Narrating an organisational *matter of fact*:

Negotiating with Enterprise Resource Planning

technology to achieve order

within a traditional academic administration

Erica L. Wagner

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To my family, Maureen, George, and Janna

"In a time of drastic change it is the learners who inherit the future.
The learned usually find themselves equipped to live in a world that doesn't exist."
– Eric Hoffer

"The lure of the distant and the difficult is deceptive.
The great opportunity is where you are."
– John Burroughs

Abstract

This thesis draws upon social science contributions related to the study of organisations in order to understand how working information systems are created. Its main concern is the process of negotiating through IT-enabled change as actors work to design, implement, install, and use a standard software package in their daily administrative activities. In other words we consider how Enterprise Resource Planning (ERP) software becomes accepted across diverse groups as an institutional *matter of fact* – an unquestioned part of the institutional narrative. We argue that in spite of the complexity of implementing ERP technology, the actions and events that lead to their creation as an organisational fact rely on communication and coordination across groups with conflicting political and social agendas. These groups negotiate with the ERP technology in an attempt to enrol the software as a delegate for their goals. To develop the argument, we employ a novel interpretation of actor-network theory routed in the field of science and technology studies (STS). These theoretical foundations inform the collection and analysis of narrative data from one in-depth study of longitudinal change. The case centres on an Ivy League University who partnered with a multinational ERP vendor to create a standard software package to be sold to higher education institutions around the world. The study follows the negotiations involved in creating a standard package and their subsequent attempts to naturalise the standard software into local administrative practices. The application of the theoretical concepts constitutes a contribution in information systems research because it presents a novel interpretation of technology's role within contemporary society. This thesis also contributes to the use of actor-network theory within the IS field because the narrative research approach adopted allowed us to highlight aspects of the theory that have as yet been under used. Furthermore, these findings are useful for business leaders, and IS professionals who might reconceptualise the details of negotiating through IT-enabled change initiatives. The thesis concludes by arguing that negotiating with technology necessarily implies the reordering of organisational reality through design, implementation, and customisation activities.

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1. Changing times: negotiating for a working information system

This dissertation is a report of an in-depth, qualitative case study which focused on the process of negotiating change within an Ivy League university during an Enterprise Resource Planning (ERP) modernisation initiative. The study is based primarily upon the narrative accounts of university actors whose stories expressed the conflicts, compromises and sensemaking activities of 'naturalising' - or creating a *working* information system from a standard software package. Increasingly, contemporary organisations are choosing to purchase standard software products rather than build customised systems within their local IT departments. As such, during implementation and use, organisations are involved in fitting their local needs to a global software package and vice versa. As Sawyer (2001a) notes, this environment differs from traditional software implementations both because of the nature of the IS development activities and the partnerships with vendors and management consultants that accompany these initiatives.

The last half of the 21st century has been heralded 'The Enterprise Resource Planning Revolution' (Ross, 1998) with enterprise systems implemented within most Fortune 500 companies (Kumar & van Hillegersberg, 2000). Business leaders, persuaded by the concept of an emerging 'global marketplace' (see Held, 1999; Castells, 1996), were enamoured with the technology's promise to streamline organisational activities, eliminate duplication of effort and data, and co-ordinate business operations across geographically dispersed locations (Davenport, 2000; Markus & Tanis, 2000).

International management consultancies were a "driving force" (Walsham, 2001) behind the proliferation of the trend, as they worked with software vendors to sell Enterprise Resources Planning (ERP) as an appropriate 'solution' for multiple markets (Walsham, 2001; Soh, Kien & Tay-Yap, 2000). Fuelled by media coverage of the feared year two-thousand (Y2K) millennium bug, the trend increased as a mass of organisations, from a variety of industries, jumped on the "ERP bandwagon" (Kremers & Dissel, 2000; Kumar & van Hillegersberg, 2000). By early 2000, ERP-related sales generated $40 billion in revenue split between software vendors and consulting firms (Willcocks & Sykes, 2000) and practitioner literature claimed enterprise systems were a prerequisite for business success in the twenty-first century (Davenport, 2000; Norris, Hurley, Hartley, Dunleavy & Balls, 2000; Langerwalter, 1999).

Enterprise systems are increasingly being implemented within universities in order to modernize back-office, administrative functions via an integrated technology platform (Allen & Kern, 2001; Mahrer, 1999; Pollock, 1999; Volkoff, 1999). This thesis argues that in addition to these goals, ERP is being used as a vehicle for professionalizing and transforming traditional higher education institutions. The trend toward ERP 'business solutions' reflects the "marketisation" (de Boeur, 1999) of universities where institutional governance is now the domain of professional managers who aim to mitigate risks while remaining competitive in an increasingly complex global higher education marketplace (Barnett, 2000; Gumport, 2000; Brennan, Fedrowitz, Huber & Shah, 1999). Not only are student numbers increasing and teaching requirements growing (Noble, 1998a), faculty researchers are ever more reliant on obtaining grant funding in order to conduct scientific investigations. The grants and contracts environment has become increasingly risky as compliance issues between funding bodies, academic investigators and institutional custodians

become intertwined. Consequently, individual academic agendas and university administration are mutually implicated when considering the risks associated with regulatory, legal and financial compliance.

As scientific and teaching enterprises become 'big business' and universities throughout the world struggle to revamp their identity within an era focused on "commercialising higher education" (Noble, 1998a, b), software vendors are increasingly viewing the education market as a lucrative "industry" (Winner, 1997), potentially worth several hundred billion dollars in revenue (Lehman Brothers study quoted within Noble, 1998a). The growing popularity of ERP technology within today's uncertain educational environment has the potential to redefine intra-organisational operations and transform administrative functioning within many North American universities. In addition, if vendors are able to market successfully their US-model as a viable "industry solution" for multiple cultural contexts, higher education operations may become more standardized worldwide (e.g., Educom and Oracle Corporation websites as well as the Newcastle Higher Education Symposium, 2000 on The Future of Universities).

Recent research highlights the dichotomy between implementing integrated, standardized ERP technology and the traditional, fiefdom-like structure of universities where information systems develop organically to support the values of academic freedom and 'scientific separateness' (Allen & Kern, 2001; Cornford, 2000; Pollock, 1999). The current generation of ERP systems evolved from technology designed for the manufacturing industry (Klaus, Rosemann & Gable, 2000) and still embed a template of "best business practices" based on a "traditional, hierarchical [and] functional view of organisations" (Soh et al., 2000), limiting the extent to which the technology

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can be customized to meet local organisational needs. The integrated, 'whole-house' view underpinning ERP technology tries to force decentralized and autonomous departments into a standardized template (Allen & Kern, 2001; Pollock, 1999).

This research project contributes to our understanding of ERP within organisations through an in-depth case study of an Ivy League university (Ivy) that partnered with Oracle corporation, an international ERP software vendor hoping to break into what they defined as a 'higher education market'. The project was expected to create an integrated, administrative platform that would later be sold as a template for other higher education institutions. System modernization and business process redesign efforts were conducted within the key functional areas in the University including financial management, human resources and payroll, and grants and contracts administration. The project scope was unprecedented for an historically self-directed university administration and the timing of the project meant external IT experts were entering a unique organisational domain.

The central mission of this strategic partnership for the University was to shift its standard accounting practice in an attempt to centralise fiduciary control, facilitate financial management reporting, and reduce audit risks. Oracle Corporation were chosen as the single ERP vendor over suppliers with more university-based experience because of the strength of their financial package and their desire to adapt their existing product range for the university context. The University was convinced that the technology would provide a powerful backbone that could be tailored to meet its specific accounting functionality.

In order to meet university accounting requirements, a complex solution was agreed during meetings between University accounting managers, senior leadership, Oracle experts and management consultants. Ivy and Oracle would design a standard ERP package for higher education based on a two-pronged development strategy to be conducted simultaneously during the University's own project initiative. First, the project team would focus on redesigning the financial management applications within Oracle's existing technological repertoire for the university context. Second, two new ERP modules would be designed that would connect to the main financial application thereby creating an integrated financial platform. These financial modules would then be integrated with all other ERP modules (such as Human Resources and Procurement) to constitute Oracle's standard software product that would be sold as a solution for all higher education institutions worldwide. This software product would be naturalised to create a working information system for the University.

This process of system development, implementation, and use is a complex story encapsulating many more subtly interconnected narratives of negotiating through change with unfamiliar technology and development partners. Our goal is to unpack these negotiations and to say something about the effort involved in creating both a standard software package and a local information system during the same project initiative. In this thesis we open Pandora's box and let the stories surface so that we can understand how change is negotiated and a system is made to work in spite of conflicting administrative goals. The aim of this study is to add to our knowledge of ERP in practice by making sense of narratives that exist during such change initiatives.

We argue that the benefits of a such an approach are layered. Firstly, we become aware of the multiplicity of perspectives that must be negotiated during large scale software projects. Secondly, by analysing the relationships between these narratives over time we conceptualise 'story' and 'organisation' as co-constituting where the latter is the product of story making (Czarniawska, 1997). An organisation is shaped by its stories but also is involved in shaping the narrative plots that circulate within the organisation. Focusing attention on the production of narratives related to a large-scale ERP project provides insight into how the initiative reforms the organisation over time. Stories unfold in time, and are ongoing. Their production and modification can impact strategic missions as stories flow throughout an organisation. These missions are capable of becoming more or less stable depending on the ability to create and maintain a unified story. For this reason we follow the relationships between narratives as they create and maintain a preferred organisational reality.

Post-modern philosophers argue against legitimizing unified stories or 'grand narratives' that make truth claims or acquire fact-status because of their power to suppress alternative versions of the world. For example the normative story of ERP as a prerequisite for business success in the 21st century (c.f. Davenport, 2000) stifled the potential for alternatives to off-the-shelf software packages during the mid to late 1990s. Lyotard (1984) argues that we must rescue the small stories in order to combat the 'totalitarianism and terrorism asserted by grand narratives' and illuminate a diversity of perspectives. We should not presume to evaluate any one meta-narrative based on the values and reality constructs of any other. However, in the context of IT projects, to abandon the notion of a superior story and revel in a relativistic paradigm where all perspectives are equal is a solely intellectual pursuit.

For organisational narratives to be useful to IS researchers and practitioners, we should adopt a pragmatic view of the world and acknowledge that whilst all stories are equally valid - in that they exist and we will be hard pressed to convince a narrator that hers is less valid than her neighbour's story - we must move beyond this and realize that in negotiating change over time some stories will be accepted as more valid than others. Without the ability to evaluate and define these relationships chaos would reign during IT projects and organisations would exist in anarchy. For this reason, the value of a narrative perspective for IS begins in multiplicity but must conclude with an analysis of an organisation's ability to achieve a stable information system – a socio-technical assemblage that is naturalised within the working lives of organisational actors. Latour (1999b) calls this state of achievement a *'matter of fact* – something so ingratiated within a community as a result of extended negotiations, that its presence is indisputable and obvious' (p. 307).

Practically speaking, organisations *do* find stability and order in spite of complex, multi-year software projects. This is accomplished because above all else organisational actors agree that there is something that they have to agree on – making the system work. While post-modern philosophers such as Lyotard, Baudrillard, and Derrida have the luxury of celebrating the small stories and allowing for unity to fall apart in favour of multiplicity, organisational leaders and managers must find a way to create unity from this multiplicity in order to hold their organisation together. In this thesis we argue that this unity is facilitated through an organisational 'grand narrative' that inspires the agenda of *making it work*. Seizing this story as a graspable truth – or

organisational fact – will help guide complex change initiatives and create a system that may not easily be classified as a success or failure but rather as a workable compromise.

When a person becomes a player in an organisation like Ivy they become part of a unified story. The grand narrative of this world class university tells of the institution as a bastion of elite education, the epicentre of scholarly research, and a hotbed of faculty discovery. The rhetoric of this story enrols the University community into believing Ivy's organisational uniqueness and human resource expertise both in terms of faculty and staff. Enrolment within this organisational grand narrative brings forth pride and commitment from its members and creates an 'esprit des corps' that motivates workers to dedicate themselves to their jobs. Ivy's grand narrative inspires the actions necessary to make the ERP work. As such, changes to an organisational grand narrative should be limited during IT projects because the story guides actors and provides them with an historical foundation upon which to rely when they are continually confronted by potential future scenarios. The grand narrative offers stability and faith in a greater good during complex change initiatives where unity is reassuring.

Anderson and Anderson (1998) argue that not all perspectives *work* so all are not equal, and whilst actors bring to the negotiating table individual stories and social constructs, not all these stories can guide the organisation toward the creation of a working information system. This begs the question – what works within this organisation and for whom? It is this valuation process that is the focus of the dissertation as we study the nature and implications of making ERP work within a traditional academic administration. We analyse multiple stories as reflections of socio-political negotiations within the organisation where actors evaluate alternative future outcomes

based on competing 'workable' scenarios of an ERP-enabled administration. These competing stories present different views of what it means to create a working system. As such, the change process is defined as progressive debates – or trials of strength (Kavanagh & Araujo, 1995) - between stories that *could work* on behalf of the University's mission. Interestingly this does not create an environment where anything goes and all stories are given equal 'air time'. Rather it sets up an environment where negotiations are between *plausible* options and excludes from the boundaries of debate those stories deemed by powerful actors to be in opposition to making the ERP work.

For example, we interpret Ivy University as an actor whose ERP project is similar to a surgical procedure during which time the actor must be kept alive despite modifications to its internal organs. Just as a good surgeon takes care to be mindful of the spirit of the patient through what is often called 'bedside manner', software project team members should be careful to give status to an organisation's grand narrative. In this way the project team comes to understand Ivy as an extra-rational actor with beliefs, norms, and values that inform its socio-technical systems, and not just a rational collection of organs working systematically to create a whole. It is the grand narrative that inspires the sustained efforts of community members when project milestones, deadlines, and pace of work become overwhelming. This unifying story is what will make the system work by propelling the project forward when all else fails. Without faith in Ivy and its grand narrative the ERP project might have failed to create a *working system* leaving Ivy with the common implementation scenario of 'operation successful, patient dead'.

Unless both the grand narrative and the smaller stories comprising the grand narrative are acknowledged as forces influencing the agency and allegiance of actors during IT projects, then the flesh of the story becomes torn. People are left flummoxed and confused not knowing any longer how they relate to the grand narrative and questioning their commitment to, and enrolment within, the larger unifying story. For example Ivy's grand story at the inception of the ERP project is one of prestige where faculty are main protagonists. However, as we will see in chapter five, attempts to shift valued faculty-based grant accounting practices created a controversy that spanned issues of financial management and governance. The controversy illuminates a shift in the effort of work where Ivy's grand narrative is reordered and faculty who were previously lead characters in the story find they are no longer central to the plot.

The twist in plot presents faculty as secondary to goals of administrative integration and professionalization making questionable the way in which this accounting change was handled. Faculty were treated as minor actors in a new storyline informed by US corporate business practices and as such their values and administrative agendas were removed and replaced at will. As a result of the ERP's design and subsequent installation, the strength of Ivy's master narrative is reduced. Faculty who were told to expect improvements to their working lives are left demanding an explanation for what they interpret to be a sudden shift in Ivy's unifying story.

In order to keep Ivy's grand narrative alive, its constituent stories must resonate with each other in order to sum up to a cohesive whole. In chapter six we continue to follow the negotiation process and focus on the ways in which a grand narrative can be challenged, and then reconstructed over time. Realising the ERP as an organisational matter of fact required Ivy leadership to readjust

their IT strategy in light of faculty recalcitrance toward the ERP which began to surface. This is an important phase in Ivy's project initiative because these stories indicate that the grand narrative is at least as powerful a force as the ERP. Ivy actors work to change the ERP environment in order to bring traditional practices back to the future activities of the University. Legacy work practices are designed into the ERP-enabled environment through the customisation of the software, associated business processes, and shifts in thinking toward an integrated mindset on behalf of users. The chapter illustrates the modification of Ivy's master narrative as it is translated into a story that is both similar and different to the past.

Creating a matter of fact within an organisation that is informed by a unifying story is not a one-time process of achieving order and closing off alternatives. This dissertation interprets grand narratives and organisational facts as constructed artefacts that may at one time be closed or black boxed, but which are subject to being reopened and modified as organisational actors move through time negotiating their working lives within a broad contemporary context. This dissertation aims to develop our theoretical understanding of matters of fact in practice. We analyse the implications of seemingly mundane design decisions for the nature of work life and consider the ways in which order is achieved, controversy accommodated, and relative stability regained over time.

We argue that such research is greatly needed within the IS community because we are stockpiling knowledge about ERP project initiatives which has diminishing value for scholars and practitioners. The volume of research focused on controlling the outcome of ERP projects through adherence to a list of critical success factors (CSF) is extensive ((Bernroider & Koch,

2000; Brown, Vessey & Powell, 2000; Shakir, 2000; Stafyla & Stefanou, 2000; Stefanou, 2000).
We argue that new insights offered by this literature have become disproportionate to the volume
of these studies. When reading some ERP success factor literature it is easy to get the impression
that creating an integrated, technological platform is somehow a linear process and that
technology often controls the success or failure of a project (Parr, Shanks & Darke, 1999;
Bancroft, 1996; Bancroft, Seip & Sprengel, 1998). This study argues that it is rarely that neat and
tidy. This is not to imply that such insights are valueless for organisations embarking on large
scale IS projects, but rather that a piece of the ERP story is missing. Factors for success have
existed for many years as a powerful narrative controlling IT-enabled change initiatives. Still
systems are judged to be failures when they are installed within an organisation. This dissertation
contributes to our knowledge of IT-enabled change initiatives by providing a much needed
'fleshing-out' of the negotiations that come after the checklist of critical factors, and before the
project is subsumed by claims of success or failure.

In light of the relatively unexplored university trend for standard administrative systems the
overall research question addressed in this study is: How does this organisation negotiate the ERP
software to create a *matter of fact* – an information system that is accepted by disparate
individuals and groups thereby binding them together for better or for worse? This general
question is further defined in the following way: What is the nature of controversy that might
threaten the achievement of this fact-status, and how might these negotiations impact who and
what is valued within the organisation? How is such controversy accommodated when the
interpretation of the ERP as a fact is challenged, and what are the organisational and professional
implications of this process?

Having stated the questions addressed in this dissertation, we turn next to the significance of the study. This study is relevant to the IS community in several ways. The general problem of negotiating change during IT projects has intrinsic importance, affecting contemporary organisations and the actors which comprise them. Previous ERP studies have turned up conflicting evidence concerning the implementation of this technology stating that projects either 'fail' or 'succeed' at the relative expense of the client organisation. This study argues for a more nuanced understanding by illustrating one university's strategy for creating a working information system.

Although ERP has been widely researched within the IS community, very little attention has been given to the role of the financial accounting application despite it being the module upon which others are integrated in order to create a back office suite. The study will be of value to practitioners considering the purchase and implementation of ERP technology. This is a novel research setting and the study seems likely to advance the IS community's knowledge in the area of IT-enabled change in university contexts. The narrative methods chosen for the study have not been widely used in the IS field, and this study will yield some useful methodological findings.

In order to produce relevant research, a rigorous methodology was designed that systematically considered the research questions at hand, and then designed the field research to meet this agenda. The details of this approach are the focus of chapter three but an outline of the methodology is provided here to round out the research picture for the reader. In keeping with the

narrative perspective discussed above, the empirical study adopts a narrative research approach in order to gain access to the multiple and interconnected perspectives of actors. Narrative is broadly sympathetic with our interpretive epistemology and general qualitative perspective. A longitudinal study of change was conducted where oral narrative accounts were gathered during the first year of system use. In addition, Ivy official documentation and software manuals were gathered and analysed as 'sedimented narratives' representing the official project perspective.

The data were organised around the theme of 'negotiating change' because when abstracting from the empirical material we found that the majority of narratives clustered around important political processes occurring at the time. The most helpful theories for looking at this theme of negotiating change are the sociology of time, actor-network theory and classification work. Together these writings provide a conceptual vehicle for revealing the interpenetration of multiple perspectives during an IT project and considering the implications for organisational operations and future IT strategy. Data handling and analysis highlighted the variety of perspectives that existed within the University at a given moment in time and we organized them into clusters in order to illuminate the socio-technical processes at work. These storylines revealed the actor-networks at work as they negotiated to resolve controversy.

This introductory chapter has framed the research study by introducing the background and objectives of the dissertation. The remainder of the dissertation is organized as follows: the next chapter presents a comprehensive review of the ERP literature as well as relevant work within the university context. Having presented the landscape inspiring the study's research questions, chapter three presents our research methodology, theoretical underpinnings, and empirical design.

This is followed in chapter four by the presentation of narrative data, the style of which is in keeping with our actor-network perspective and illuminates our interpretation of moving through change over time.

The second half of chapter four transitions the reader into part II of the dissertation focused on data analysis. Having considered how change is negotiated, chapter five analyses the net consequence of the ERP change initiative at the University which was an attempt to radically modify the administration of academic fiefdoms in favour of a more corporate approach informed by business-oriented accounting practice. This chapter highlights the shifting power relations within the University and considers the impact of inscribing such interests into the administrative operating platform. Despite the inscription of these interests into the ERP technology, the University experienced recalcitrance from actors.

