "if we can imagine it, then it must exist".
Thomas Aquinas	1226 - 1274	Believed that human beings have the natural capacity to know many things without special divine revelation, even though such revelation occurs from time to time.
Modern		
Realism/Empiricism		
Bacon	1561 - 1626	Prominent scientific revolutionary and proponent of Inductive Reasoning.

Key Philosopher	Dates	Main Philosophy (of relevance to this study)
Hobbes	1588 - 1679	One of the founding fathers of Materialism
Idealism		
Descartes	1596 - 1650	Widely recognised as the "Father of Modern Philosophy. "I think, therefore I am".
Empiricism		
Locke	1632 - 1704	He argued that the "associations of ideas" that one makes when young (early in a career) are more important than those made later because they are the foundation of the self.
Leibnitz	1646 - 1716	Documented the binary system used in modern computers. Argued for that theory be combined with practical application – Applied Research
Berkeley, George	1685 - 1753	Propounded the theory of subjective idealism (immaterialism)."To be is to be perceived."
Scepticism		
Hume	1711 - 1776	Put forward the idea that Inductive inference is reasoning from the observed behaviour of objects to their behaviour when unobserved and argued that nature cannot always be assumed to be uniform when unobserved.
Philosophe		
Rousseau	1712 - 1778	Major works on the origins of inequality. Made pronouncement on the value of training, "The noblest work in education is to make a reasoning man ... If children understood how to reason they would not need to be educated."
Critical Philosophy		
Kant	1724 - 1804	Maintained that our understanding of the external world has its foundations not merely in experience, but in both experience and a priori concepts, thus offering a non-empiricist critique of rationalist philosophy.
Hegel	1770 - 1831	"Asserted that in order for the thinking subject (human reason or consciousness) to be able to

Key Philosopher	Dates	Main Philosophy (of relevance to this study)
		know its object (the world) at all, there must be in some sense an identity of thought and being. Otherwise, the subject would never have access to the object and we would have no certainty about any of our knowledge of the world." – Absolute Idealism

19th Century

Empiricism

Comte, Auguste	1798 - 1857	Founded Positivism "Observing the circular dependence of theory and observation in science".
Mill, John Stuart	1806 - 1873	Supported Utilitarianism "believed that we must focus our attention away from our own happiness towards other objects and ends, such as doing good for others."

Dialectic[25]

Materialism

Marx, Karl	1818 - 1883	"The presupposition of a dialectical argument is that the participants, even if they do not agree, share at least some meanings and principles of inference." Theories on the organisation of labour

Phenomenology

Husserl, Edmund	1859 - 1938	Founder of phenomenology, believed that experience is the source of all knowledge.

Analytical Philosophy

Russell, Bertrand	1872 - 1970	Philosophical realist who believed that our direct experiences have primacy in the acquisition of knowledge.
Wittgenstein	1889 - 1951	Argued that propositions cannot represent logical form: it is mirrored in them. What finds its reflection in language, language cannot represent.

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[25] Art or practice of critical examination of the truth of an opinion Oxford Dictionary of Philosophy BLACKBURN, S. 2008. *The Oxford Dictionary of Philosophy,* Oxford, United Kingdom, Oxford Univerity Press.

Key Philosopher	Dates	Main Philosophy (of relevance to this study)
		What expresses itself in language, we cannot express by means of language. Propositions show the logical form of reality. They display it. Maintained that all knowledge should be codifiable.
Polanyi, Michael	1891 - 1976	Argued that absolute objectivism is a myth and a false ideal, as personal commitment and tacit knowledge/awareness almost always played a part in science.
Kuhn, Thomas Samuel	1922 - 1996	Held that science undergoes paradigm shift, which open up new ways of understanding, but these are always tinted by scientists own subjective perspective.

Logical Positivism

Durkheim, David Emile	1858 - 1917	Posed key question: How may one study an object which, from the very beginning, conditions and relates to the observer? Acknowledged that, perfectly objective observation" in may never be possible.
Freud, Sigismund	1858 - 1939	Social scientists have adapted some of his theories of the unconscious mind to social science settings.
Ayer, Alfred Jules	1910 - 1989	Major proponent of logical empiricism/neo positivism - the idea that observational evidence is indispensable for knowledge of the world all knowledge is based on logical inference from simple sentences grounded in observable facts.
Popper, Sir Karl Raymond	1902 - 1994	Gave a solution to the problem of induction – a theory is true until it is disproved and corrected as false. Critical rationalism

CURRICULUM VITAE

Ola-Dapo A Ajayi was born in London, England. He graduated in 1984 from the City of Birmingham Polytechnic (now Birmingham City University) where he earned a Bachelor of Arts, with honours, degree in Accountancy. He completed his Association of Chartered Certified Accountants examinations in 1986 and was admitted to membership in 1989. He gained his Masters of Business Administration degree with options in International Business and Marketing from Aston Business School, Aston University in 1991.

Dapo is a Certified Information Systems Project Manager and has many years' experience working in finance and management consulting.

"The reward of a thing well done is to have done it"

Ralph Waldo Emerson (1803 – 1882)