The penultimate chapter analyses how the University managed this resistance and is working to create a locally accepted information system. Focusing on post-installation customisation activities, this chapter highlights the University's choice to balance local operational flexibility with institutional standardisation through the selective creation of boundary objects. The final chapter of the dissertation considers the nature of the work that is legitimised through the ERP design and extrapolates from this context to discuss the appropriateness of implementing ERP technology within the university context. The dissertation concludes with suggestions for future research.

2. Literature review: The ERP bandwagon enrols universities

This chapter positions the study in relation to current literature and points out the gaps in our knowledge base related to Enterprise Resource Planning (ERP) technology and the processes of negotiating change over time. What is presented here is a literature review of the work of leading writers whose research is helpful for positioning the analysis and contributions of this particular study. The literature was compiled through a systematic review of key IS journals and conferences from 1997 – 2002[1]. To this end we situate our research alongside other qualitative studies of ERP within organisational contexts that take a process view of change over time. In section two of the chapter we highlight the research focused on the introduction of ERP into traditional university administrations. We consider the state of IS research in this area and illuminate the particular issues which have been raised through this work. We then highlight the gaps in this literature and begin discussing the way in which this study makes its contribution.

State-of-the-art research on the implementation of ERP within contemporary universities indicates that higher education is a particularly problematic context for negotiating with enterprise technology. The historic ways of organising work within universities are at odds with the design of ERP making it is difficult to shift from a legacy administrative infrastructure to naturalise the ERP and create a matter of fact. We conceptualise these difficulties as attempts to shift normative administrative practice through the configuration and design of ERP. As such we position our

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[1] See table 2.1 in the appendix for a list of journals and conferences surveyed.

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particular university-based ERP study as a complement to science and technology studies (STS) focused on analysing *the work involved* in negotiating with technology. We briefly review the relevant research findings of authors who adopt this perspective in order to study ERP technology and discuss the theoretical concepts informing STS research in more depth in chapter three. We conclude this chapter with a summary of the current state of research outlined above and a brief discussion of the gaps in the literature that are explored in subsequent chapters of this dissertation.

2.1. Enterprise Resource Planning

This section reviews the academic literature published on Enterprise Resource Planning systems relevant to the focus of this doctoral research project. As discussed in the introductory chapter, the overarching theme of this in-depth study is the process of negotiating change during an IT-enabled modernisation effort, and the implications this has for work life in an ERP-enabled organisation. For this reason we seek to categorise current ERP literature in terms of negotiation. This is not an easy task because as Esteves and Pastor (2001) point out through the categorisation of their annotated bibliography, the organising focus of most ERP literature is on one of six lifecycle phases: adoption decision, acquisition, implementation, use and maintenance, evolution, and retirement. Whereas the focal point of this study is the longitudinal change process itself which spans ERP lifecycle phases. Therefore, we broadly classify current ERP literature in terms of its contribution to understanding the nature of project initiatives. This approach provides a base from which to situate our study. We begin by defining ERP and then its evolution as a trend beginning in the 1990's is considered. Next, research that identifies organisational challenges for implementing ERP is outlined. Third, we review literature focusing on the management of

implementation process within organisations. The section concludes by positioning this doctoral thesis within the broader ERP literature.

2.1.1. Definition and Evolution of the ERP phenomenon

ERP is a packaged software product that can be bought 'off-the-shelf' and tailored by an organisation in order to integrate and share its information and related business processes within and across functional areas (Davenport, 2000). Unlike custom-built software that must be programmed in traditional ways to meet local needs, ERP software is 'generic, targeting multiple industries, and must be configured before it can be used. Modules are combined together to create ERP suites for specific industry sectors (e.g., manufacturing, retail) or company size' (Klaus, Rosemann & Gable; 2000) and it is through the configuration of these modules that local solutions are derived. The technology often replaces 'home grown', discrete information systems and applications with a single infrastructure that when combined with efforts to re-engineer work practices, promises to streamline organisational activities by eliminating duplication of effort and data (Davenport, 1998). This is expected to facilitate increased confidence in organisational data and lead to timely and informed decision making by squashing 'silos or stove pipes of technology - large, diverse, unintegrated and ageing systems' (Bannister, 2001), and building an integrated platform upon which all administrative activity takes place (Davenport, 2000; Norris et al., 2000).

Back-office ERP systems evolved from technology designed to aid operations in the manufacturing industry (Klaus et al., 2000). First to help with inventory control (IC) and later to manage materials and manufacturing processes (MRP and MRP II). Software vendors exploited

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the notion of designing standard software packages that could be sold within multiple markets and across organisations within particular industries thereby increasing their economies of scale (Kremers & Dissel, 2000; Kumar & van Hillegersberg, 2000). This business strategy was based on the notion that all contemporary organisations have generic business needs and could benefit from vendor and consultant expertise by implementing a standard business solution as their information infrastructure. As such, MRP II functionality was expanded into ERP by including most enterprise processes such as operations and logistics, financial and managerial accounting, human resources and sales/order management (Kumar & van Hillegersberg, 2000; Davenport, 1998). As will shall see in subsequent chapters of this dissertation, this evolutionary process continues as standard ERP packages are redesigned by vendors seeking to penetrate untapped markets (Bennett & Timbrell, 2000; Everdingen, Hillegersberg, & Waarts, 2000; Sprott, 2000; Stallaert & Whinston, 2000; Nairn, 1998).

We argue that the design history of ERP should remain part of our understanding of the technology because the software code enables and constrains future design and implementation efforts. Enterprise Resource Planning is also referred to in the IS literature as enterprise systems (ES) and less frequently as enterprise-wide systems. Davenport (2000) calls for the replacement of these terms with a more generic classification of ERP as 'business systems'. He argues that the technology has developed to such an extent that it now includes front and back office functionality making it inappropriate to assign an ERP label which is reminiscent of its material requirements planning (MRP) heritage. Whilst we take Davenport's point, we choose to employ the term ERP throughout the thesis as a reminder of the lineage of the technology in the manufacturing context. In other words, our use of the phrase ERP is purposeful and is meant to conjure images of

technology that is informed by a traditionally hierarchical view of organizing where business functions are clearly delineated (Kumar & van Hillegersberg, 2000). As we will see in subsequent sections, this design template is particularly important to consider as ERP 'integrated business application packages' are adopted by organisations with missions other than maximizing profit.

As Walsham (2001) notes in his recent book, the 1990's was a decade where companies were turning away from decentralised computing systems in favour of "company-wide initiatives for organisational transformation" (Walsham, 2001). He argues that company managers began situating their organisations within a global context and in turn they developed a sense of worldwide business solutions. This awareness was supported by international management consultancies whose revenues increase as approaches become more widespread and standardised (Walsham, 2001). In fact, he argues that these consultancies were the "driving force" behind both the ERP trend and its precursor, Business Process Re-engineering (BPR) which forms an integral part of most ERP implementations (Sarker & Lee, 2000).

BPR initiatives are aimed to increase organisational efficiency through more streamlined work practices (Davenport, 1993). However, at the height of BPR's popularity in the early 1990's, it was difficult to achieve such transformations because many information systems remained as functionally-based silos of technology that contradicted process-oriented models. In 1992, the press first reported on integrated technology solutions and the German software company, SAP was launched its "R/3" ERP package (Scott & Kaindl, 2000). The viability of an integrated, enterprise-wide solution developed from the decreasing cost of computing technology, the advent

of client-server architecture, and the increased use of the internet by organisations (Klaus et al., 2000).

By the mid-1990's the media began to report on the ERP trend in conjunction with fears about the 'millennium bug' and Y2K system compliance. Management consultants were touting the global ERP software solutions available from the several vendors that had come to dominate the market (SAP, the industry leader as well as Oracle, Baan, JD Edwards and PeopleSoft). Davenport (1996) introduced "mega-packages" to the academic information systems community at the International Conference on Information Systems (ICIS) and by this time high-profile organisations had already begun installing the software.

In 1998 "The ERP Revolution" was named (Ross, 1998) and by late 1999, most of the Fortune 500 companies had implemented the technology (Kumar & van Hillegersberg, 2000). This 'revolution' continued to grow as a mass of organisations began jumping on the ERP bandwagon in an attempt regain control over their systems in a time of global insecurity (Kremers & Dissel, 2000; Kumar & van Hillegersberg, 2000). Klaus et al. (2000) note:

> "Whether an overreaction to market-hype or a practical reality, Y2K undoubtedly contributed to dramatic growth in ERP sales in the second half of the 1990's as many organisations scrambled to replace their non-2000 compliant legacy systems."

While enterprise technology infiltrated industry consciousness and organisational culture throughout the 1990's, academic publications about the project management, implementation, and use of ERP systems exploded in 1999. It was Davenport's (1998) seminal article that provided the first solid overview of the technology substantiated through succinct, case studies of ERP

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implementations at several multinational companies. He consolidated what the trade press had been reporting in bits and pieces for approximately one year: complexity and challenges abound when organisations try to reconcile the promises of ERP with the realities of its implementation and use (Economist, 1999; Stein, 1999).

The ERP phenomenon entered industry consciousness through the print media, on the back of global concern for Y2K compliance. We argue that promises of ERP 'integration' existed as an inflated expectation within many organisations long before the decision to implement. This myth is propagated by software vendors, management consultancies and ERP user-organisations around the world (Walsham, 2001; Klaus et al., 2000). Business executives seeking expert advice about operating in the new millennium were encouraged by management consultants and ERP vendors to replace outdated, home grown systems and applications with a single integrated solution.

To illustrate the growing market-hype surrounding ERP technology, we conducted three Lexus-Nexus Executive searches surveying the trade and popular press. The search was limited to The Financial Times and Global News Wire because we felt this was representative of what the global press were reporting. The following search string was used: "ERP or 'enterprise resource planning' or 'enterprise systems' or 'enterprise wide systems'". The first search was conducted for the period of January, 1992 through December, 1995 and generated 40 articles, less than .1% of total publications for our search period (i.e. less than 1% of all ERP articles were published in the first four years of the search period). The number of references between January, 1996 and December, 1999, leading up to the Y2K changeover, grew to 19,754. This equals 45% of the total

publications with the remaining 54.9% published after the 2000 date change. This final search

gathered 24,093 articles from the period of January, 2000 through mid-June, 2002 (see chart 2.2).
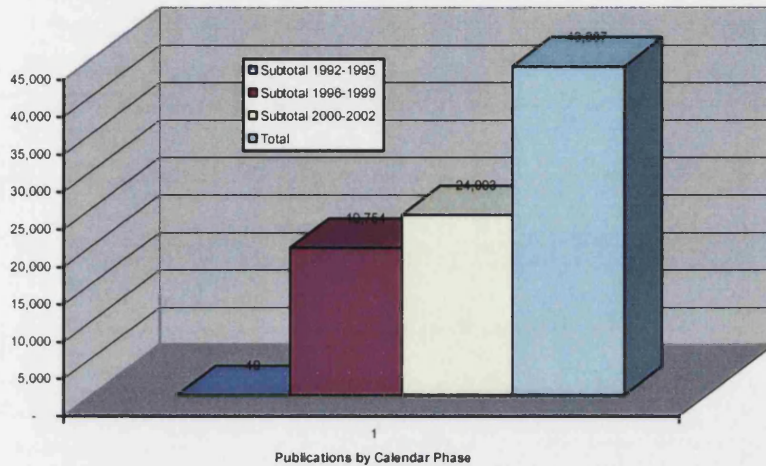
Chart 2:2: Visual representation of ERP practitioner publications

Not only did the off-the-shelf ERP solutions provide a 'comfort-level' to organisations because

the technology was Y2K compliant but also because its integrated design promised to increase

management control and centralise decision making (Hanseth, Ciborra & Braa, 2001). Purchasing

packaged software allows organisations to "acquire functionality" rather than "reinvent the wheel"

by designing in-house administrative systems that 'may not differentiate the organisation in terms

of competitive advantage' (Willcocks & Sykes, 2000). The notion that back-office administrative

functions are non-strategic and best automated based on a standard ERP template seems to be

taken for granted by organisational leadership. This is illustrated in the work of Davenport,

arguably the academic whose writings on ERP crossover most readily to a practitioner audience

(c.f. Davenport, 2000, 1996, 1998), where he claims that although these systems are difficult to implement, ERP is a prerequisite for operating in the 21st century (Davenport, 2000).

We interpret Davenport's perspective as quite powerful but also contentious. We argue that the ERP bandwagon has gained in momentum because organisational leaders believe their administrative infrastructure should be based on the 'best business practices' embedded within ERP software. From this perspective, difference is frowned upon in favour of adopting a standardised administrative infrastructure similar to those adopted by other contemporary organisations. This trend toward standardisation is no longer limited to wealthy, western industries. Rather, ERP continues to proliferate with vendors branching their development and sales efforts East into India and China (Tham, 2002a, b). In addition, ERP technology is being offered to smaller and less developed organisations through an application service provision (ASP) model. Bennett and Timbrell (2000) provide an insightful definition:

> "Application Service Provision is a form of selective outsourcing where a third-party organisation rents generally available packaged software applications and related services."

Hosting a generic or customised ERP system through networked servers using the internet or a virtual private network offers organisations the architecture without the ownership of it. This strategy is expected to reduce administration costs and redirect human resource efforts away from the management, monitoring, and maintenance of back-office ERP technology and toward strategic systems issues (c.f., http://www.oracle.com). Whether purchasing the software or outsourcing the applications, overhauling administrative information systems to an ERP model encourages organisations to adopt a normative administrative model the basis of which underpins a vast number of contemporary organisations around the globe. Whilst the revision of back-office

work practices through ERP may not be considered an activity that will increase competitive advantage, it certainly has impacted the ways in which organisations must confront and work toward their strategic IT goals.

The differences between developing and implementing customised information systems versus configuring packaged software such as ERP has been the subject of several information systems studies. Researchers have taken an historical perspective, charting the trajectory of ERP as a software solution (Hossain & Patrick, 2002; Klaus et al., 2000; Rashid, Chung & Snyder, 1999). Sawyer (2001a, b) considered the similarities and differences of ERP development and finds that the domains are distinct and that the growth of the packaged software market has implications for multiple stakeholder groups involved in such initiatives. Whilst Brehm, Heinzl and Markus' (2001) review of empirical research shows that local organisations choose to modify standard ERP packages to such an extent that the technology cannot appropriately be defined as off-the-shelf software. Rather, organisations are involved in something in-between complete customisation and configuration which impacts the implementation risk and cost of subsequent system upgrades.

The reported popularity of ERP technology coupled with the challenges of implementing an integrated software package into an organisation has led academic researchers and software vendors to try and provide insight into controlling the implementation processes. The transition from locally accepted, 'legacy' systems to standard enterprise-wide architecture is complex impacting both organisational outcomes and the momentum of the global ERP trend.

As Esteves and Pastor (2001) note, the implementation phase of the ERP lifecycle is currently the most widely researched in the IS discipline. They associate this focus with the stage of the ERP trend and the lengthy scholarly publication pipeline. Esteves and Pastor subdivide the implementation literature into four topic areas listed here in order of popularity: implementation case studies, implementation success, implementation approaches, and other implementation issues. This research classification is incongruous to us because the case study is not a topic area but a method for conducting research. So whilst the number of case studies on ERP might be higher than the other three topic areas, we argue that the focal point of these case studies vary.

We recategorise the ERP literature in terms of three main project foci. The first takes as its starting point the notion of *controlling* the implementation in order to ensure success and is reviewed in subsection two. The next considers *future innovations* that are expected to make success more attainable by decreasing the rigidity of current ERP packages and increasing its diffusion throughout contemporary organisations. The third category reviews ERP research focused on *understanding* the dynamics of these initiatives and is addressed in subsection four.

2.1.2. Controlling ERP

It is not a new phenomenon for IS researches to determine a list of 'critical success factors' for IT-enabled project initiatives (Nandhakumar, 1996; Reich & Benbasat, 1990; Ginzberg, 1981). IS Scholars have focused on controlling implementation outcomes within organisations for over fifteen years (Land, 1992; Lucas, 1991; Porter & Millar, 1985). Today, a plethora of researchers

are working within this research area to identify similar factors specific to ERP implementations (Ross & Vitale, 2000; Brown & Vessey, 1999; Parr, Shanks & Darke, 1999; Sumner, 1999; Bancroft, Seip & Sprengel, 1998; Bancroft, 1996). Most recently, authors have employed positivist research approaches to test the validity of these factors as truly necessary conditions for implementation success (Sarker & Lee, 2000) and then predict the affect of installed ERP technology on firm performance (Poston & Grabski, 2000).

Other research prioritises critical success factors in order to advise managers about which of the factors are most critical for their organisation (Somers, Nelson & Ragowsky, 2001; Sharks, Parr, Hu, Corbitt, Thanasankit & Seddon, 2000). The saturation of the IS field with success factor research means that differentiating studies from one another in order to understand the value of one list of factors over another is becoming more difficult. We paraphrase the language of Esteves and Pastor (2001) in their annotated ERP bibliography in order to illuminate our point. The authors categorise the implementation success literature in some of the following ways:

- Identification of critical success factors
- Integration of Critical Success Factors (CSF) into a unified model of CSF
- CSF divided by ERP project phase
- CSF by phase – a cross cultural study
- Unique ERP project risk factors
- Critical issues affecting an ERP implementation
- Identification of variables that inhibit an ERP implementation
- Key issues to enable successful ERP implementations

This list is not exhaustive but we hope it exemplifies the extent to which the topics of success and failure are a dominant research stream. We view this detailed categorisation as a result of topic saturation where in order to make an original point, 'hairs must be split' to distinguish one study from another.

Whilst critical success factors related to the implementation phase of an ERP project abound, studies have also been conducted to identify factors related to the selection of an ERP package (Brown, Vessey & Powell, 2000; Stefanou, 2000), based on organisational size (Bernroider & Koch, 2000). Similar studies have modelled the decision making process involved in the selection, implementation and evaluation of ERP (Shakir, 2000) and mapped the selection process from a management perspective (Stafyla & Stefanou, 2000). We argue that these studies are not without benefit because they illuminate important issues for consideration and point to the complexity of software project initiatives. Organisations and researchers may find consulting a list of *a priori* 'factors for success' beneficial, such items are not in-themselves keys to a preferred outcome. Rather, they tend to focus attention on controlling and simplifying innately complex situations.

These prescriptive approaches have long been criticized for their attempts to predict success (Ciborra and associates, 2000; Ciborra, 1998b; Farbey, Land & Target, 1995) whilst disregarding issues of organisational context and process (Bussen & Myers, 1997; Walsham, 1993). Boudreau and Robey (1999) follow on from these criticisms and directly address ERP researchers and practitioners. The authors warn against being influenced by previously published material on the topic. At this stage, the reputation of the technology has a tendency to precede itself and the authors argue that taking too much account of previous findings and initiatives may unfairly frame academic research agendas and project management activities. Instead the authors present a framework to help researchers consider their theoretical choices for studying issues surrounding ERP transitions.

2.1.3. Future ERP Innovations

One indication that the ERP software is in a transitional phase is the publication of IS research focused on trends for its future development (Markus, Petrie & Axline, 2000). Before the software being implemented in organisations has reached maturity, academic studies are being published that report on changes to the technology as well as the process of better controlling problematic ERP implementations. For example, as noted earlier, studies have begun reporting on Application Service Provisions (ASP) as a viable option for organisations interested in an ERP architecture (Bennett & Timbrell, 2000). Another alternative to purchasing software from a single ERP vendor is the adoption of a Best of Breed (BoB) strategy which argues that organisations considering an ERP architecture should select the modules based on their particular needs rather than being persuaded by a vendor to purchase their entire suite (Light, Holland, Kelly & Willis, 2000).

BoB is expected to increase as a selection strategy through technological advances in componentisation of ERP software. Several studies report on component-based enterprise system development which is expected to enable a more flexible, open and scalable architecture through innovation in internet technology and development methodologies (Reussner, 2001; Sprott, 2000; Stallaert & Whinston, 2000). Componentisation is expected to improve upon ERP's claim of application integration which to date has been problematic in practice (Themistocleous, Irani, O'Keefe, & Paul, 2001).

In addition, ERP software vendors are actively trying to reduce the complexity not only in their development of the next generation of ERP systems but also through community outreach. Software vendors are sponsoring conferences to discuss issues and generate ideas amongst practitioners, educators, and researchers (Kumar & van Hillegersberg, 2000; c.f., http://www.sap.com/partners/events/congress.asp). Business cases are being published as pedagogical tools to aid understanding, (Avital & Vanderbosch, 2000; Bhattacherjee, 2000; Brown & Vessey, 2000; Hirt & Swanson, 1999; Ross, 1999; Sieber et al., 1999) and ERP is being taught to students within North American universities as part of IS and MBA curricula.

In their annotated bibliography, Esteves and Pastor (2001) reserve a separate category for IS research focused on "ERP and education" because a large number of studies have analysed the use of the technology within the classroom. It is particularly interesting to note that none of the studies sited in this category, or in fact in the bibliography itself, focus on the adoption, implementation and use of ERP within university administrations.

We argue that introducing ERP into the classroom is a strategy used by software vendors interested in securing the future of ERP within the corporate world. For example, SAP has developed an initiative to train the future business workforce in enterprise technology through its "University Alliance" which provides academic institutions with a free copy of its R/3 enterprise software for use as a pedagogical tool to support their under/post-graduate business curricula (c.f., Watson & Schneider, 1999). Universities who join the alliance, commit to training their business school faculty in the technology and this then forms the infrastructure upon which a majority of coursework is based (Becerra-Fernandez et al., 2000). This approach is expected to embed within

the workforce of tomorrow, a process view of management and ensure proficiency in SAP

enterprise technology. Already there is research into the ways in which ERP based curricula is

changing the nature of coursework and teaching (Rosemann, Scott, & Watson, 2000; Stewart,

Milford, Jewels, Hunter & Hunter, 2000)

The forward-looking focus of ERP vendors is to be expected. Similarly, academic researchers

should be compelled to study software innovation and diffusion. However, our discipline's focus

on the future of ERP trends and/or the control of project outcomes has created a gap in the

literature. Our understanding of the *work* involved in such project initiatives – the negotiations

that come to constitute critical factors, the ways in which a project is constructed as a success or

failure, and how this work sets the stage for future opportunities – remains limited in comparison.

It has been argued that research focused on future innovations is moving ahead of itself without

taking time to understand the nature of current ERP technology within an organisational context.

(Hanseth, Ciborra & Braa, 2001). This leads to the possibility of history repeating itself because

we are too busy 'chasing the tail of advancement' to develop an in-depth understanding of the

present. Not only does this have implications for organisations hoping to learn from its

predecessors but also for ERP user-organisations who are migrating to updated versions of the

software. Similarly ERP vendors and management consultants who focus on future innovations

may be less equipped to help organisations manage the complexity of current ERP installations.

In the next subsection we highlight the research that moves beyond controlling and perpetuating

ERP software. These researchers emphasise the processes of organisational sensemaking, the

power of rhetoric to influence negotiations, and the implications of these activities for local organisations and industry sectors.

2.1.4. Understanding ERP

ERP technology continues to be sold in the boardrooms of organisations across the world and is touted by software vendors, management consultants and user organisations as the industry standard for business operations this century (Davenport, 2000). However, promises of integration and streamlined business practices are now being juxtaposed against the loss of unique organisational activities. Willcocks and Sykes (2000) define ERP as "IT catch-22 with a vengeance" where organisations feel they must join the ERP playing field to be on equal footing with their industry colleagues and competitors but have difficulty justifying the costs, implementing the system and achieving long term business advantages.

Ironically, the systems are becoming so popular that companies whose competitive advantage comes from their unique administrative activities may be forced to seek innovation elsewhere as ERP systems proliferate their industry (Davenport, 2000). In fact, Davenport's recent book on ERP entitled "Mission Critical" and is based on the premise that there exists no viable alternative to ERP technology for organisations operating in a constantly changing, global marketplace. He advises practitioners on how to "realise the promises of enterprise systems" despite pitfalls.

Whilst statistics about ERP popularity proliferate and rhetoric of its importance for contemporary work life continues, a growing body of literature documents the difficulties that many

organisations encounter when implementing the technology (Kremers & Dissel, 2000; Markus, Petrie & Axline, 2000; Scott & Vessey, 2000; Davenport, 2000, 1999). In contrast to the development of in-house information systems designed specifically to fit the needs of the organisation, when configuring packaged software a tension often exists between organisational working patterns and the technological constraints of the system (Walsham, 2001; Kremers & Dissel, 2000; Hanseth & Braa, 1998). Soh et al. (2000) define this tension as a "misfit" and point out that the likelihood of such a state occurring is far greater when implementing integrated ERP systems:

> "The problem [of misfits] is exacerbated because ERP implementation is more complex due to cross-module integration, data standardization, adoption of the underlying business model ('best practices'), compressed implementation schedule and the involvement of a large number of stakeholders."

In order to resolve the gap between legacy work practices with which the organisation is familiar and standard ERP processes, project leaders must consider a spectrum of choices ranging from the modification of its work practices to suit the ERP technology or customising the packaged software to better fit organisational needs (Markus & Tanis, 2000; Soh et al., 2000).

ERP technology embodies process templates that claim to represent the current 'best business practices' but which may be at odds with locally embedded work practices. As Kremers and Dissel (2000) point out:

> "ERP systems are supposedly based on the best practice generic business processes. Therefore, when buying an ERP system, off-the-shelf, organisations obtain these practices and subsequently are pushed into the direction of implementing them."

While the system can be customized to better meet the needs of the organisation the technology does not lend itself easily to this option. Changes to source code and the creation of add-on modules to the integrated suite of applications are complex and costly options likely to increase the project scope and budget (Kremers & Dissel, 2000; Markus et al., 2000; Soh et al., 2000). Current literature is dominated by reports of organisations that radically adjusts work practices to fit within the standard technological infrastructure (Brehm, Heinzl & Markus, 2001; Willcocks & Sykes, 2000; Davenport, 1998; Foremski, 1998).

However, one interesting study focuses on the adaptation of ERP technology rather than on organisational shifts toward the software (Brehm, et al., 2001). We report that some organisations have 'tailored' their ERP software; a process they define as the range of activities from standard 'configuration' work of implementation to 'modification' where the organisation radically changes the software code to fit local practices, at times resulting in the loss of vendor support. They provide a typology of nine tailoring options based on empirical research, and a review of academic and practitioner literature. This introductory typology indicates that organisations are moving beyond the acceptance of ERP's standard software configuration in an attempt to resolve the misfit between global standards and local operating needs. The authors propose three hypotheses as a basis for further study and call specifically for in-depth case research in order to better understand the risks and benefits associated with a tailoring strategy.

It is hypothesised that the tailoring of standard ERP suites can hinder the project budget, schedule and system performance. In particular an organisation's 'migration' to a new version of the software might be impacted depending on the type of tailoring embarked upon. ERP software

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upgrades are advantageous because newer versions have increased functionality and often embed tools for ensuring regulatory compliance (Kremers & Dissel, 2000). Aside from these benefits, ERP vendors often contractually require such migratory upgrade processes if organisations wish to receive continued support of the technology (Kremers & Dissel, 2000). Together, these issues discourage locally-driven adaptations of the technology.

On the other hand, the study questions the extent to which organisations that tailor their ERP package are able to differentiate themselves from industry competition and create a local solution that is more easily accepted within the organisation. The authors pose a third hypothesis that questions whether a causal relationship exists between an organisations willingness to change their business processes to fit the standard ERP and the degree of tailoring embarked upon. These questions highlight the focus of this dissertation because they touch on the complexity of negotiating through an ERP project landscape where success and failure are relative concepts that shift over time based on the choices and actions of project actors. In this way the 'fit' or 'misfit' of ERP features and organisational functions is achieved over time through the interplay of both technological and organisational tailoring.

ERP misfits are not just the result of conflicts between standard technological design and local work practices. The large number of stakeholders involved in ERP projects add complexity to communication and coordination efforts. ERP projects are organised as complex matrix structures comprised of multiple stakeholders who must be able to articulate their perspectives to a diverse group of team members ranging from ERP programmers, management consultants, local technical and functional experts, and end users (Willcocks & Sykes, 2000). The core competencies of these

team members often do not overlap, creating a "knowledge gap" between understanding the detailed functionality of the ERP system versus the intricacies of organisational business processes (Soh et al., 2000). A great deal of time is spent articulating and translating expertise across expert domains.

Several IS studies have focused on bridging this gap by considering the interplay between software vendors, management consultants and local actors. Westrup and Knight (2000) focus on the role of consultants in shaping, rather than just facilitating ERP project initiatives. Another study analyses the important characteristics of vendor/client interorganisational teams whose mandate is to collaborate on ERP module enhancements (Scott & Kaindl, 2000). Although only a passing comment, they indicate that end users have less power in ERP projects because software functionality is determined without their input, through high-level, elite collaboration between the ERP vendor, organisational leaders, and management consultants.

The lack of end user involvement in ERP projects is interestingly supported by Sawyer (2001a) who found that during ERP implementations end user needs are filtered through intermediaries with stronger ties to the project initiative. He goes on to note that despite the project structure being designed to include end user participation, it is the existing social network of the organisation that influences the extent to which users are considered. Whilst user workload increased during ERP projects it was not because they were intimately involved in the project but rather, they were managing an increase in communication with project intermediaries. Therefore, Sawyer argues that organisations embarking on ERP projects should design the team to reflect the

social relationships in the organisation rather than trying to force interactions between stakeholders that wouldn't normally communicate.

Sawyer (2001b) also emphasises the exclusion of end user input from the initial decision making phase of requirements definition, a crucial part of an ERP initiative where the configuration and business process strategy is articulated. Alvarez and Urla's (2002) study found that whilst users were questioned by software analysts during requirements analysis interviews, their responses were often discounted by the analysts because the users tended to respond by telling stories about their legacy work practices. These narratives were considered by the analysts to be subjective and irrelevant to the configuration of the ERP system.

Baskerville, Pawlowski and McLean's (2000) study found that through the development of "divergent knowledge" about one another's expert domains, project members are able to communicate across traditional functional categories and help move ERP initiatives forward. Scott and Wagner's (forthcoming) study highlights the reconciliations of these project misfits by focusing on the negotiations between divergent stakeholder groups as they try to understand one another and create a viable ERP-based operating environment. Whilst Gable, Scott and Davenport (1998) attempt to improve the support of the ERP lifecycle by considering the management of knowledge between vendors, clients and implementation partners. In a related paper, Klaus and Gable (2000) focus on how senior managers conceptualise 'knowledge management' and provides a base for understanding the interplay between the three key ERP stakeholders who are the focus of the parent project.

In addition to research that highlights ERP misfits caused by technological design or interpersonal team dynamics, a group of studies focus on the interplay between these issues. Such studies most closely relate to the focus of this doctoral dissertation because their analyses present ERP projects as complex socio-technical initiatives through which technology, humans, organisational arrangements, business processes, and power relations shift. Central to achieving such analyses is bringing technology into high relief – affording it a sense of agency in order to better understand its role within the ERP project.

As Orlikowski and Iacono (2001) ironically note, the IS discipline has been sadly lacking in our ability to theorise the role of technology in contemporary society. We argue that the literature on ERP presented in the previous sections indicates the contentious and complex nature of the software when introduced within contemporary organisations. For this reason it is particularly important to focus on understanding ERP in interaction with organisational stakeholders. Several studies highlight how such a focus develops our understanding of ERP software in action – technology 'in-the-world'.

Askenas and Westelius (2000) take a social constructionist perspective of ERP technology arguing that the software is assigned particular roles by the humans with which it interacts. The five roles identified are bureaucrat, manipulator, administrator, consultant, and dismissed. The study theorises this process through the study of a particular company whose actors projected different roles onto the ERP over time as the organisational structure and agenda for IT-enabled change shifted. Whereas Hanseth and Braa's (1999, 1998) case study of ERP technology implemented

within a Norwegian company analyses the power of software to influence human actors thereby directing the project initiative. Their theoretical perspective advocates a broad sense of agency in order to illuminate the ERP software as an active and powerful participant during the system implementation. This is in contrast to normative studies that conceptualise ERP as an object for modification where misfits between technological features and organisational preferences were attributed to conflicting social programs.

We interpret Hanseth and Braa's study as a breakthrough piece of ERP research because they illuminate the complexity of configuring standard software by theorising the technology itself as recalcitrant (1999). The case reconceptualises the ERP as a purposeful, and somewhat autonomous, actor in its own right with an agenda to maintain a powerful position within the organisation by reshaping local work practices to fit its design. They found that although increased management control was sought through the project initiative, the opposite was achieved because the ERP became a 'traitor' to all organisational interests.

In a special issue of ERP in the journal *Datasbase*, Hanseth, Ciborra and Braa (2001) employ this case in a critique of globalisation in modern times to argue that despite the rhetoric of ERP and its precursor, BPR being technologies of increased control, their implementation within organisations actually reduces this state of order. This occurs because the enterprise systems act like 'runaway engines' (Giddens, 1999) influenced by various complex situations but controlled fully by none. Therefore, the authors argue that any attempt to dominate technology in order to move it into alignment is futile.

This is part of Ciborra's larger research agenda where he has argued for a shift away from the mindset of control which proliferates practitioner and academic management literature. Ciborra and associates (2000) directly address the prescriptive critical success factor literature by presenting the notion of 'technology drifting' (Ciborra, 1996b) as a more accurate starting point for understanding the complexity of today's environment and argue that 'aligned' and 'standardized' IT infrastructure is a rare event in rapidly changing industries (Ciborra and associates, 2000). However, while the approaches outlined above explain the management of implementations in radically different ways, neither side of the debate adequately investigates the dynamics involved in reaching a project outcome.

Several ERP studies have taken as their central focus the investigation of such dynamics and together these studies informed our interpretation of IT project negotiations as involving both conflict *and* repair where order is achieved in spite of difference. This is illustrated in two recent articles focus on the simultaneous installation of ERP software and a Knowledge Management (KM) system within an organisation (Galliers, Newell, Huang, & Pan, in press, 2002; Huang, Newell, Galliers & Pan, 2002). Their interpretive case study is relevant to this dissertation because it is focused on the negotiations involved in creating an operating environment that is both efficient and flexible enough to allow for local innovation.

Where this study highlights the ability of an organisation to negotiate with the ERP to good effect, of equal interest is research that reports on the conflicting political perspectives that create tension

between technological design and organisational form. Allen and Kern's (2001) study of UK public universities argues that ERP is particularly problematic to implement within these organisations because the culture is fundamentally at odds with the design of integrated and standardised software. Through stories of 'power, politics, and resistance' from multiple universities' actors, they interpret the ERP as a 'Trojan horse' attempting to transform academic values into those of private sector organisations. Not only is this study's university focus directly relevant to this dissertation, but it is useful for illuminating the complexity of negotiating through IT change. The authors highlight the values of Corporate America inscribed within the ERP as being in conflict with the academic ideals such as its loosely coupled organisational form, semi-autonomous reporting structures, and ad-hoc IS development tradition. In the next section we consider in more detail the ERP research conducted to date within this context.

2.2. University Administrative information systems

In the 1990s many universities to sought external advice regarding computer-based information systems (Allen & Kern, 2001). As a result, outdated business practices and conflicting lines of responsibility are being identified as impeding organisational performance. This has led many universities to include system modernization and process redesign efforts as an integral part of their business strategy (this includes all Ivy League universities as well as universities outside the US and Canada).

In response to the complex higher education environment, several multi-national enterprise resource planning (ERP) software vendors are actively vying for domination of the higher

education sector (See for example www.oracle.com). These vendors are courting wealthy Ivy League and other universities with promises of global organisational standards provided through an integrated infrastructure upon which to operate in the new millennium. In the late 1990s several large universities chose to adopt the role of market leaders by being the first to implement enterprise systems. Today, less renowned private and state funded universities are following the leadership of their Ivy League counterparts (c.f., Craig, 1999; Sieber, Siau, Nah, Sieber, 1999). However, there is a concern that integrated ERP 'solutions' are being chosen without wholly considering the structural 'side effects' that can greatly impact the loosely coupled nature of the organisation (Koch, Slater & Baatz, 1999).

University practitioner literature on ERP is prevalent with thirteen articles published between 1998 and 2002 in the two main Educause journals. Educause is a 'non-profit organisation focused on the advancement of higher education through the intelligent use of information technology. The membership consists of almost two-thousand colleges, universities, and education organisations and almost two-hundred corporations' (c.f., www.educause.com). In addition, faculty administrators are sharing their experiences with one another through guest seminars at other universities (personal communication, 1998), conferences such as the Seminars on Academic Computing conference (c.f., http://www.educause.edu/sac) and the annual Educause conference (c.f., http://www.educause.edu/conference/). In addition university leaders attend software vendor user group meetings such as the Oracle Applications User Group Conference (c.f., www.oaug.org) and spend a great deal of time communicating within special interests groups set up by the vendors for particular industry sectors, in this case higher education (c.f., http://www.oaug.org/hiedoaug/).

However, very little academic IS research focuses on back-office enterprise resource planning systems within the university context. The recent popularity of ERP systems within the higher education industry promises to elicit more research in the area and indeed the number of publications are growing. A review of the major IS conferences for the past five years resulted in only two publications addressing ERP and particular aspects of the university context (Allen & Kern, 2001; Mahrer, 1999)[2]. Several studies draw on university-based case research but their analyses are not directly focused on university contextual issues (Oliver & Romm, 2000; Volkoff, 1999). Two teaching cases were found (Craig, 1999; Sieber et al., 1999) along with two conference panels on university issues (ECIS, 2000; ICIS, 1996).

Several studies of administrative IS within the university context exist and are relevant to our understanding of ERP technology more specifically. These studies have focused on the context of the university as being distinct from business organisations. Studies focusing on the UK based Management and Administrative Computing (MAC) initiative provide a different technological context but consider the standardisation and integration of work practices within the university context. The MAC initiative was expected to standardise administrative systems across UK universities, moving these institutions out of their local fiefdoms of activity. Sillince and Mouakket (1998) highlight the political issues involved in the MAC initiative by illustrating the importance of 'perspective switching' where users and software vendors were able to collaborate when they began to understand the point of view of others involved in the project. Pollock's (1998) thesis on the MAC initiative focuses on the ways in which users negotiate with software

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[2] Review based on AMCIS (through 2000), ICIS (through 2000), IFIP 8.2 (through 2001), and ECIS (through 2001).

designers and the technology in order to create 'work-arounds' that enable their local administrative practices.

Another article focuses on the software development trajectory within three universities and considers the interactions between administrative staff, university leaders, and software vendors during different projects (Heiskanen, Newman & Simila, 2000; Heiskanen, Newman & Simila, 1996). A complementary article focuses specifically on a consortium of universities that joined together with software vendors to create a student record system. The study emphasized the fiefdom-like nature of the consortium and the way in which this impacted the joint development approach (Heiskanen, Newman & Saarinen, 1998).

Mahrer's (1999) research of an ERP implementation at a technical university in Zurich sought to find "success cases" of implementation. The analysis argues that whilst top management defined the project as an "outstanding success", other university stakeholders saw it as less than that. This is not a new idea, nor is it context specific. What is more interesting in this article, although in need of development by the author, is the notion that management constructed the 'success' out of necessity. Finding themselves "victim" of highly complex packaged software, they were ill equipped to rein it in. Rather, the implementation resulted in a situation of "operation successful – patient dead" where the ERP technology was made operational at all costs but the organic processes that long supported the university structure were dead. The author concludes by warning that implementing the rigid ERP technology within a higher education context is "more dangerous" than in corporations because of the impact on the unique organisational form.

2.3. Areas for Further Research

Whilst at first it might appear that it is hard to make a contribution within the ERP literature as the mainstream management issues have been extensively sifted through, most articles discuss either the organisational challenges inherent in the technology or how to control project initiatives. Few attempt to understand *how* it is that organisations take problematic ERP software and build an integrated information system that works for organisational members. Many researchers have preferred to offer prescribed solutions; checklists that they expect will help define the future and minimise hardships for the next company thinking about implementing ERP technology. It is crucial that the community moves beyond this knowledge base if we are to understand IS in practice.

Interestingly, there is very little research focused on the role of ERP's financial management functionality. We argue that with 92% of organisational implementations involving the financial module of an ERP suite (Themistocleous, et al., 2001), a great deal of research needs to be done which directly addresses the role of accounting within ERP project initiatives. The disproportionate relationship between the number of published studies on the topic and the significance of this module within organisational contexts is in itself significant because it speaks to the skewed nature of our knowledge about these systems and their role within contemporary organisations. We seek to contribute to our understanding in this area through our in-depth data analysis.

This study in particular seeks to contribute to the ERP literature focused on understanding the technology. We provide insight into the negotiation process by interpreting change as a series of interconnected negotiations through which the information system will emerge. We then challenge the duality of categorising ERP projects as either success or failure by illuminating the power of accounting functionality to shift the boundaries of work practice within an organisation. We illustrate that the installation of ERP does not mark the end of the negotiating process. Rather, the work involved in naturalising the ERP within the organisation continues. These negotiations have important implications for organisational priorities and impact who and what is valued within the university.

The extent to which this ERP package is sold as a standard operating platform for universities around the globe has implications for the way in which these organisations will be modernised and will frame the boundaries of what is legitimised within the administration of academic institutions. If, as Davenport's (2000) predicts, ERP systems are to become the industry platform upon which organisations will operate this century, academic researchers have a responsibility to conduct independent research, and provide an alternative perspective to the rhetoric which surrounds the technology. Longitudinal studies of negotiating with ERP software may provide additional insight about the shifting boundaries of governance, management, and forms of organising so that we can begin to understand the impact of this technology on contemporary organisational operations.

3. Research Methodology

This chapter presents the epistemological position underpinning this doctoral study and introduces the research approach and tools employed in carrying it out. Consideration is given to the research design with special emphasis on a narrative approach to accessing context. This chapter is relevant to the dissertation in three main ways. First, it defines the nature and scope of our methodology. It should be noted at the outset that the methodology was designed with the overall research question in mind. Second, the chapter introduces and links the study's theoretical framework to the empirical design, and finally it helps transition the reader's attention from the background and objectives of the study to its empirical analysis.

We adopt an interpretive epistemology aligning the study with an established IS research tradition. The research strategy was designed to emphasize the role of language in the construction process and therefore we adopt a narrative approach to conducting an interpretive field research within an organisation. The majority of field work was conducted between June 1999 and August 2000. Since then periodic correspondence has been kept with the study's interlocutors and follow-up email interviews were conducted in 2002. The methods employed in the field study are commensurate with the interpretive epistemology and are specifically informed by the study's narrative approach. The tools include: narrative interviews, collection of official and confidential documents, and direct observations.

This chapter is organised into four sections. The first situates the study's narrative approach within the broader interpretive tradition and identifies it as a distinctive qualitative research

vehicle. Section two presents the current stream of IS narrative research and the specific approach informing the study. The section highlights five properties of narrative text that distinguish it from other data and identifies six aspects of narrative accounts that are useful for interpretive researchers. It concludes with a discussion of research site access. Section three considers the study's research methods and introduces the organising theme of 'negotiating change'. The final section introduces the most helpful theories for exploring this theme, and prepares the reader for the presentation of empirical data in chapter four.

3.1.   The choice of research methodology within information systems

This section introduces the interpretivist epistemology underpinning the doctoral research project and highlights the commensurability between this stance and the qualitative, narrative approach informing the field study. Where the scientific tradition argues that an objective reality exists and that the aim of research should be to provide insight into the truths and laws which constitute that reality, interpretive researchers take the ontological position that reality is socially constructed (XXXX). This subjective reality can be accessed through the articulations of participants and researchers as a result of their sense making activities (Walsham, 1993). The presupposition of interpretive research being that the domain of social science presents recalcitrant objects of study: human beings who cast doubt on the ability to access 'objective truth and reality' through their language, symbols and actions (Latour, 1999c).   Rather, we gain access to *individual interpretations of reality* by collecting and analysing such data (Klein & Myers, 1999). Therefore, the main aim of an interpretive researcher is to understand the process of sense making as situations emerge and are made meaningful by individuals and groups (Scott, 2000).

In particular, this doctoral thesis is informed by the hermeneutic process of interpretation (Ricoeur, 1981; Gadamer, 1976) which provides a philosophical basis for understanding the design, implementation and use of socio-technical systems in our world (Boland & O'Leary, 1991). This perspective is recommended as the fundamental principal guiding for the evaluation of interpretive field studies (Klein & Myers; 1999). What differentiates hermeneutic interpretation from other forms of subjective sense making is the notion that we understand the world as *text-analogues* and can appropriate meaning about them through a 'reading' of the situation. Interaction between a whole (for example an organisational community) and its parts (individuals, technologies) creates an important feedback loop where meaning develops and deepens over time. From a hermeneutic perspective, one's interpretation of context is deepened through reflexively creating shared meaning within a community (Boland, 1987). Whilst we all enter situations with prejudices based on our pre-existing stock of knowledge, it is through dialogue with others that we adjust our interpretive lens and come to a finer reading of the situation.

The juxtaposition of the logical, scientific paradigm with the philosophy of hermeneutic interpretation, points to an historic methodological and epistemological debate amongst IS research camps which once dominated our discourse (for historical understanding see, Robey, 1996; Orlikowski & Baroudi, 1991). In the late 1990's this argument began to be largely replaced by discussions of the value of diverse research epistemologies (Benbasat & Weber, 1996; Robey, 1996), and in turn, the importance of developing appropriate methods of evaluating research conducted within these different areas. The design of fieldwork should be done in a manner

consistent with the philosophical assumptions underpinning one's study. Epistemology becomes manifest within the chosen research methods and these in turn impact the status and nature of the data collected and the contributory claims made based on the research findings (Walsham, 1993).

3.2. Qualitative research

In 1997 the IFIP 8.2 working group conference was dedicated to reflecting upon and evaluating the application of qualitative research approaches within the IS field. This meeting lent credibility to the multiplicity of research agendas within information systems, and conference organisers argued it was an indication of the developing maturity of the IS discipline (Lee & Liebenau, 1997). The editors of the conference proceedings also argued that the widespread acceptance of qualitative research, threw into high relief the shortcomings of traditional approaches for understanding human cognition and agency (Lee & Liebenau, 1997).

Qualitative methods such as case study, ethnography and action research, developed within the social science tradition for precisely this reason. In an attempt to provide tools for studying social and cultural contexts through the eyes of inhabitants, qualitative methods work to elicit perspectives, observe activities and reflect on interactions during field investigations (Myers, 1997). Rather than employing research tools that work to quantify and test variables, qualitative methods help the researcher gain a close relationship between context, content and process (Pettigrew, XXXX) in order to develop a deep understanding of the research environment (Walsham, 1993). It is worth noting however that qualitative methods are employed by researchers with varying research agendas. For example, whilst the case study is a qualitative

method, this strategy has been employed by researchers with a positivist agenda (c.f, Yin 1994; Benbasat 1987), and an interpretive perspective (Walsham 2001, 1993; Scott 1998).

The legitimisation of multiple research approaches within the field makes it all the more important to purposefully design a study that is commensurate with overall research goals and objectives. This doctoral study was designed with the overarching research question in mind: How does this organisation negotiate with the ERP software to create a *matter of fact* – an information system that is accepted by disparate individuals and groups together for better or for worse? In order to answer this question a qualitative approach was chosen because we are interested in understanding the process and meaning of IT-enabled change as experienced and expressed by organisational stakeholders. As Denzin and Lincoln (1998) point out, adopting a qualitative approach is a particularly effective strategy for 'capturing individual view points by examining the constraints of everyday life and developing a rich description of the social world'. Access to this "world in action" (Denzin & Lincoln, 1998) is gained in this study by privileging stories as representations of context that are constructed through a hermeneutic process of interpretation.

3.3. Research Strategy: a narrative approach

The main research strategy selected for this research is an in-depth interpretive narrative study of one organisation. The previous section outlined our understanding of interpretivism and qualitative research, what follows is a discussion of the narrative research strategy which is highlighted through the application of relevant literature. First, we define narrative as a particular qualitative approach and consider the ways in which stories enter organisational studies. Second,

we discuss the ways in which narrative has been applied in the information systems field. Third, we elaborate upon the current state of the art narrative research through the work of Jerome Bruner (1990, 1986). Together these literatures form the basis for the narrative research strategy. Fourth, the selection of the field site is discussed and the motivations and circumstances that influenced this choice are considered.

3.3.1. Qualitative Narrative Studies

Van Maanen describes narrative studies as a distinctive kind of qualitative method that are particularly useful for studying organisational change because they 'connect individual stories, experiences and actions to social events, processes, and organisational achievements' (within Czarniawska, 1998, p. v). It is this connection that we seek to illuminate through our field data. According to Czarniawska (1997), there are at least three ways in which narrative enters organisational studies. Firstly, interpretive researchers adopting a hermeneutic perspective 'conceptualise organisational life as story making and organisational theory as story reading' and in this way connect local experiences to grand social theories. Secondly, case descriptions constructed by the researcher represents tales from the field (Van Maanen, 1998) that provide a narrative explanation of the study's empirics and prime the reader for a theoretical analysis of the study's context. Thirdly, tales of the field (Czarniawska, 1997) refer to the collection, handling and analysis of narrative as it emerges within the organisational context.

Purposefully designing narrative-based fieldwork helps the researcher focus her perspective at all stages of the research process by giving her the 'eyes to see' the interconnectivity of stories and

follow the change process as it unfolds. In addition, such an integrated research design encourages consistency between epistemological position, the design and execution of fieldwork, and the representation of the research as a plausible, contextual account intended for a particular academic audience. The design of this study agenda aims to illuminate the dialogue between alternative perspectives and embed the study's findings within such an analysis. In the following sub-section we consider the application of narrative by IS researchers in order to explicate the value of this strategy for qualitative field researchers.

3.3.2. IS narrative research stream

The handful of IS studies that adopt a narrative research approach are disparate, seeming to borrow methods from different disciplines that have a strong narrative tradition. The unifying characteristic of this emerging research stream is the focus on narrative as providing insight into multiple perspectives that exist within certain contexts. Alvarez and Urla's (2002) and Davidson's (1997) articles focus on a particular form of narrative analysis to illustrate the multiplicity that exists at a given moment in a software project. Whilst these moments differ between studies, the former focusing on ERP requirements definition, and Davidson's on the inception of a project, the findings of both articles argue that analysing interview data as stories was useful for accessing the conflicting sense making activities of project participants.

Similarly, Brown and Jones (1998) construct two retrospective narratives of IS failure, one tale from the field tells the story from the perspective of a user group and the other, from the point of view of the project team. The juxtaposition of conflicting narratives provides insight into

organisational reality as a social construction where multiplicity rather than consensus of opinion is highlighted. In this way narrative is a vehicle through which meaning is created and ascribed to certain events. As Brown (1998) notes, adopting a narrative approach is practically synonymous with embracing multiplicity and as such throws into high relief the authors role in constructing narrative accounts:

> A focus on narrative is valuable because it facilitates recognition of the extent to which interpretive research involves the creation and ascription of meaning in ways that require authorial reflexivity." [Brown, 1998 p. 53]

Contrasting tales from the field throw into high relief the hermeneutic circle where interlocutors and the researcher are involved in privileging particular perspectives. Narrative data do not provide researchers with the ability to uncover 'the facts' surrounding an event, despite a narrator's claim to have access to 'the truth' or 'the real story of what happened' (Gabriel, 2000). Commensurate with the interpretive epistemology, a narrative approach foregrounds the notion that truth claims are relative and as such, seeks to foreground this subjectivity by presenting different interpretations of the same event. The official story of a software project which is recorded in organisational documentation, represents the dominant interpretation of the initiative, but it does not represent what 'really happened', merely what managed to be remembered.

Coherent and powerful narratives are determined through processes of interpretation and negotiation at multiple levels (Czarniawska, 1999) and as such, narratives are often analysed as a reflection and expression of power relations within organisations (Czarniawska, 1999; Boje, 1995; Filby & Willmott, 1988; Mumby, 1987). Within the field of IS, Brown (1998) presents multiple interpretations of an initiative by constructing narratives of different stakeholder viewpoints. He illustrates how narrative can be used to privilege one perspective and silence others based on the

agenda of the narrator (Brown, 1998). His study illustrates the way in which narrative can be gathered as a form of evidence that highlights, not just multiple voices, but the construction of multiple realities within organisations. Boland and Schultze (1996a) also illuminate this with their narrative/anti-narrative play on activity-based costing as a technologically inscribed accounting practice. They remind us that whilst narrative provides a powerful tool for convincing readers of a particular argument, there always exists an alternative narrative vying for the dominant position. These studies illustrate the rhetorical nature of narrative to construct and support a preferred organisational 'reality' by creating an infrastructure that silences those whose narratives are seen as contentious.

These current IS studies emphasise three characteristics of narrative data that are particularly useful for supporting interpretive field studies. First, narratives provide access to multiple interpretations of the research context and as such help researchers develop an awareness of field data as subjective texts rather than objective truths. This is directly related to the second characteristic of narrative addressed in the IS literature which highlights stories as rhetorical devices. Interlocutors will narrativize (Bruner, 1990) a particular version of reality in an attempt to convince the researcher of the influence of their perspective. In addition to illuminating the power relations underpinning research contexts, narratives are a vehicle through which meaning is created. This third characteristic provides insight into the sense making practices of the narrator as they articulate the way in which they view the world. The multiplicity, rhetoric and sense making of narrative accounts helps focus attention on the 'politics of voice and value' (Bowker & Star, 1999) inherent within contemporary organisations. A narrative field study can point to powerful organisational stories and also give voice to those whose agenda has been silenced by

seeking out alternative perspectives and constructing tales from the field that foreground multiplicity.

Together these qualities illustrate Bruner's (1990) thesis that narratives are 'a main mode of knowing and communicating in organisations'. Similarly, it indicates why increased attention is being directed at the role of institutional storytelling as a research approach (Gabriel, 2000; Boyce 1996; Boje 1995, 1991) and a tool for practitioners seeking to craft a particular organisational reality (Snowden 1999; The 2001 Story Telling Masterclass series). Despite this, the narrative mode of cognition (Bruner 1990, 1986), as an approach for understanding the socio-technical dynamics of computer-mediated organisational change, is still in its formative stages. When translating into practice these readings on narrative, we found several under-explored aspects that were helpful for interpretive field research and which could inform the field's understanding of the value of narrative methods. In the following sub-section we describe our appropriation of narrative as an overarching research strategy by highlighting these issues. The sub-section concludes with a taxonomy of the properties of narrative data and the characteristics of narrative accounts as defined in this study.

3.3.3. A narrative approach

Novel research strategies require explicit communication of the approach adopted, rigorous attention to the design and conduct of the field study and systematic execution of the methods. This sub-section translates the theoretical work of narrative scholars into a methodological approach that supports the overall research goals of the study. Whilst Barthes (1977) first defined

narrative within the field of literary theory as 'any form of communication', Bruner (1990, 1986) provides a more useful starting point for our study by arguing that "paradigmatic cognition" is only one of two 'modes of knowing' and although it is legitimated by scientific practice, the "narrative mode of cognition" is the more common way in which people articulate their world. As such, attending to narratives provides a vehicle for understanding how particular cultures attribute meaning to their constituent actions and practices (Bruner, 1986). In short, our definition of narrative derives from Boland (1996a, b) whose IS research trajectory of hermeneutic and narrative studies is significantly informed by Bruner's (1990) work: "Narrative is the mode of cognition that shapes the making of meaning and the construction of coherence" [p. 408].

Bruner (1990), Czarniawska (1998, 1997), and Boland and Shultze (1996a, 1996b) underpin this methodology for their respective attention to narrative cognition, narrative as a method for understanding negotiation, and the stories inscribed within technology and standard work practices. This sub-section presents the properties of narrative texts (see table 3.1) and highlights the characteristics of narrative accounts (see table 3.2) that have been useful in conducting this IS interpretive field study. To explicate the properties of narrative we take an example from our study of the ERP project. We begin with the story of a manager who is retelling the process by which the project was named:

> "The project at this point still didn't have a name...We were running naming contests, trying to get a name...there were some wild names that people voted on at a meeting to see if there was a preferred name but we couldn't reach consensus. Then [during] that two-day you know - information and posting notices. So the developer of the web site didn't even have a name to give the project, and so she picked project 'x' as the front-page logo – 'x' was the placeholder until we decided on a name. Then eventually people just threw up their hands about six months later and said *that's the name!* Well the name *'Project X'* is odd enough that it got across several different feelings. One [feeling] is that this [project] is new, that it is difficult to understand, and this is something that is not meant to be institutional. It's

meant to be here and then go away. It's a temporary thing! So it said - this is a temporary project - essentially. Not that - you know - the initiatives and the underpinnings of the project are temporary, but that the project itself is meant to not become institutional in nature."

We juxtapose this narrative with a listing of the elements related to the same issue[3]:

1. Ivy University's holds 'naming contest'
2. A web designer begins work on the project site.
3. Ivy University's project is named Project X.

Without 'hearing' the narrator's voice explaining how Project X was named, we are not able to understand the perceived causality of this process. Narratives 'order the world' from particular perspectives through their sequential properties. The chosen plot fundamentally differentiates narrative accounts from other data. It is in this retelling of events that we become aware of the multiplicity of interpretations constituting the research context. This manager applies a particular sequence to actions and events - his storytelling emphasises 'the naming' as a socio-technical drama comprised of emergent and contingent actions negotiated by members of the organisation. In this regard, Czarniawska's (1997) narrative approach is useful because she focuses on following the emergent action as it is revealed through the sequencing of stories. For example, she does not shadow particular actors but uses narratives to guide her study of Warsaw city's administration:

> "My study....took me about 14 months, 4 of which were directly in the field. During that time, a new city council was elected, which meant that I lost half of my interlocutors. Moreover, the neighbors also changed as a result of an administrative reform. The point is that I was not studying a community of city managers but an action net of city management: interconnected acts of organizing." [p. 26, original emphasis]

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[3] This example is adapted from Czarniawska (1998 p. 2)

These *action nets* surround socio-technical dramas and can be analysed through narrative accounts of change in a way that one cannot with list of data, diagrams and to varying degrees structured and semi-structured interviews (Riessman, 1993). Such question and answer sessions often strip away the narrator's sequential ordering in favour of the questioner's paradigm.

Narrators emphasize the agency and intentionality of actors who are working to move from an ordered state of being, through change, to a re-ordering of their world. In this way, narrative accounts illuminate the sense making process where the exceptional *is returned to* the ordinary (Bruner, 1990). While the truthfulness of the manager's sense making process can be debated, his account remains a powerful articulation of how a seemingly logical event such as naming a multi-million dollar software project, results from a series of interconnected negotiations over time. The emergence of the name Project X highlights the present as the only locus of reality (Adam, 1995). During the manager's story, the past and future are non-existent, constructed and fictitious. For example, as the present emerged to the storyteller, he made sense of it, adjusting his interpretation of the past and future accordingly (Mead 1980). In his story, the manager makes sense of the name Project X and ascribes to it a short-term trajectory that distinguishes it from the University's daily operations. The manager is re-ordering the past and future by making a logical relationship between a wholly emergent phenomenon. In addition, the storyteller is trying to convince we that the outcome of the naming was appropriate, despite it being unplanned and contingent.

We see this story silenced as the name Project X gained momentum in the University through community members visiting the website. Slowly the naming contest became hidden from view

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and Project X was translated into the vocabulary of diverse University action nets. Stories of the naming event as an accidental act were replaced with far more purposeful and grandiose narratives. Actors began associating the name with the popular US television series "The X files": a prime-time drama following the controversial investigations of FBI agents Mulder and Scully who specialize in solving super-natural crimes. The excitement of this television program mixed with the cutting-edge vibe of the University initiative created a powerful alternative story of the Project X name. This story was infused with an exclusive and high-profile character. In this way "Project X" became a powerful narrative through which actors conceptualised their futures and re-told the past.

The point here is alternative versions of socio-technical dramas will always exist. The power of the manager's narrative to be remembered as the 'real story of how Project X was named' resides in its ability to convince others - persuade action nets - of the plausibility of his perspective. In this way narratives are indifferent to whether they are considered 'factual' accounts of the world. At the time of writing, the manager's story of the etymology of the name Project X was largely covered over, silenced by the more powerful and persuasive narrative of the University and a science-fiction drama.

Property of Narrative: *Narrative data example*
Sequentiality: ordering of events, plot. *Manager: Project X name is portrayed as an emergent phenomenon that resulted from the work of web designer rather than a naming contest.* *Community: Project X is named because of the television show The X Files.*
Voice: perspective. voice of the speaker is evident. *Uses the pronouns "I" and "we". Narrator is retelling the story to an audience whom he tries to enrol with phrases such as "you know".*
Agency and intentionality: perceived intentions, actions and goals. *The project naming is told as a contingent event and yet the narrator ascribes post-hoc intentionality to the name as being appropriate because it connotes impermanence.*
Managing departures from the canonical: sequence moves from an ordered state, through change, back to the everyday. *The project name achieves 'everydayness' when users accept it as ordinary.*
Factual indifference: power is in persuasion not in 'truthfulness'. *The narrative does not tell us whether the manager is telling the truth, only that he is telling an interesting story. This story was countered by another interesting story which has maintained the interest of the community in a way the manager's story could not. Whether the manager's story is the 'true' account is uninteresting to the community.*

Table 3.1 Properties of Narrative (adapted from Bruner, 1990)

These properties of narrative broadly informed the field study and were held in mind by the researcher throughout her readings on the subject. However, individual accounts of change do not create change. Rather, it is only through co-ordinated action that change takes place (Boland & Tenkasi, 1995). The focus of this study required we illuminate the process of coordinated action over time as the University tried to create a local information system. Therefore, when translating into practice the work of Bruner (1990; 1986), we focused mainly on making connections between individual stories and thereby illuminating multiple agencies of change and order. Czarniawska

(1998) and Boland and Schultze (1996b) address some of the most relevant aspects of Bruner's narrative mode of cognition for understanding organisational activities. Their work emphasises that woven into individual narratives are connections and politics that highlight the basis for coordination. It is this aspect of narrative which is least explored within IS research but which this researcher feels is most promising for the field.

Embarking on a computer-mediated change initiative introduces dramatic shifts to organisational culture both in terms of business practices, organisational membership, reporting structures and professional identity. During this change process individuals are encouraged to coordinate their thoughts, actions, practices and goals so as to be attentive to the interdependencies of the community (Boland, Tenkasi & Te'eni, 1994). If IS researchers are willing to move beyond analysing and representing individual narratives gathered during a moment in time, this approach has the potential to provide a powerful vehicle for accessing how such coordinated outcomes are (are not) supported and achieved over time (Boland 1991; Bruner, 1990). Analysing the interconnectivity of narrative accounts over time highlights the resourceful ways in which operational integration and 'community coherence' (Bruner, 1990) is achieved in light of alliances and despite conflict.

This researcher argues that during IS projects, actors use narrative to express shared meanings amongst community members but as the complexity of the project increases and involves multiple communities, it becomes more difficult to rely on consensus across narrative accounts. Rather, during change processes individuals and groups are forming interpretive procedures that help them evaluate and judge the increasingly uncertain and complex organisation. As Bruner (1990)

notes, narrative accounts can be analysed in order to reveal the ways in which communities create

an integrated environment despite conflict:

> "It is probably the case that human beings forever suffer conflicts of interest, with attendant grudges, factions, coalitions, and shifting alliances. But what is interesting about the fractious phenomena is not how much they separate us but how much more often they are neutralized or forgiven or excused." [p. 95]

Of fundamental importance in this process of conflict resolution is the act of peace-making where

alternative perspectives are articulated within a single story. The main goal of peace-making

narratives is explication rather than sense-making or persuasion. Attending to narrative accounts

of change emphasizes the multiple voices of actors as they work to regain an ordered state of

being where interconnectivity and coherence exist despite conflict.

Provide access to multiple interpretations
Vehicle through which meaning is created
Can be rhetorical
Interpret the present in relation to the past and future.
Highlight disruptive events and repair work.
Vehicle for cultural peace-making.

Table 3.2: Characteristics of narrative accounts (adapted from Bruner, 1990)

Foregrounding the interconnectivity of narratives highlights the multiple histories involved in

crafting organisational reality and provides an opportunity for us to understand the complexity of

computer-mediated change efforts before this multiplicity becomes silenced beneath the one,

official record of the initiative. By doing so, we gain insight into how actors traverse uncertain

project landscapes, and the way in which choices made during one moment in time impact later

opportunities. The author suggests that focusing on the emergence of narratives over time

presents IS researchers with an opportunity to analyse the flow of events differently and explore the characteristics of project work through a new lens. The remainder of this section presents an overview of the research site and considers the implications of its selection.

3.4. The selection of the organisation

This research was conducted at an Ivy League university, which will be referred to by the anonym 'Ivy' in order to evoke an archetype through which readers can relate their experiences. The Ivy League is defined by Oxford English Dictionary as eight "long established universities in the eastern US having high academic and social prestige" (OED, 1998). The Ivy League are privately governed institutions holding tax-exempt status and endowed with large reserves of gift and investment income. The fieldwork took place during the first year of system use between June 1999 and August 2000 during which time we conducted four field site visits each lasting between 6 and 10 weeks. Periodic communication has been maintained with key interlocutors up to the time of writing. The personal background of the researcher also contributed to the study as she worked in the University from 1993 to 1995.

Ivy was founded early in the 18th century by a single benefactor with the purpose of educating young men. Steadily the institution expanded with its first addition in the early 19th century being a medical school. Today, Ivy is comprised of an undergraduate college; a graduate school and ten professional schools. The mission of the University is stated in part as follows:

> As one of the world's leading centers for learning, [Ivy's] primary mission is to attract, educate and motivate a diverse group of the most highly talented men and women in order to advance and disseminate knowledge and to promote the scholarship, high character, values, and leadership which can be directed towards sustaining and improving society. [Ivy official documentation, 2002]

The statement continues by addressing the 'dual responsibilities of faculty whose research and teaching are fundamental to achieving Ivy's mission'. This strategic focus is governed by Ivy's 'corporation' comprised of elected fellows and the University president. Ivy's Provost is the chief operating officer in charge of both academic and financial agendas. The Vice President for Finance and Administration (VP) is also a University officer reporting directly to the President. However, in practice the VP coordinates many activities through the Provost.

Ivy University officers are tax-exempt fiduciaries responsible for a 1.3 billion dollar operating budget and 300 million dollar a year capital budget. It is the state's highest graded financial institution, receiving a "Triple A" credit risk rating by independent analysts Standard & Poors. Unlike public universities, Ivy's annual operating budget is supplemented with investment income earned from its endowment fund. At the time of this study, this fund had an average market value of almost 6 billion dollars and accounted for 35-40% of the total University budget. The secure financial position means that Ivy is not as dependent on tuition revenue or state funding. In fact, Ivy's strategy has been to maintain a small student population which it feels is fundamental to providing an elite, Ivy League education.

The undergraduate population of approximately 5,000 students and 3,000 faculty has been the same for almost a decade. Whereas, the graduate and professional school populations have been purposely reduced to an approximate total of 5,000 in order to provide larger stipends to fewer students. Less wealthy Schools and Departments are subsidised from Ivy's central funds in order to enable the pursuit of research and teaching activities that underpin its overall mission. Ivy's Medical School has seen the biggest growth in the past decade with increased activity in research

and clinical activities. However, its student population has remained stable as have the teaching demands of its faculty.

Medical School faculty generate 80% of the University's total, grant and contract awards, the single largest source of operating revenue for Ivy. When this wealth is considered alongside its size (50% of the total population) and administrative transaction volume (70% of total), the powerful position of the School in relation to the wider population is evident. The Medical School is geographically separated from the 'Central campus', located adjacent to the city's teaching hospital approximately one-mile from the city centre. The location and business complexity of the School are two issues that influenced the Medical School's decision to maintain control of many of its administrative and managerial activities usually governed by Central campus departments. Through the creation of satellite offices, the Medical School centralises its local business activities which they then report to University management.

One of the most serious problems faced by Ivy University today is the modernization of its administrative infrastructure in order to manage an increasingly complex financial and regulatory environment. The complexity of Ivy's research, clinical and teaching activities have increased dramatically over the last decade and in such a way that the legacy systems no longer adequately supported the University activities. This situation created a sense of insecurity among the University Officers who were unable to control the financial operations of the institution because of its decentralised operating paradigm. During the early 1990s the University mandated spending for the upgrading of information systems. As a consequence they retained external expertise in the form of management consultants who advised an overhaul of all administrative systems.

The Vice President for Finance and Administration recognised the criticality of the situation and took a number of measures to rectify it. This resulted in the choice to partner with Oracle Corporation in order to co-develop and implement an Enterprise Resource Planning (ERP) system. This initiative is the focus of our narrative study. Specifically, our analysis centres around the redefinition of the grants management process. We will concentrate on the ways in which Ivy negotiated through an IT-enabled change initiative in an attempt to create a naturalised enterprise-wide system to replace their legacy infrastructure.

3.4.1. Choice of site

The first reason for selecting Ivy as a field site is that the aim of this thesis is to follow the political and social negotiations as they unfold within an organisation. As Pettigrew (1990) notes, focusing on a single field site allows the researcher to observe the progress of "social dramas longitudinally [to] provide a transparent look at the growth, evolution, transformation, and conceivably, decay of an organisation over time" [p. 275]. This study focuses on several socio-technical dramas in order to understand how, despite complexity, Ivy manages to create a technologically-mediated administrative solution.

The second reason is a practical one related to the researcher's knowledge of the University's organisational structure and financial operations. The researcher was employed as a financial analyst within the Medical School between 1993 and 1995. She returned to the University in the summer of 1998 prior to her PhD study and worked as a temporary employee within the an ERP project team. As such, the researcher was well positioned to conduct a timely, interpretive field

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study within this context. Entering a field site with an informed understanding of cultural values and norms meant the researcher was able to communicate with community members by appropriating local language, symbols and practices. Gaining access to these individuals and garnering their trust was timely because the researcher was viewed as in 'insider/outsider' by the local community. As such, she was quickly able to establish her credibility and develop interpretations of context with greater depth than would likely have been the case at an unfamiliar field site.

As King and Applegate (1997) note, access to case sites is fraught with difficulty because of several "powerful barriers" [p. 29] including 'length of time, cost of research, access to mangers, and the level of business sophistication required of researchers in order to effectively handle qualitative data' (King & Applegate, 1997). They argue that such practical considerations limits the interest in, training for, and application of qualitative case based research during a time when "the need for qualitative research is reaching crisis proportions" [p. 29] because of the need for a 'holistic and deep understanding of complex phenomenon.' The researcher's inside knowledge of the organisation positioned her to contribute to what the author's consider to be a dearth of case–based research by doctoral students and non-tenured faculty.

The third reason for selecting the site is related King and Applegate's point that there are "diminishing returns" when conducting qualitative case based research in part because of the complexity of acquiring site access. Unfortunately access to organisations as research sites is difficult to obtain, and/or qualified in some significant way (for example requiring organisational approval of all research publications). Pettigrew (1990) states that choosing a research site and gaining access to it, is a matter of "planned opportunism" that involves mobilising one's network

of contacts in order to find a site that will fit with the research strategy, topic, and questions being posed. These practical considerations don't imply that the researcher should neglect their epistemological position or modify their research objectives. Rather, it emphasises the importance of thinking and acting strategically by planning the topic of research and the context within which it will be conducted in tandem.

We gained unprecedented access to Ivy University, an institution which had never agreed to the subject of an independent, external research project. Historically, Ivy's culture was such that its leadership believed all the expertise needed could be found within the walls of the institution. However, after several meetings with a former colleague, an interview with the financial controller, and finally with the VP, the researcher was given full access to study Ivy's ERP implementation. The project was approved and supported by the Provost but this fact was not communicated to the larger community because we preferred to maintain a low profile. The researcher's former colleague was assigned as her 'sponsor' and acted as the main contact point. Interestingly, the only stipulation for conducting this study was expressed to the researcher by the VP who required that the project be longitudinal in order to gain an in-depth understanding of the change process. The researcher infers from this statement that she would not have obtained access for anything other than a qualitative field study.

In hindsight, the researcher has become aware of the exceptional nature of her access through discussions with other doctoral students. For example, Ivy did not require the researcher to anonymise its identity. Rather, this was a choice taken by the researcher, independent of any mandate. The researcher is committed to the confidentiality of her individual interlocutors and as

such has only broadly categorised their roles within the organisational hierarchy. The researcher has done her best to de-identify the case organisation and to protect the privacy of its interviewees. However, re-identification of the University may be possible for some readers because of the characteristics that remain part of case description because of their materiality within the study (for example that Ivy is within the Ivy League – this is important because of Ivy's 'strategic partnership' with Oracle Corporation which was in part based on the prestigious reputation of the University.) Ivy's relationship with Oracle is itself an obvious way to re-identify the case. In addition, the timing of the project and the distinct governance structure of the University might distinguish it from other universities.

The researcher was provided with copies of all confidential ERP project material, and conducted 129 of 132 scheduled interviews. Whilst this receptivity could in part be due to interviewees wanting to be seen to be cooperating with the project, we did not see or hear of any attempts by Ivy leadership to encourage or discourage the research study or guide it in a particular direction. Further University support was given by employing the researcher on a part time basis during two of her field visits. This provided the research with vital funding for living expenses. In response to the researcher's request for critical distance, she worked in the accounting department and was not directly involved with any aspect of the ERP project. This part-time work focused on account reconciliation during Ivy's busy fiscal year-end closing period. The researcher's workstation in the accounting department allowed her a base camp from which to operate. Her networked computer enabled her to schedule appointments, communicate via email, and write up field notes directly after each interview. The sponsor arranged for the researcher to have full access to Ivy's libraries, an email and schedule account through which she organised research interviews.

3.4.2. Implications of selecting site

We acknowledge that the narrative research stream is newly emerging within the field of IS and the researcher seeks to validate its use through rigorously conducting and explaining all aspects of the research from design, to collection, handling and analysis of data. This interpretive field study is expected to enhance our understanding of the contemporary university context and the behaviour of its members during a large-scale IT project. Where the characteristics of this study are present within other contexts, the researcher might expect the negotiations surrounding the localisation of the ERP system to produce the same consequences (Baskerville & Lee, 1999). Further, the selection of a single research site theorised through the lens of social science should provide a conceptual vehicle that is useful for future research projects and informative for professional practice.

We are aware of the dominant perspective within IS literature claiming that intensive field research cannot be generalised to larger populations and is therefore of limited relevance. However, we join Baskerville and Lee's (1999) refutation of this position and argue that such 'findings can be applicable to other contexts sharing the same empirical circumstances of this organisation'. The authors make the point that the IS community has conflated the concept of generalising which has been "harmful" to the discipline:

> "When researchers unnecessarily divest their right to claim generality, their research audience is defined by their analysis of the utility of their theories...By renouncing their right to generalize and claim generality, intensive researchers lose latitude to explain the wide field of uses for their findings... Our understanding of the social and organisational aspects of our field may be trailing far behind our grasp of the technical issues. Unnecessarily confining the application of new theories from intensive research is helping to cripple our ability to keep pace". [p. 63]

We favoured the opportunity to study IT-enabled longitudinal change within a novel research setting because it juxtaposed: tradition with trends, education with business, and academia with management. She was fascinated to understand the implications of implementing standard technology designed for governments and the public sector within a private university. Second, her employment history centres around education-focused organisations. In addition, as a fellow American and long-term local resident of the city in which Ivy is located, she was interested in fusing her UK-based doctoral studies with her US roots. Second, during her part-time work on the project she was struck by the determination and commitment of the project team to overcome complexity in order to move forward. We wanted to follow this process in an attempt to provide a voice for the 'blood, sweat and tears' of individual effort and illustrate 'order within the chaos' of IT-enabled change initiatives.

Having worked within Ivy's powerful Medical School, she entered the field site with a predisposition toward the political structure of the organisation. Although she had been away from the Medical School for three years, the researcher was aware that some of the members of the organisation were former colleagues who might expect her to maintain allegiances with particular parts of the University community. In addition, she expected that the informal 'gossip mill' was still as strong as it had been when she was employed as a full-time member of staff. The 'story of Erica – a local girl made good' often preceded her meetings. The researcher was conscientious about maintaining the utmost integrity with issues of privacy. Her insider status meant that a few community members prodded her for confidential information by asking questions such as 'so what are the Med School saying about this' or 'I hear you interviewed [insert name] over on Central campus, he really doesn't know what he is talking about – what did

he say?' Manoeuvring through the political landscape was difficult in the beginning but once the community realised that the researcher would not disclose information, they stopped asking. It is worth noting here that these comments are rhetorical attempts to influence the perspective of the researcher.

The researcher's interpretive epistemology is underpinned by an ontological belief that reality is socially constructed. As such, the researcher is always involved in a hermeneutic circle of interpretation as she tries to make sense of context. Inevitably the research will form prejudices, opinions and preferences based on her interactions and field site observations. Her goal has been an awareness of, and accountability to these biases. The researcher documented her perspective in the research journal and actively sought to refine her perspective through interpersonal communication and the reading of official documents. Most importantly, she designed the study to support her in remembering her responsibility to be critical of initial interpretations. This is discussed in more detail in the next section focusing on research methods.

3.5.   Research methods

This section presents the methods adopted for conducting our narrative study of Ivy University. The techniques for collecting data were narrative interviews, interpretation of confidential and Ivy official documentation, and direct observation of meetings. We conclude the section with a summary of our research design which prepares the reading for the final section of the chapter introducing the conceptual grounding of the study.

3.5.1. Narrative data

129 interviews were conducted with 53 project members and the wider university community. In addition the research directly observed 11 project meetings (see appendix table 1). The majority of the interviews followed the narrative interviewing (NI) convention, which provides a temporal frame of reference (for example, "Describe the last project phase to me.") and then allows the interviewees to narrate, without interruption, their interpretations of important moments of negotiation in front of them at that time (Bauer, 1996). As a data collection technique the narrative interview (also called the ethnographic interview, Czarniawska, 1997) was a powerful attempt to subvert the Hawthorne effect where actors adjust their behaviour when they know they are being studied (Mayo, 1933). In addition it challenges our tendency to interpret actors through their organisational role and impose our research agenda on the field site.

In compliance with narrative interview methods (Bauer, 1996; Riessman, 1993), interviews were tape-recorded and verbatim transcripts were produced prior to the next field site visit. There were 5 interviews that were not recorded because of either a technical fault with the recorder, or the reluctance of an interviewee. These were transcribed to the researcher's best ability based on her detailed notes. An administrator in the Sociology department at the LSE transcribed one-third of the tapes and we personally transcribed the remainder[4]. The verbatim transcription process was very time consuming with each 1-hour interview tape taking approximately 6-hours to convert into text. Upon producing the verbatim transcripts, the researcher "re-transcribed" the tapes in order to communicate the "spoken features of discourse" such as tone, mood and pace of the

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[4] The method of transcription varied with some of the tapes being converted into text through a creative use of voice recognition software. We would listen to the interview transcript with headphones and repeat in her own voice, the interviewee's narrativizing. Translating the tone of the voice into her own and speaking it into a microphone allowed the voice recognition software to convert the sound into text.

narration (Riessman, 1993). We felt that formatting text in this way was important for understanding the storytelling characteristic of the texts. The following examples are helpful for illuminating the convention:

"Then we ought to *fire 'em* and get new - then we ought to **fire 'em** - and get new users! I mean - because this is - this is - *first of all*, their users are the highest paid people on campus because we *supposedly* hire better people in the Medical School, for more complex business. *I mean that's the theory*...." [interview with financial manager]

"...A combination of the Steering Committee and the Co-ordinating Committee, [interruption from passer-by: 'I didn't get that attachment. Was there an attachment with the document you sent this morning?'] So [pause] an initial group of players, of senior - of seasoned [looks around the room] What we tried to do was create the *super structure* of the project teams in that early summer of '96..." [interview with project manager]

The first quotation illustrates the simple but effective convention for formatting narrative data. **Bolding of text** is used to connote the raising in volume of the narrator's voice. *Italicised words* note inflection of the pitch and tone of voice and a ***combination of bold and italics*** indicates these characteristics were occurring simultaneously. We use the dash (–) mark to indicate a break, or logical shift, in the narrator's thought and a segue way into the next phrase. In the second quotation the focus is on representing longer interruptions of narrative. Through the use of brackets [ ] we insert non-narrative information. For example background information about the action occurring in the room is inserted using brackets, as are details about non-verbal cues such as a significant pause by the interviewee is notated as [pause].

Single quotation marks indicate the narrator is telling the story in the first person as above when the storyteller speaks with a passer-by. Or when the narrator is representing another group. This is illustrated in a short excerpt from an end-user story:

"She came out of the meeting crying and said 'this is a part-time job, I can't deal – I *shouldn't have to* deal – I don't want to take work home like I have been.' We all feel 'dumb', we can't do our jobs – can't get answers and it's so frustrating for us.".

The researcher's journal supplemented the NI and helped fill-out the transcripts. We brought this journal to each meeting in order to take detailed notes. This journal was invaluable during interviews because many interviewees felt compelled to draw diagrams which we copied down and then referred to in the transcript in order to link the storytelling with the visual representation. A simple example of notes from the journal:

> He drew a picture of a triangle representing a traditional hierarchy and he placed most organisations in this model where decisions are being made "from the top down to the masses". Then he inverted the triangle and defined it as Ivy's structure where the tenured faculty are at the top and are being served by a smaller group - the bottom tip is the "lowly clerk".

Many times the researcher was able to take the actual drawings away with her and she filed these artifacts with the transcripts. From her journal notes the researcher also added notations to the end of each transcript. These included pre/post interview banter, non-verbal cues, and the researcher's interpretation of events:

> I was 5 minutes early for the interview and he was on the phone with a hands-free set [must spend a lot of time on phone] and was working on the computer at the same time. He is a very tall man who is very welcoming and unassuming. He makes jokes and has a kind air about him. He is known throughout the University as a candid speaker and I found this to be the case in the interview.

We also included practical information about office location as well as personal details that would help the researcher to develop rapport with interlocutors such as hobbies, family members or a recent holiday.

Beyond the interview context we recorded in the journal observations during meetings to which she was invited, notes about informal chats with Ivy faculty and staff, and thoughts about the relationship between context and IS theories with which the researcher was familiar. As Callon (1991) notes, 'texts are vital to science' because they reflect the relationships between actors whose "destinies are intertwined in the 'socio-technical' dramas" constituting organisational life. In the next section we consider the method of handling and interpreting narrative data in order to illuminate context and point to power relations *at work*.

3.5.2. The interpretation of socio-technical dramas

Retranscription is a large part of narrative analysis where the researcher spends time listening to the tapes, formatting the texts, focusing on properties of narrative, and interpreting the meaning of each story (Riessman, 1993). When gathering and analysing interview data, the aim is not to find the interviewee/s who gave the answer closest to the truth, but rather to understand the processes and patterns revealed in multiple interpretations (Scott, 2000, 1998). Narratives tend to be constructed as a convincing explanation of 'why things are the way they are' (Czarniawska, 1998; Bruner, 1990, 1986).

The timely transcription of interviews facilitated a process of preliminary analysis and helped prepare the researcher for the next stage of empirical work. Important issues and actors referred to in narrative accounts set the agenda guiding us to the next round of interviews. This incremental and participant-led process meant that we were able to take opportunities to reach interviewees and collect narratives that reflected their *in situ* sensemaking. This data collection

strategy allowed us to gain multiple perspectives by interviewing not only organisational allies but also controversial actors who may have otherwise remained 'silent voices' (Star, 1991). When a reference was made to a group, or to a non-human stakeholder such as a critical business process, we would arrange to interview a delegate actor who would speak with authority on behalf of another (Pouloudi & Whitley, 2000).

Any collection of narratives is likely to be partial; on a practical level one cannot collect data all the time, from everyone. However, when abstracting from the empirical material we found that the majority of narratives clustered around important political processes – dramas – occurring at the time. For example, impending deadlines, user group requirements or controversial work practices. The analysis of these narratives highlighted the variety of perspectives that existed within Ivy at a given moment in time and we organized them into ontological networks to illuminate the socio-technical processes at work. These storylines focused on resolving an unknown future and took us 'backstage' to provide insights into the complex processes of socio-political negotiation whereby conflicting interests worked to colonize organisational reality.

The analysis of narrative data was preliminarily conducted over the 11-months of field work and was the Central focus of the researcher's third academic year of study. During this time she carefully read and reflected on her field data, made lists of themes and issues that existed *within* each narrative and *across* narratives. She discussed these concepts during regular meetings with her supervisors[5], and communicated via email with project participants. Large, wall charts

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[5] The researcher was co-supervised through her second year of study.

outlining the site visits, the relationships between storylines, and emerging themes were produced after each stage of the project. These were informally discussed with the interlocutors in order to refine the researcher's interpretation of events.

We actively chose not to use a formal narrative analysis approach for two main reasons. First, the volume of narrative data (129 interview transcripts and over 100 official documents) was inhibitive of a detailed analysis of the structural properties of each narrative unrealistic. Second, as previously noted, this study is focused on the relationship between narratives. As such, the deconstruction of texts was less relevant than concentrating on the patterns between stories. Therefore, we handled and analysed narratives as emergent interpretations of context, produced in time and situated in relation to all other accounts that were gathered (keeping in mind absent accounts). This organic analytical approach dominates IS interpretive field research (c.f., Walsham & Sahay, 1999; Scott, 1998) and is emerging within the narrative stream (c.f., Brown, 1998; Brown & Jones, 1998; Boland & Schultze, 1997, 1996a, 1996b). Together, these researchers create analyses guided by the fundamental principal of hermeneutic interpretation.

We often found that interviewees would not want to discuss the issues that they had made the agenda of the last interview, since in their minds 'the world had moved on'. The dramas that had dominated their focus at one point in time was now, in the words of one interviewee "a done deal"; what had been an open controversy during a certain period had become black boxed (Vidgen & McMaster, 1996) and a matter of fact (Latour, 1999a) for the interviewee. This is directly linked to the emergent quality of narrative accounts, where the present is the only locus of reality, and as the present emerges we make sense of it, adjusting our interpretation of the past and

future accordingly. For example, as we began the last phase of interviews, one project team leader said that she would be "fascinated" to read her own transcripts from interviews over the last two years, because her understanding of the project, and what it meant to Ivy University, had changed so much over time that she actually couldn't remember how she had made sense of it previously. A key reason for this is that, understandably, the temporal frame of interest to the interviewee tends to be radically different from the researcher.

The juxtaposition between the researcher's academic tempo and that of the frenetic project management world highlighted the theme of 'negotiating change' as the organising principle of this interpretive field study. The pace of Ivy's IT-enabled modernisation effort meant that stakeholders were actively involved in situated, socio-technical dramas that propelled the organisation in a particular direction. However, there is little practitioner guidance or academic study on the interconnectivity of these dramas and the ways in which they together affect ERP-related change. Our research focus is underpinned by Pettigrew's (1990) classic text on longitudinal studies of change in which he states:

> "The longitudinal study of a sequence of drama allows varying readings to be taken of the development of the organisation, of the impact of one drama on successive and even consequent dramas, and of the kinds of mechanisms that lead to, accentuate, and regulate the impact of each drama." [p. 275]

Whilst this research is situated around an in-depth study of a University, the primary goal of the study is to understand how an organisational community would 'manage', come what may, to achieve a working information system – one that would bind their community together for better or worse. In recognition of the multiple influences revealed in the analysis of our empirical data, the study's context is organised around the *transformation* of that community where the

University is continually being *re-formed* through talk, negotiation, and action, and is *made* *durable* through the design of material objects, software, work procedures and structures (Latour, 1991). In the following section we focus on two theories that we found the most helpful for exploring the theme of negotiating change. These theories include the sociology of time (Adam, 1998, 1995, 1990) and actor-network theory (Latour, 1999b) and help the researcher explicate the process of achieving organisational integration despite conflict.

RESEARCH PERSPECTIVE	CHOICE
Topic	IT-enabled modernisation efforts
Overall premise	How do organisations manage to create a working information system from a standard technology package.
Epistemology	Interpretive
Methodological Approach	Understand context and process of organisational change through an interpretive field study.
Research Strategy	Narrative
Research methods	Narrative interviews, observations, review of documentation.
Research Site – focal level	Ivy University – organisational level
Analytical focus	Negotiating change
Detailed units of analysis	• Squashing organisational silos: new grant accounting and management Managing silos: negotiations and administrative boundary objects
Theoretical grounding	Sociology of time and actor-network theory

Table 3.4: Research perspective of this dissertation (adapted from Walsham, 1993)

3.6. Theoretical grounding

In this section the theoretical grounding of the thesis is outlined, introducing the theme of temporality through the work of Barbara Adam (1998, 1995, 1990). We then focus on making explicit the relationship between multiple, subjective times and processes of negotiation between these times within heterogeneous actor-networks. We emphasise the changing temporalities of work life within a contemporary organisation in order to elucidate time as a social construction and make visible the processes of negotiation by which this construction is re-ordered (Sahay, 1997). We draw on Kavanagh and Araujo (1995) whose contemporary interpretation of actor-network theory emphasizes the negotiation of 'at-stake times' between actors trying to create a stable and pervasive temporal landscape.

Standard work times are a 'prerequisite for complex social and economic organisations' but are not *a priori* characteristics that follow an organisation throughout time (Kavanagh and Araujo; 1995). For example, the process-oriented temporality inscribed within Oracle's integrated, ERP suite is quite different from the historical tempos and rhythms of Ivy's siloed, legacy systems. A shift by Ivy from building information systems to buying standard technology implies a re-ordering of their social times that can have far reaching consequences including loss of expertise, reliance on Oracle support, pressurized workplace or imposition of problematic, static standards. This theoretical focus illuminates situated and reflexive shaping processes as they emerged over the duration of the University's software project and emphasizes the complexity of reconciling long standing notions of work with efforts to modernize administrative functions.

Our application of this theoretical perspective answers Mosakowski and Earley's (2000) call for broader consideration of multifaceted, subjective views of time in empirically based, strategy research. The strategic implementation of information technology within organisations shifts the space/place dimension of where work is done and stored. In addition, such initiatives transform the temporal features of work by reordering the pacing, rhythms and tempos of standard work practices and prescribing this normative temporality upon multiple subjective views of time that exist across the organisation. Empirical research can illuminate the power of information technology to reorganize the *centres of calculation* (Law & Callon, 1994; Latour, 1987) within an organisation: who and what will be legitimised and valued. In the case of standard ERP technology such research can also provide insight into the ways in which standard technology

packages are modified as a consequence of local implementation projects. Focusing on this reflexive process is an important research agenda for IS researchers. As Sahay (1997) notes:

> "...Meanings of time-space are deeply embedded within social structure, and IT through its capability to create new time-space conditions for social interaction, impinges on the material ordering of our daily lives and the associated feelings of inclusion and presence with respect to the social system. These feelings contribute to redefining conditions of social structure and also influence how actors interact with technology. It is argued that a more sophisticated analysis of the implementation and consequences of IT should be based on an understanding of these complex and subtle processes of creation and recreation." (p. 255)

This appeal to researchers has been heard and the number of conferences (International Conference on Spacing and Timing, 2001; Time Focused Research Workshop, 2001), journal special issues (The Information Society, v 18 n 4, 2002), and IS published research adopting a time-space perspective (El Sayed, 2001; Sawyer & Southwick, 2001; Sahay, 1997) has increased. The researcher aims to add to this growing body of literature by elucidating the reordering of times within the University. While she emphasizes the temporal dimension over the spatial aspects of this change initiative, the researcher understands time and space as interconnected concepts that together constitute social systems (Sahay, 1997; Harvey, 1989). The temporal focus is driven by our empirical data where socio-technical dramas focus on changes to *local working rhythms* (Adam, 1995) over spatial relocation.

Adam's (1995) thesis helped the researcher explore her empirical data by providing a way to think theoretically about 'resonances and multiple readjustments where the old figures in the new and the new modifies the old'. For example, this narrative study of ERP transports the reader to a particular period in the history of academic institutions in the United States, and temporal features that underpin the prestige associated with an Ivy League university. At the end of the 20th

century, the steady, long careers of university administrators came into conflict with intellectual trends toward Y2K global business solutions like ERP; elite higher education institutions were no longer able to ignore the compelling urgency underpinning powerful corporate approaches to accounting and regulation. Entrenched time-honoured routines and procedures came head-to-head with process-view projects, as Ivy University leapt at the opportunity to lead IT innovation in academia.

A sociological focus on time reminds us that the imposition of clock time as a means of implementing and measuring the success of plans, and strategies like ERP, is not a neutral process. Clock-time is 'fundamentally embedded in our understanding of the structural relations of power, normative structures, and the negotiated interactions of social life' (Adam, 1990; Clark, 1985; Harvey, 1989). While software projects are situated in time and measured over clock-time, deadlines and the calendar, multiple actors work to create a future operating environment that is commensurate with their temporal experiences rather than dominated by the times of others, which are considered foreign and unfamiliar. Yet, the experience of multiple and interpenetrating times in the information systems literature is rare (notable exceptions are Sahay, 1997; Orlikowski, 1996; Kavanagh & Araujo, 1995) as is work that makes explicit the temporal assumptions of actors and how they influence corporate strategy (examples would be Mosakowski & Earley, 2000; Das, 1987; Clark, 1985). In the following sub-section we explore the role of multiple and interpenetrating social times in negotiating change. We then outline how these negotiations move an organisation in the direction of a particular temporal landscape.

3.6.1. Illuminating Multiple Times

Time is a deeply taken-for-granted aspect of social life, it is not an 'out there' phenomenon like a fence, but permeates our social worlds. The dominance of clock time in contemporary Western culture makes it difficult to conceptualise other features of time which are less concrete, but none-the-less prevalent, in our daily lives (Adam, 1990). Western society is organized around the clock and calendar in order to facilitate standardization and context independence – the clock and calendar epitomize the achievement of durable time. However, time should also be understood as 'lived, experienced, conceptualised and related to based on context specific situations' (Adam 1995). The academic context illuminates this concept of multiple times nicely. The academic calendar textures the year, drawing our attention to each new fall, providing familiar traditions and rituals. Graduation ceremonies roll by; yet in their repetition we find difference, as every person, clique, and year group imbue the events with their own meaning. The slow rhythms of research and cycles of publication are set apart from the 'hurly burly' of business times but, especially in information systems, move in awareness of each other. Career expectancy has tended to follow distinctive work times with formal job-for-life, tenured positions among academics and informal, long-term networks among administrators. These multiple times form, what Barbara Adam (1998) might call the 'timescape' of academic life-worlds. The ERP in our case study can be viewed as constituted by multiple and interpenetrating times (see table 3.5).

The prestigious history that makes an Ivy League university
The local, embodied, embedded expert work times of university administration
A period of uncertain industry transformation
End of millennium Y2K panic
Individual biographies and careers
Intellectual trend toward global business solutions
Phase of technological maturity and diffusion of ERP
The time worlds of project and project teams
The 'right time' for change

Table 3.5: Multiple and interpenetrating times present during the ERP project initiative

The personal and professional biographies of actors, their past experiences, future hopes, fears and ambitions fall outside what clock time can measure and yet these taken-for-granted times are experienced, perceived and conceptualised in relation to this universal time. As Adam theorizes, "all time is social time" (1990, p. 42). Paralleling the dominant relationship between clock time and other social times, the "global electronic embrace" explains the capacity of technological tempos and rhythms to dominate local, contexts. The global world becomes a local one through the instantaneity of electronic communication coupled with the simultaneity of networked information and communication technologies (Adam, 1995). Local temporalities are influenced by decisions being made across the globe and the effect is that local futures are recursively defined through the observation of *our time* in relation to others.

Foregrounding the process by which *global work times* (Adam, 1995) become negotiated into local times, is an effective vehicle for describing the way in which standard technology becomes part of the furniture; a local resident (Silva & Backhouse, 1997). The organisational zeitgeist of the late 1990s is captured by stories of ERP and the Y2K millennium bug. Their electronic embrace sent ripples around the world communicating the political rhetoric of these trends across time and space. The result was a global trend for Y2K compliance where the global work times underpinning ERP technology are used to try and supersede local computing strategies and grassroots temporalities. The researcher interprets the collision between these times as a phenomenon for investigation and challenge the normative interpretation of ERP packages taking precedence over local working rhythms. However, she also understands the power relations between conflicting times and argues that achieving an enterprise system that is equally informed by ERP working rhythms and University social times is unattainable. This study highlights the conflict, coordination and subsequent privileging of certain times during the software project. This focus sensitises the reader to the interpenetration of multiple work times and considers the implications of such choices for organisational operations and the appropriateness of enterprise technology for the university context. The next subsection introduces the paper's actor-network perspective (Latour, 1987; Callon, 1986) which provides an effective construct for revealing the interplay of multiple social times held by diverse human and non-human actors as they work to gain dominance within a local context.

3.6.2. Actor-Network Theory and Temporality[6]

Actor-network theory (ANT) was originally conceived by Bruno Latour (1987) and Michel Callon (1986) as part of the field of science and technology studies (STS) and has been applied by a variety of IS process-oriented researchers (Quattrone & Hopper, 2001; Ciborra, 2000; Hanseth & Braa, 1999; McMaster, Vidgen & Wastell, 1999; Boland & Schultze, 1996a) to remind us that technology is not just a static artefact, able to be introduced within a variety of organisational contexts without conflict. Rather, these non-human entities are interpreted as political actors, capable of being shaped by domain experts but also limited by design in the way they can be modified. Actor-Network theoreticians advocate a broad sense of agency because they argue there is no longer a clear delineation between the purely social and the technical. Instead, a network metaphor focuses attention on the relationships between entities as they express political and social interests and attempt to influence others over time.

Actor-network theory's overall premise focuses on how the work of society is accomplished (Latour, 1987; Callon, 1986). Rather than viewing society as consisting of static entities and structures within which scholars can conduct research, the proponents of this approach extend enthnomethodology (Garfinkel, 1967) in order to conceptualise human and non-human actors as working together to create social environments. The localization of technology into the everyday fabric of an organisation is conceptualised as an 'achievement of order' resulting from successive negotiations between heterogeneous actor-networks (Monteiro, 2000). Focusing on these

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[6] This interpretation of actor-network theory is informed by readings as well as personal instruction received from Bruno Latour during his 2001 presentation of two courses in the Information Systems Department at the LSE. The first course provided what he called a 'travel guide for ANT' that described theoretical tenets and their usefulness for field researchers. This was accompanied by a writing workshop designed specifically for student researchers in which participants worked to write one-page situation descriptions that illuminated the theory of agencies through the text.

processes foregrounds the emergent and progressive manner in which order is achieved and relationships are established (Kavanagh & Araujo, 1995). Insight into these negotiations can be gained over time if researchers follow processes of *translation* (Latour, 1999a, b, c; Law & Callon, 1994; Callon, 1986), where the actors' interests become aligned with others.

Recent applications of the sociology of translation (Callon, 1986) make explicit the relationship between negotiating change and creating a dominant temporal perspective across networks (Quattrone & Hopper, 2001; Latour 1999b; Sahay, 1997; Kavanagh & Araujo, 1995). It is during translation that actors negotiate for the acceptance of their temporal working rhythms. As Latour (1988) writes:

> "Time is the distant consequence of actors as they seek to create a fait accompli on their own behalf that cannot be reversed. Time does not pass. Times are what are at stake between forces." [p. 165]

This quote illuminates time as a resource for negotiation between actors in the present moment. However, Latour continues: "Of course, one force may overtake the others, but this can only be local and temporary because permanence costs too much and requires too many actors (1988, p. 165)." It is this process of change that the researcher seeks to illuminate through her analysis. We rely upon an understanding of the creation of durable time (Kavanagh & Araujo, 1995) in order to illuminate the essence of time and time-making as it existed within our case study. We return now to the example of the Project X naming in order to illuminate the construction of a relatively irreversible temporality.

As the reader will recall, in 1996 the project team was negotiating to find a name they felt would adequately connote the tempo, pace and rhythm of a multi-year software project. The web designer, commissioned to develop the project site, had to flip between different *temporal zones* (Kavanagh and Araujo, 1995) when she tried to determine the name of the project and create a front page logo. Meanwhile, the tempo of the indecisive project team is bound up with sixty-two contest names ranging from "Liberate", "Survival", "Rebirth", "Nightmare on [State] Street" and "Big Bucks". These names are *specimens* or *representatives* (Latour, 1999a) brought forward in time to act as *delegate actors* (Walsham, 1997) that refer to the physically absent whole. In this way the contest participants and their temporal landscapes are *inscribed* (Akrich, 1992; Akrich & Latour, 1992) into each proposed project name. These multiple inscriptions illustrate Adam's point that there is no single, universal time but rather a plethora of social times that are held in relation to one another. In this way Kavanagh and Araujo (1995) talk about *networked time.*

While the project team grapple with the list of names, the web-designer institutes a *program of action* (Akrich & Latour, 1992) to move forward with her work despite conflicting time zones inhibiting the Project's naming. The designer-website actor inscribes its temporality into the web site and tries to enrol the interests of the project team into selecting a contest winner. Here we see that it is not always possible for multiple times to democratically co-exist as the team's slow pace collides with the work tempo of web design. In addition, the team's indecision conflicts with the project timeframe which is measuring progress through the clock and calendar.

The designer responds to the project timeframe by inscribing with the letter 'X' both her temporality and, by its absence, the indecision of the project team. This *inscribed time* (Kavanagh

& Araujo, 1995) initiates an unintended *trial of strength* (Callon, 1998b) between the designer-website hybrid and the project team. Crucial notices, official project information and timely University communications are added to the website. The hybrid actor has called upon allies from the past, present and future in an effort to persuade the University community to subscribe to its version of the project and in so doing, adopt its embedded temporality (Kavanagh & Araujo, 1995). Together these artifacts provide a comprehensive source of information - a *script* (Law, 1997; Akrich, 1992; Akrich & Latour, 1992) that University members begin following when they interact with the site. As a result, the Project X website becomes an *obligatory passage point* (Callon, 1986): the main portal through which actors must move if they require project details. The site itself becomes a hybrid actor inscribed with multiple times including those of the designer, web software, computer hardware, and site content.

The translation of interests through this obligatory passage point marks a significant moment where change was negotiated. The acceptance of the website enrolled diffuse allies and in turn created a *centre of calculation* (Latour, 1999b, 1987; Law & Callon, 1994) that employed inscriptions to act and manage at a distance. The outcome of this socio-technical drama marks a *stage in time* where the project's future and past are implicated by the outcome of the present moment. The point being that the construction of the future occurs not in isolation but rather as a result of movement in time. Over time the web designer is left behind but her temporal working rhythms are inscribed within the project infrastructure. This process of abstraction creates room for the development of new and different understandings (Latour, 1999a). It is precisely the connections between what is abandoned (the web designer, the sixty-two alternative names) transported over time (the logo Project X, the website) and created during each stage of

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transformation (Project X paraphernalia, placards at the entrance to offices, headings on Ivy official documentation and folklore about the name's etymology) that provide insight into negotiating change.

The interconnectedness of these moments in time illuminate the potential for network paths to become standardized, limiting the range of choices that can be made, and in turn, creating a durable time zone. The name Project X acquired strong characteristics of *irreversibility* (Callon, 1991) as a result its multiple inscriptions throughout the project. This highly progressive and non-linear process of translation illustrates the way in which everyday trials of strength are interwoven to affect change and result in the 'future becoming colonized through a series of seemingly innocuous, past events' (Kavanagh & Araujo, 1995). The material inscription of these interests result in the design of an operating environment with particular temporal characteristics. As Latour (1991, p. 103) writes: "technology is society made durable": by following multiple agencies of change and order we can gain insight into the ways in which Ivy University moves from an ordered state, through change, toward a re-ordering of their temporal landscape.

The next chapter elaborates these concepts through a further theorized accounts of our narrative data. We adopt this convention from our work with Latour during a course he taught at the LSE on research method. Latour requested students to write 1-page stories on a particular theoretical without using specific academic jargon. He argued that the best explanation of theory comes from the description of empirical data:

> "If we display a socio-technical network – defining trajectories by actants' association and substitution, defining actants by all the trajectories in which they enter, by following

translations and, finally, by varying the observer's point of view – we have no need to look for any additional causes. The explanation emerges once the description is saturated." [Latour 1991, p. 129]

Latour's premise is that explaining a theoretical perspective, then providing a case description, synthesizing the two in an analysis section, and then discussing the findings is a redundant process. Our goal is to ensure clarity of thought, accessibility of ideas for the reader, and adherence to stylistic conventions of doctoral dissertations. As such, we present three *narratives of negotiation* in order to show actor-networks *at work* trying to negotiate an uncertain and complex future operating environment. This theorised description instantiates our conceptual framework and prepares the reader for the introduction of related theoretical ideas in subsequent chapters.

4. Weaving a story: a narrative approach to accessing context

This chapter is informed by the study's overall research question: How does this organisation negotiate with the ERP software to create a *matter of fact* – an information system that is accepted by disparate individuals and groups together for better or for worse? The process of negotiating change over time is empirically illuminated by drawing on significant events from Ivy's ERP initiative. In preparation for our analysis of these modernisation efforts, we present the case study in the form of three meta-narratives, which have been constructed by the research from an analysis of Ivy official documentation and narrative interviews. These stories each belonged to a powerful network that came to dominate at different times during the project initiative. We argue that these actors became involved in negotiations with other networks thereby influencing both the University's choice to implement a standard ERP package and decisions that allowed it to be compromised. Together, these significant events illustrate the way in which multiple networks influence the design of the ERP system and subsequent temporal landscape in which the administrative work practices at the University were situated.

This chapter is organised into three sections. Section one begins with a discursive introduction to the case context which is meant to provide the background of the study and inform the reader's understanding of the forces at work within Ivy as its leadership began thinking about IT-enabled modernisation at the end of the 20th century. The section then presents three *narratives of negotiation* each belonging to a powerful network that came to dominate at different moments in time during the project initiative. We argue that these actors became involved in controversial

events the outcome of which progressively influenced both the University's choice to implement a standard ERP package and allowed it to be compromised. Together, these stages in time illustrate the way in which actors influenced the design of the system in an attempt to make the ERP a delegate representing their administrative interests.

The first sub-section begins with the presentation of the VP's network, whose narrative of *global negotiation* impacted the commissioning of the ERP project, setting in motion a powerful temporality that would influence Ivy's future. This is followed by the project team's narrative of *collective negotiation,* which, together with the VP's narrative, aimed to create a durable, project network that would design its working rhythms into the standard ERP technology. The final subsection highlights the faculty network whose narrative delayed the localization of the ERP technology through *local negotiation* where a voice that had been relegated to the periphery during the project initiative, made its resources felt within the project initiative.

Section two synthesises particular actor-network concepts that were illuminated in the narratives of negotiation in order to begin transitioning the reader to part II of the dissertation focused on in-depth analyses. The third and final section summarises this chapter and introduces the analytical focus of each analysis chapter comprising part II of the dissertation.

4.1. Case Description

In 1993, Ivy's chief operating officer, the University Provost, authorised the office of Finance and Administration to begin sponsoring initiatives that would improve University-wide business

practices. An advisory committee was commissioned to consider and evaluate different computer-based information systems initiatives. This committee was comprised of senior representatives from major schools, Distributed administrators representing academic departments, and Central managers responsible for institutional units such as Human Resources and Finance. Their advice resulted in Ivy's sponsorship of several initiatives in the early 1990s including the implementation of a new integrated student system; the standardisation of desktop configurations throughout the University; and the commissioning of a task force to investigate ways in which Ivy's procurement business could be improved. Two findings of that group were that the purchasing and accounts payable systems needed to be replaced, and that an administrative data warehouse environment would allow for more flexible reporting of financial activities.

In early 1995, Management consultants, Coopers and Lybrand were retained to advise on the replacement of the purchasing and accounts payable systems. In this capacity they encouraged the University to consider an integrated replacement of all their administrative systems rather than a piece-meal upgrade of each outdated and home-grown system. Components of Enterprise Resource Planning systems (ERP) were beginning to be implemented at several US universities and as we noted in chapter two, these organisations were one of the last to jump on the ERP bandwagon which was proliferating the US business context. Coopers and Lybrand advocated a comprehensive suite of applications and encouraged Ivy to act in a timely manner so as to replace legacy systems that were non-compliant with the year two-thousand date format.

In late 1995, a newly appointed Vice President (VP) for Finance and Administration commissioned a working group to consider Cooper and Lybrand's proposal and its potential impact on the University's financial systems. University financial managers and accountants had for the past several years been speaking of Ivy's academic enterprise using terminology that conjures images of cross-disciplinary work and complex project alliances. In an effort to control, manage, and be accountable for this operating environment, the VP began considering promises of integrated and standardised ERP technology packages designed to create a streamlined, corporate University poised to lead others in the 21st century.

This decision for 'integration and standardisation' successfully enrolled the Ivy community for three main reasons. First, Ivy's legacy financial systems were not Y2K compliant and would require a multi-million dollar investment to address this issue. Second, updating this technology seemed unwarranted because discrete, systems didn't fit the VP's integrated business and technology vision. Third, the fragmentation of these systems made it very difficult to produce key institutional analyses that supported planning, compliance and audit issues (Ivy official documentation, 1996).

This third point is particularly important for understanding the motivations informing stakeholders driving the change initiative were working not just to modernise the technological infrastructure, but to professionalise its administrative practice. Central to the VP's evaluation of software solutions was the integrity of Ivy's financial systems which he interpreted as the linchpin of the University's administration. As such, accounting leaders spearheaded the direction of IT-enabled modernisation discussions. Central Accounting Leadership, in consort with the VP, were driven

to professionalise the financial management of the University and increasingly discussed the 25-year old mainframe accounting system in negative terms explaining that its functionality was no longer useful for Ivy's evolving administrative practices. The VP explains his agenda:

"I *heavily leaned* in the direction of wanting to go with the strongest *financial* system. I thought that the largest pay-off from the project, when you *really* looked at it, ultimately would be in *better financial data* and the ability to do more interesting things on the clinical and grant management side. and so I *really saw* **that** as the *real* pay-off whereas the other administrative functions like [human resources] seemed to me to be more meat and potatoes. But it probably is also true to some extent that [the financial controller] was particularly - was very enthusiastic about a move forward from our *mish-mash* of mainframe financial systems that didn't allow complex analyses. She was certainly a big supporter of overhauling accounting and budgeting and helped rally support for this – she really pushed."

The inability of Ivy's legacy system to directly report on relevant financial activities created a vast number of discrete shadow systems that would reclassify financial data from the general ledger and facilitate the planning, reporting and monitoring of expenditures for an academic audience. Central management argued that such decentralised work practices posed a substantial institutional audit risk because they did not provide an infrastructure to support institutional control over research and clinical finances.

Together, Central and Distributed leadership advocated a technology solution that could accommodate an integrated budget and planning tool and a new financial chart of accounts (COA)[7]. The redesign of Ivy's financial budget process was expected to formalise the intellectual process of planning for, managing, and reporting on, University funds. The VP and Budget Director envisioned a process where faculty and staff would budget their funds over time – into

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[7] An organisation's chart of accounts (COA) can be thought of as a detailed list that classifies possible financial activities. The COA provides a blueprint or a map of codes that are numerically ordered. Employees will assign codes to properly classify the financial transactions of an organisation. It is through these classifications that the transactions enter an information system and can be reflected on the organisational financial statements.

what they called 'time-phases' - based on the expected rhythm of activity across the fiscal year calendar (e.g., low expenses in summer months, increased gift revenue during a pledge campaign). In other words, time-phased budgeting would take into account the entire grant budget by spreading it over time and managing actual expenses against this plan. This approach was expected to be commensurate with the functionality of the new chart of accounts conceptualised to mimic the nature and cycles of academic work which had recently become organised around projects rather than organisational units. Designing a system to support 'project-centric' practices would provide the ability to track multiple funding sources for a particular project as well as multiple project destinations for single funding sources.

The VP and accounting leaders felt that an institutional accounting and budgeting standard within Ivy was high priority to remedy the fragmented decentralised manner in which these activities had traditionally been managed in the academic environment. The Medical School Executive Director was a strong proponent of an integrated approach because she felt it would create a comprehensive and useful financial system for University governance while maintaining the independence of the its research programs:

> "What we had [with our legacy system] had been massaged for years but it required a lot of reconciliation between groups in order to get apples to talk to oranges. You see faculty are PI's [Principal Investigators] on grants and usually have multiple proposals so they're very *project driven* but our general ledger and chart [of accounts] *didn't support that.* So we had all kinds of sub-ledgers that supported that. and so we *really* wanted to go to project-centric accounting in the Med School - so we were one of the main drivers of having an accounting system that supported our complicated way of doing business. You know for faculty things might span fiscal years, they might involve multiple personnel, and different units, and program projects, and all kinds of diverse faculty collaborating - you know - across organisational lines, outside of our fiscal hierarchy. So we wanted a budget and accounting system that would help us track that. But it would still be - you know - obviously *monitored* and *managed* against a *fiscal budget* – against the official statement of record. But that would happen outside of the PIs' world. He or she would only worry about *their specific*

projects. So they get the best of both worlds - they can track their budget, and financial expenditures but not have to worry about being a bean-counter who can understand financial statements."

This financial management vision is a radical departure from historic University practices referred to as commitment accounting (CA). CA is normative practice within many research universities and as such, faculty are enrolled within this method of calculation and reporting. Despite the novelty of project-centric accounting and time-phased budgeting within higher education institutions, it was felt by Ivy accounting leaders that this approach better matched the University's current financial operations especially related to grant dollars.

Commitment accounting involves reserving, or setting aside, funds for future activities and reporting to the Principal Investigator how much money they have left after these commitments are recorded. One Distributed manager explains:

> "Its very common for faculty members to come and say 'my grant started in August and around March of next year I'm going to have a Post Doc starting, the salary's going to be this, put a commitment in'. Come November, the PI says '*oops*, Post Doc's not coming until February 'cause they have to finish some work on their thesis. *Change the commitment.*' So its like a - you know - a two minute - *not even* - a *thirty-second* transaction - you went in there and you changed it – his grant got updated, and the commitment burdened the account appropriately - *and it was done.*"

Grant finances were controlled by departmental Administrators whose expertise lay in their ability to straddle two worlds: Ivy's academic enterprise and Central administration. This Distributed management role (and accompanying information systems) grew organically to support the values of academic freedom and 'scientific separateness' as distinct from issues of Central management and governance, which have traditionally underpinned University culture.

As mentioned in previous chapters, these discrete pockets of administrative activity were referred to at Ivy as 'silos' or 'stovepipes' and evoke an image of a myopic departmental focus rather than a process view advocated by integrated, ERP systems. One Distributed administrator explains:

> "Departments are very much in *silos*. They operate like *little, independent corporations*, and part of that is driven by the distinctness of the academic setting. So they – their Chair is like the *CEO*. There is an academic discipline within each department and in that respect it makes sense for them to be *autonomous and separate* from the other departments. But what we are trying to do is prepare people to break down some of those department walls and look *beyond* their departments to build an *integrated* administration. Knowing that any integrated system is going to be *much more* complex than the ones they had been used to - not only the systems themselves or the computer systems - but also the *new policies, procedures* and whatever - we are hoping that we can get everyone *on the same page* and make a big – *a whole administration.*"

An increasing regulatory and reporting environment meant that the receipt of grant awards by faculty brought with it expectations of shared responsibility and accountability between Principal Investigators and the University. Academic researchers, their staff, and Central administrators all recognized the importance of moving away from discrete silos of activity to a more transparent accounting practice in order to manage institutional risk, comply with regulatory bodies, avoid litigious hazards, and act as competent fiduciaries in an increasingly complex operating environment.

As such, the VP and a core group of managers became proponents of replacing Ivy's legacy systems with an integrated, Y2K compliant enterprise package from either PeopleSoft of Oracle Corporation. Despite PeopleSoft's experience with university operations, in the summer 1996 Ivy created an alliance with Oracle Corporation to develop and implement flagship technology. The choice to work with Oracle was two fold. First, Oracle's Government Financials (OGF) product

was considered very strong by Ivy and was in use within government and public sector institutions as well as several universities.

The financially focused agenda of the VP and his entourage meant that the stability of Oracle's package was more convincing than PeopleSoft's experience. The VP felt confident that Oracle could provide a project-centric financial system that would integrate accounting and budget functionality with all other administrative functions. Second, Oracle was interested in entering into a 'development partnership' with the University in order to design two modules, Oracle Grants Management (OGM) and Labour Distribution (LD), that would integrate with its OGF and Human Resource System (HRS) software to create an ERP package specific to the University context (Ivy official documentation, May, 1996).

In addition to designing these two modules in partnership with Oracle, Ivy aimed to be the first university to successfully achieve an ERP 'big bang' implementation by simultaneously replacing five of its core information systems. System modernization and business process redesign efforts were conducted within the key functional areas of financial management (including general accounting, financial planning and reporting, and purchasing and accounts payable), human resources and payroll, and grants and contracts administration.

In October 1996, this initiative was officially announced to the Ivy community by the University Provost and VP who reported the project's expected completion date as October 1998. The remainder of this chapter elaborates upon this initiative. The project scope was unprecedented for

an historically self-directed university administration and the timing of the project meant external IT experts were entering an unusual organisational domain. Despite the common financial management vision that spearheaded the project, Ivy's transition from an historically embedded practice of budgeting, to a newly mandated institutional standard of time-phasing was (and still is) a contentious issue for the University. As such, the negotiations surrounding this accounting controversy illuminate Ivy's attempt to embrace the future without giving due attention to its past.

We now consider the process of negotiating change by focusing on three significant events that occurred during the project initiative. These events surround important controversies where multiple perspectives vie for a dominant position within the University story. The narratives are interconnected and show how the outcome of such negotiations can enable and constrain future possibilities and influence the design of the ERP.

4.1.1. The VP's Network: A global negotiation

The horizon of the 1990's was overshadowed by fears of computer viruses associated with Y2K, the hubris of the 'internet economy' and enterprise-wide organisational transformation (c.f., Financial Times, 1999). Wide currents of change toward the standardisation (Agre, 2000) and "commercialisation of higher education" (Noble, 1998a, b) existed as quite influential narratives within the US educational context (e.g., Noble, 1998a, b; Winner, 1997). Software vendors, consultants and university administrators, "hoping to get a piece of the commercial action...giving their institutions a fashionable forward-looking image" (Noble, 1998a), are flipping between different interpretations of what the future holds for contemporary universities. Together these

networks will attempt to create this unknown future in light of advances in computer-mediated learning and integrated technological infrastructures (Agre, 2000; Cornford, 2000; Noble, 1998a, b; Silver & Silver, 1997).

The VP was confronted by these powerful global trends and was charged with creating an infrastructure that would position Ivy against the litigious hazards and potential reputation risk posed by an uncertain environment. For example, as a prestigious research institution whose faculty were in search of external grant funding, University faculty were confronted by a highly competitive market vying for governmental and private grant dollars. The enrolment of Ivy University into the networks of multiple funding agencies was an impetus for seeking a standard administrative infrastructure that would integrate the varied financial activities of Ivy faculty. The cycles of grant funding, the pace and rhythm of application processes, as well as multiple, and often conflicting, legal and regulatory requirements of funding agencies, assigned a high level of responsibility and institutional risk to Ivy as stewards of these research dollars. In addition, experimental compliance was becoming more highly regulated in terms of human and/or animal subject testing. In this environment, the VP became a spokesperson for Ivy's institutional modernisation goals, at the centre of which was the management of a complex research network.

Historically within the University, IT decisions fell within the domain of the Chief Information Officer and his staff. However, this changed with the VP's program of action to position the University as an administrative leader by embracing recent technological trends that were dominating the corporate, business world. Rather than aligning himself with Ivy's diffuse network of grass roots development expertise, his agenda was to partner with industry. The VP's

break from tradition marked the beginning of a trial of strength where he worked to enrol the University community into his understanding of financial management drawn from years of work within the fast-paced, globally-focused investment banking industry. Also sympathetic to Ivy's three-hundred year heritage, and its accompanying narrative of an elite University run by professionals on behalf of scholars, he introduced technology as an enabler. His narrative spoke to the need to quicken the pace of work, the importance of communicating across departmental lines, and the notion that Ivy was a complex 'business'.

The VP cultivated a powerful narrative that conscripted non-human actors from the global networks in which he was enrolled to provide sources of legitimacy for his perspective. No longer was it a story of implementing 'just another IT system'; rather, University leaders became enrolled into the VP's network through the belief that seeking outside expertise secured a prosperous future for them all. This is expressed during an interview with the VP where he begins the story of Ivy's project initiative by placing Ivy as an actor within a network of universities all trying to establish relationships with powerful software vendors during the same period of time:

> "...I remember once at the IBM conference centre at Palisades, New Jersey a number of universities met to see if we could agree on a joint vendor and collaborate. We had *a number of vendors* come in and talk with us and - you know - it was different people, at different places, at different times, and we had different priorities and that to some extent led to *very different answers*. I remember at that meeting people were there from [three Ivy League universities and two large research schools] and - *you know* - after the meeting if you had like *two months later* asked where everyone was, it was kind of ironic, [one University] was pursuing a relationship with SAP, [another Ivy League] was with PeopleSoft. [The research university] decided that they were just going to enhance their existing system and maybe consider PeopleSoft later and [we] moved towards Oracle...*I'm not trying to cast stones* because - I mean - I think circumstances are *different* and quite often - *you know* - organisations are *organisms just like our bodies* are and quite often - *you know* - they stop things or start things because *the timing isn't right* and *that's ok* – but the other [universities] **just haven't been able to come through on their projects.**"

The VP's commentary as an indication of his role as delegate for Ivy within a network that spans organisational boundaries. He justifies a move toward ERP technology by telling us of the emerging trend within other University networks. He evaluates Ivy's experiences in relation to other institutions and his story illuminates the perceived importance of developing non-traditional relationships with other schools and business partners.

The VP's narrative alludes to Ivy's relationship with Oracle Corporation whose powerful sales narrative conscripted Y2K, ERP media-hype and the future higher education as an 'industry' to cast doubt upon the reliability of Ivy's legacy system. Boardroom negotiations ushered in an additional development agenda belonging to the software vendor where Ivy's local administrative practices would be introduced to ERP's standard working rhythms in order to create an 'industry solution for higher education'. The VP's strategic vision drew together multiple influences to combine leading-edge business logic and prestigious intellectual ethos with the aim of colonizing Ivy's undetermined future. It was presented to Ivy as an opportunity to set the global standard for academia. In this way the inscription of Ivy's working rhythms into Oracle's 'higher education solution' would create a tangible artefact expressing the interests of this strategic partnership. The expected adoption of the ERP package by multiple universities would connect Ivy and Oracle to these organisations through the software design which inscribes the interests of these actors. In this way the standard ERP software would influence the nature and extent of administrative activities and allow Ivy and Oracle to manage at a distance through a technologically mediated centre of calculation (Latour, 1999b; Callon, 1998b).

The contractual agreement between Ivy and Oracle created a strategic partnership and set up a point of translation between both parties who must work in consort if the project was to proceed. The goals and agendas of Ivy and Oracle were inscribed into the contract joining together two very different traditions and having the effect of reordering the past and potential future outcomes for each organisation as a result of the partnership. No longer were Ivy's administrators masters of their own destiny but rather, Ivy's grand narrative would from then on be regarded in relation to other powerful stories:

> "The difference between now and back in the day of home development is *we're not our own masters*. Our code is provided by vendors who have their own agendas. [Ivy] cannot dictate how it wants to do its business *by itself*. [Ivy has] always been accountable to federal regulations but more and more it's has to work with vendors providing code, vendors providing services, vendor needs...So there is - you stand back and ask yourself this question – 'if nobody did anything once we implement the ERP, what would happen, what would inevitably happen?' [pause] There is what I call *the osmosis factor* - the osmosis factor was that in the old-days if we *did* nothing - *nothing happened*. The osmosis factor *today* is that the *world keeps changing* and there's **nothing you can do about it** – gotta keep up - change **with it**."

This quotation from an Ivy manager indicates that the University is 'in bed with' Oracle Corporation, for whom the higher education market represented a miniscule network alliance when compared to their total business agenda.

Ivy's connection to Oracle meant they committed to implementing a technology that was not fully developed, and which embeds an integrated view of administration quite different from Ivy's traditional practices. The VP felt he could secure Ivy's future as a guiding light for universities through the newly formed alliance with industry. Ivy's leaders acted as delegates for the larger University community, subscribing to the VP's narrative and lending a degree of stability to his

network by inscribing his vision of the future within artifacts such as the contractual agreement, software license, and initial seed funding.

The approval of the project initiative marked the beginning of what was commonly referred to as the "VP's vision" or his "number one baby" (multiple interviews with Ivy community). His strategic narrative was so powerful that it created a durable network where multiple agendas were accommodated through a single story of Ivy's future. This had the effect of black boxing – or making invisible through its success (Latour, 1999) - the negotiations preceding the purchase of Oracle's ERP technology. The appropriateness of a standard software package for university operations was unquestioned, and took on fact-like status within Ivy. The irreversibility of this network proved quite phenomenal over time as it maintained the enrolment of almost the entire University community who incorporated this narrative into their own stories and became unable to recall a time when alternatives to this vision existed. This is expressed by one end-user at the Medical School:

> "We all know that **nobody** builds their own systems anymore. *It just isn't an option* – life is too confusing now, *so why reinvent the wheel*? I'm **surprised** that an institution who has been such a fast follower and not a leader would take such a leading role. But the ERP is [the VP's] baby as evidenced by the **huge** project budget and the number of staff its been given."

The VP's program of action to create a centre of administrative leadership had become scripted into the University's narrative of an unknown future. Ivy's enrolment into his network required that they leave behind an historically self-directed managerial and computing style in order to make room for an unknown future. The next subsection analyses the irreversibility of the VP's

vision through the creation of a project network that attempted to translate different working rhythms in order to negotiate for a single project temporality.

4.1.2. The Project Network: A collective negotiation

If the VP's vision was to continue to enrol and maintain the interests of the Ivy community, a powerful project network would need to be created that successfully joined together actors with varied expertise. Ivy opened its doors to delegate actors representing the alien ERP assumptions and timeframes of project, process and milestones. External ERP experts lacked contextual understanding of Ivy's ethos and workflow, making it difficult to develop a common basis for a collective, project team narrative. The VP hired a Project Manager with experience implementing ERP software in large business organisations. However, his inexperience with university operations meant that day-to-day leadership of the initiative was driven by a core group of middle managers close to the VP and senior leadership. The majority of these actors were considered functional business experts with only a cursory understanding of ERP technology.

The creation of a project network with a common narrative required its constituent actors to learn how to flip between perspectives and find overlapping stories in order to communicate with one another and build common connections. The core group of Ivy's middle managers translated their knowledge of embedded and embodied University work-times to a broader project temporality in an attempt to create a shared understanding of the initiative. These efforts succeeded in opening a crucial dialogue focused on developing "divergent knowledge" (Baskerville, Pawlowski & McLean, 2000) about one another's expert domains. In addition, Ivy worked to inscribe a project

temporality through the allocation of space, state of-the-art technology, and a generous financial budget.

Creating a project team with collective momentum was difficult to achieve. The VP 'back filled' the permanent jobs of the core group of Ivy managers, thereby enrolling their full attention on the project and curtailing many of their pre-project, network alliances. However, Oracle experts were only partially enrolled in Ivy's project. These ERP delegates saw Project X as a small network amongst many, whose temporal markers and commitments had to give way to more powerful networks concerned with macro-corporate goals of return on investment (ROI) and industry proliferation. These actors were less willing to 'make room' for a collective Project X temporality and as such, a series of negotiations between the various actors ensued as each struggled to maintain their priorities. While the core group was constantly attempting further enrolment of the ERP and its ambassadors, the temporal resources of these delegates were often pulled toward more powerful commitments.

In many ways the future of Ivy was shaped by Oracle's noted recalcitrance which threatened the irreversibility of the VP's vision. Oracle expressed its power through the continued absence of its ERP experts from Ivy's project initiative. In this way Oracle remained an unknown to Ivy, an actor that fought enrolment in the VP's vision. The development priorities of Oracle were to modify existing ERP technology quickly and inexpensively while the core group spent time considering possible business process changes that would support a financial accounting, budgeting, and management model. They were later criticized for being conceptually focused at a very high-level for the first two years of the project. This is expressed by a senior programmer

whose story is one of frustration related to what he interprets to be a functional agenda that was focused "30,000 feet above sea-level". He continues:

"The technical teams have to work through their functional leadership who in many cases may be motivated by getting what they *want* in the system but don't understand the difficulties it takes to get that kind of stuff *coded*...So you know I think very highly of the folks who lead the functional teams but they won't necessarily have a technical perspective. The technical guys need *someone to hear it from* - independent of what their functional leader said - to what we call '*open the box*'. Oracle hasn't been that voice – their modules are still vapourware and I'm convinced they haven't even staffed this project properly. Back at home it's been like buying Microsoft Excel and looking at the box and saying 'you know - I wish Microsoft Excel would do this', 'I wish Microsoft would do this', 'I wish Microsoft would do this', but you never actually opened the box and installed the software to see *what the hell it actually did – two years* in and **the box isn't open**! [pause] *I want the box opened* – so we could essentially say 'this is what it does and this is what you get'. While [the core group] are debating whether [the system] *should do this*, or whether it *should do that*, or whether it *should do this* – [the technical teams] are waiting on Oracle for permission to say, 'this is what it *does* and this is what it's *going to do*'."

This quotation points to a divided effort between technical and functional actors as well as Ivy versus Oracle priorities. This fragmentation of perspectives was evident through the lack of tangible ERP applications and continued debate about the concepts that should eventually be designed into the software.

However, we should not interpret the outcome of the implementation project as one in which Oracle's temporal landscape dominated all local trials of strength. An Ivy manager expresses this sentiment as part of a larger story where he invokes 'Ivy pride', a main characteristic of the University's grand narrative:

"*I could tell you right now*, [Ivy] **will not yield** to a computer system [pause]. *It hasn't yielded to anything else so far* - so it's *not going to yield to a computer system. We'll figure it out, we* **always do**."

We recall Adam (1995) who reminds us that such collisions between temporalities such as Ivy's traditions and the ERP, help highlight 'times as privileged when compared with other times and it is the process of managing the stresses between these less compatible times that provides insight into the complexity of everyday life.' In response to Oracle's absence and the incomplete ERP design, the core group developed their own temporal working rhythms while Oracle programmers remained off-site designing the grants management (OGM) and labour distribution (LD) modules.

Fuelled by the VP's narrative of the University as an intellectual hotbed of both academic and managerial ideas, the core group thrived upon conceptualising the future based on different scenarios. They spent the first year of the project envisioning alternative scripts where Ivy's "futures [were] continually being created and destroyed" (Kavanagh & Araujo, 1995). The team was negotiating what would get transported over time and what would be created during each stage of transformation. In this way the they were able to hypothesize about the impact current negotiations would have on Ivy's future once the functionality was inscribed into the ERP technology. Without Oracle expertise, the team was less adept at systematically determining what must be abandoned in order to make room for the new Ivy temporality. A frequent phrase during the first year of the initiative was "now is the time" (multiple interviews with team members), which was underpinned by a powerful narrative of organisational transformation that implied a fleeting 'window of opportunity'. The innovations brought to the table by Ivy team members were added to the development agenda, creating 'scope creep' and putting additional pressure on the already recalcitrant ERP project management timeframe.

In October 1997, the University contracted external auditors to conduct an assessment of the project's progress. The rapid approach of Y2K and the slow pace of system configuration and design, led auditors to recommend a modification of the deadline. What was previously supposed to be a single, big-bang implementation was replaced with a phased approach where all applications had to have basic functionality by the 'drop dead date' of July 1999. This date marked the beginning of Ivy's year 2000 fiscal calendar and meant any legacy systems still in operation were putting the University at risk of the millennium bug.

With the approach of this immovable Y2K deadline, the VP became concerned with the state of implementation. He decided to enhance the power of his local network by acquiring an Ivy Technical Director to subvert Oracle's hold over the University's future. In an interview the Director retells the state of the project upon his arrival:

> "The first thing that was missing at Ivy from my perspective when I arrived in November '97 was – [the VP] will kill me but [pause] it wasn't really clear what was the driving factor. Was it – 'you had to get [the system done] on time', 'you had to get it in on budget' or 'you had to get it perfect'? I participated in nearly every committee I could think of during my first four months here and the phenomenon I was seeing still coalescing was - 'is it supposed to work this way', 'is it supposed to work that way'. It seemed to me that the culture was 'we are going to get it **right**' and *right* was being defined as 'centrally we're going to get anyone that we think has a legitimate excuse or a legitimate point of view and accommodate it'. In other words of the three triangles - the three parts of Project Management 101 there's *time*, there's *money* and there's *quality*. This place was focussed in it's own way on the quality piece. So I don't think the objective was fully understood whatsoever.
>
> and this was reflected in how the management structure was being used. I recall explicitly going into a Co-ordinating Committee meeting which was supposed to be senior University leadership and there was a 2 ½ hour presentation on the [project-centric] chart of accounts. That's not the level the chart of accounts should be vetted at - how many senior leaders care about account codes? The net effect of that was twofold for my position. One is, we were not closing down on the scope after two-years into the project - what were we were going to be able to deliver? and two, we were wasting a *tremendous amount* of *time*! and indeed I think part of the reason that I was finally hired was [the VP and the core group] realised they

were in trouble on the IT side because they hadn't paid as much attention to it and they were in deep-shit. I'm not trying to paint a picture of arrogance here as much as the real motivation. When they looked at me in the interview it was clear they were in extremis, not making good progress, and one of the items that was really missing was the IT infrastructure issue - they looked at my resume and said, 'I'll take him'."

The VP told the Director that his number one priority was to "meet the Y2K fiscal year deadline - no matter what" (interview with VP). The VP was so concerned about Oracle's development delays that he travelled three-thousand miles by plane to their corporate headquarters to inform top management that the partnership would cease if the custom modules were not delivered in a timely manner and with high functionality. This act of recalcitrance attempted to conscript the ERP back onto the VP's own political timeline.

The trip triggered a compromise, whereby Oracle delivered generic modules by moving what they defined as 'non-essential functionality' to a phase-two timeframe that became added to the project plan. However, it was only when Ivy took control of both incomplete OGM and LD modules that a collective project temporality was realized by the University:

> "The VP, who was the *father* of this project...was willing to compromise on the strategic goals that he wanted to achieve to get to the end game - which was - *to get it done*...more than anything else, failure is not an option! Regardless of whether it's *pretty* and whether various people are *happy* with it – *it's got to get done*! **The project couldn't be a failure!**" [interview with Change Manager]

The VP and Technical Director made a decision to complete the development of these applications 'in-house' as a security measure in case Oracle didn't come through with a viable design. This reduced the VP's global vision and power but ensured that basic functionality would be delivered in time for the Y2K deadline. This was a costly strategy, the effects of which are still being felt within the University. The VP's act of recalcitrance toward his business partners

temporarily limited Oracle's influence within other university contexts. Ivy was without a working information system, but so too was Oracle without local expertise to aid in the completion of its global university package.

The creation of the phase-one system was another stage in time that impacted the way in which Ivy's future would be colonized. While the project initiative had defined the 'right time' to inscribe the core group's priorities into the ERP, its members neglected important 'other times' (Adam, 1995) held by the wider University community. In the end, the VP and his core group had managed to create a standard software package that reflected the outcomes of negotiations preceding it. The ERP sought to legitimise the vision of Ivy as an administrative leader by successfully translating embedded and embodied work practices into its design. In this way, the project team was made durable through the ERP system and their interests became a translation point through which they expected the Ivy community to move as it conducted its daily administrative activities.

The next subsection highlights the ERP's attempt to conscript Ivy's powerful faculty network and translate their academic interests to adopting a business-oriented approach to financial management. However, faculty recalcitrance delayed the localization of the ERP technology into the wider Ivy community by negotiating a voice for the local interests which had been relegated to the periphery during the project initiative.

4.1.3. The Faculty Network: A local negotiation

While a small group of departmental end-users and faculty were consulted throughout the initiative, the phase-one system very much reflected the interests of Oracle and the VP's core group of managers. In an effort to illustrate this shaping process we focus on the transition from phase-one into phase-two of the project implementation and use the example of the Principle Investigator (PI) Report, to highlight relevant issues surrounding this controversy. Faculty administrators provide the vital link between academic agendas and University reporting requirements. As direct consumers of the July 2000, phase-one system, they found themselves unable to provide faculty, who were Principle Investigators on grants, with a report detailing their financial commitments and could not answer the fundamental question 'How much money do I have left to spend?'. Suddenly, a group who had been told to expect a "reduction in the hassle factor" (interview with faculty member) as a result of the new system, felt unable to accomplish key aspects of their job.

The accounting and budgeting design of the phase-one system, its slow pace of transaction processing, and rigid ordering of the user-interface, were initially at odds with the temporal priorities of faculty and their administrative staff who refused to become enrolled in the phase-one design. Although designed by the project team to act as a centre of calculation that would facilitate 'acting and managing at a distance', previously silent actors exhibited their recalcitrance through narratives of resistance during the first six months of the system's use. This prominent controversy emphasizes the collision of Ivy's past with its proposed future when the phase-one ERP system confronted a local unknown.

In July 1999, the clock and calendar quantified Ivy's ERP project duration as lasting more than three-years. However, actors' experience of such time is subjective and context dependent based on their respective life-worlds. As such, Ivy's academic network first confronted Project X and all the initiative represented when faculty administrators were unable to generate reports for Principal Investigators detailing their remaining balance. Although the project team had organized several faculty presentations over the previous two years, the turnout was minimal. Once the system went live users were not well positioned to opt out of the ERP completely because by this time it had been inscribed with the interests of Oracle, the VP and the project team.

However, this controversy broke an implicit set of trust relationships between the project team and the wider University community. In addition, it tested the irreversibility of the VP's original vision to shift Ivy toward a more corporate financial management paradigm. Powerful faculty conscripted certain narratives from Ivy's past to use as delegate actors on their behalf in order to remind the VP of his official promise to improve University administrative practices for the entire community, through the new system. The faculty leveraged their own network of resources, to make their voices heard in the broader project narrative, and achieve tactical concessions in the flow of organisational strategy. The VP's vision, the core-group, and the phase-one ERP had joined together to create an indisputable artefact informed by conceptually robust administrative practices. However this network found that in spite of their phase-one design, they had to negotiate with faculty and their support staff who still held dear Ivy's historically grounded grand narrative of locally determined academic work practices.

Ivy's academic network enrolled enough powerful actors to conscript the VP and his project team and create a translation point where administrative interests had little choice but to accommodate faculty interests. Faculty and their administrators demanded that the accounting system which generated the legacy PI Report remain live until new tools were developed as part of phase-two implementation. This compromise was particularly hard for the project team to accept since from their perspective the PI Report inscribed a 'checkbook' mentality which was interpreted as an outdated mindset in conflict with the vision of an integrated budget and planning process. This is described briefly by a member of the core group who compared the legacy system to Quicken, a simplistic software program for the management of personal finances:

> "The PI Report is based on a legacy commitment accounting system that is essentially what you could do with a copy of **Quicken.** So think of Ivy as having a copy of Quicken for each grant - **and we have 4,000 grants.** *So it's pretty messy.*"

The VP's core group had purposely excluded this functionality from the enterprise system in preference of a more corporate approach. A senior financial manager bluntly articulates this:

> "I would say that the mentality that we've had...for managing is **primitive** to say the best and it's very old-fashioned...the corporate world left it many years ago...Many faculty think of things **fundamentally wrong.** We want to move people towards a management model where we're going to ask [them] to put together a time-phased budget and management plan."

However, the project team quickly realized an important omission in their development priorities for the phase-one system. Oracle and the core group had deemed time-phased budgeting tools as non-essential development items and re-scheduled them as a phase-two deliverable. Without an alternative network solution in place, the legacy system concession had to be allowed.

The failure of the core group to envision this controversy during the project initiative and negotiate faculty interests into the phase-one ERP system was an omission that had cost them powerful allies. Unable to conscript Oracle into design efforts, the team worked to increase the stability of the ERP through a series of quick, trials of strength. Their immediate goal was to create a temporary ERP solution as quickly as possible. The project team shifted phase-two development priorities and took a crude intermediary step in which the old style PI Report was created and then temporarily 'bolted onto' the ERP system.

A medical School grant expert who spearheaded this process explains the motivation for creating the bolt-on:

> "Their time-phased budgeting approach didn't show a reduction in the bottom line. It basically said how faculty were doing against their budget. Um - so there wasn't a way to generate a report for faculty saying 'you only have $20,000 of discretionary spending because it's all been spoken for in personnel' or 'this big piece of equipment that you bought last month, that's not going to arrive for three months, means you *really don't have $150,000*'. So we struggled for quite a while but eventually - in listening to our end users say 'we have to have to commitments' and the University saying – 'oh, they're just used to the old system eventually they'll get over it', it became clear - not only to them - but to us that **no** that *isn't* the case there's *always* going to be a need for being able to do commitments. So what we did, we took that message over to the [core group], and I said 'look guys, departments really need commitments. We have looked at every creative way of using the ERP in either budgeting, reporting, whatever, it's become clear to us that we need a commitment system'. and I said 'we're poised at the Medical School to create our own commitments system but what I would like is to present this as a University issue and I want to know whether or not you would like to join us in this effort'. **Boom, boom, boom.** All of a sudden it just happened like *overnight*. They had a working group that very quickly went into designing a customised system."

This bolt-on had the effect of fusing valued commitment accounting properties with ERP transaction processing cycles into a single integrated system. The core group then conscripted users into their network by closing down the legacy system and forcing a user migration to the new technology. However this translation was temporary because the academic administrators

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found the ERP process accompanying the bolt-on design incommensurate with the nature of faculty grant management. The system was cumbersome and inefficient and as a result, a new wave of shadow systems emerged and the bolt-on began being used as a data repository that translated time-phased budgeting categories into financial commitments.

From July 2000 the VP's core group entered into an unexpected back-and-forth process of report development directly with faculty. Almost two years after going live with the phase-one system, faculty administrators must still import data from the ERP system via the bolt-on into customized spreadsheets in order to report to faculty the amount of money they have available for research. At the time of writing, the University remains unable to break the hold of shadow systems because the remaining project team members have yet to design a functioning time-phased ERP solution that incorporates an efficient business process with effective reporting tools.

The investment in the project initiative has grown so large that the ERP system as a whole is an indisputable fact but the extent to which new working rhythms will underpin this multi-million dollar administrative infrastructure is highly questionable. At the time of writing, the VP's network was still attempting to enrol faculty and administrative staff into adopting the time-phased budgeting approach. However, with the VP's vision at risk of being replaced by powerful faculty interests both he, the Budget Director, and the Financial Controller separately chose to leave the University in order to pursue other opportunities.

The PI Report controversy illustrates the extent to which the ERP project initiative was driven by the high-level agendas of Oracle and the project team. Despite the promise of "higher quality administrative services to faculty, students, staff, alumni, donors, and sponsors" (official Ivy announcement of initiative, October, 1996), the system still neglects aspects of University administrative practice. This thesis emphasizes that the creation of a local information system is not just a story about the powerful 'winning'; that would be far too straightforward. Although aspects of the ERP have become 'part of the furniture' at Ivy, an enterprise-wide administrative system is still being negotiated. Local shadow systems sit beside the ERP and reflect the constitution of interests that have yet to be articulated within the context of the official system development.

4.2. Connecting data and theory: transitioning to part II of the study

The previous section organised three meta-narratives about significant events that occurred over time during Ivy's ERP initiative. These events were presented as negotiations between actors involved in a particular controversy occurring during a phase of time. Also each event was written from an actor-network perspective in order to show the chains of transformations connecting the three events together. We chose to present the data in this way because they illuminate the change process as non-linear but possessing continuity between phases of change and order. Key project issues were framed according to ANT tenets such as translation where the Ivy community are initially enrolled into the VP's vision for the future. These concepts were illuminated through the 'light' application of actor-network vocabulary to empirical data. Having described how change was negotiated over time at Ivy, part II of this dissertation focuses on in-depth analyses of this process. In preparation for these analyses this section aims to transition the

reader from the empirical data in section one, the theoretical concepts of section two, to the in-depth analyses comprising part II of the dissertation. Chapters five through seven are wholly informed by this foundation and draw upon complementary theoretical concepts in order to highlight particular aspects of the empirical data. Pausing to analyse these narratives will prepare the reader for the in-depth analyses that follow. The concepts are informed by our study of actor-network theory and include: constitution of agency, enrolment and translation, summing up, and the achievement of order.

4.2.1. Working with technology: The constitution of agency

As we noted in the first section of this dissertation, academic and practitioner literature on ERP is abundant. Within this body of knowledge exists a stream of actor-network studies focused on conceptualising ERP as an organisational actor with interests that actively influence project negotiations (Scott & Wagner, forthcoming 2003; Hanseth & Braa, 1999, 1998). We find this research particularly helpful for understanding ERP and our meta-narratives of negotiation are written in language that emphasizes the theory of actor-networks introduced in the methodology chapter. In conducting this process-oriented field study, the analytical focus was geared toward understanding socio-technical negotiations over time. ANT's theoretical program does not define agency as a solely human characteristic instead asking that researchers follow the action as it unfolds without specifying in advance who/what participates in negotiations.

The reader will have noticed that the three narratives of negotiation afford a symmetrical relationship to human and non-human actors because both tend to be present during the project

controversies. For example, the lens of ANT helps us understand the strength of ties between the ERP, Y2K deadlines, Oracle programmers, and their influence upon Ivy leadership and the Project X team. ANT has been criticized for this concept of symmetry by researchers who find the literal argument of technological agency implausible (Collins & Yearley, 1992). We side with proponents of the theory who recognize ANT's broad constitution of agency as a powerful analytical device, providing an opportunity to consider on whose behalf delegate actors work and what interests they inscribe (c.f., Law, 1999).

Our aim – and that of the larger IS discipline - is to theorize the agency and role of technology within contemporary society (Orlikowski & Iacono, 2001). As such we find it useful to 'give voice' to non-human actors such as the phase-one system, the faculty PI Report, and the 'drop dead' Y2K deadline, all of which reflect particular values and politics and represent an 'epistemological ordering' (Scott, 2000) that can influence the future of University work activities. For example, we recall that over time the Y2K drop dead date was afforded a great deal of agency by the VP who prioritised its role over the achievement of full ERP functionality. This decision legitimised the drop dead date and reordered the importance of grant accounting functionality as a non-essential design item slated for phase-two development.

Narrative is particularly helpful for studying the constitution of agency and the production of networks because individual stories of negotiation speak on behalf of a network of interests. An individual's account of change when viewed from an actor-network perspective is interpreted as a delegate, or spokesperson for a particular set of interests. The description of the VP's narrative illustrates this point nicely. Not only did the VP himself tell the researcher about his vision, but

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more importantly this vision was repeated time and again within the narratives of diverse University actors. In this way Ivy actors are expressing their enrolment within the VP's network; they are connecting themselves up to a powerful group of interests which in turn helps to perpetuate the VP's network. In addition, the VP's network gains momentum through the inscription of interests into material objects such as the ERP software license, development contract, project web site, office space, and staffing. These non-human actors are delegates that work on behalf of the VP in order to translate the interests of conflicting network interests and thereby perpetuate the stability of the VP's vision.

4.2.2. Creating an information system: Enrolment and translation

In the previous section, we began our narrative descriptions of the change initiative at an interesting moment in Ivy's history where the VP's narrative of the future enrols the University community into a high-profile modernization initiative. As such, a group – or network - is formed that connects the interests of multiple actors such as Ivy, Oracle Corporation, US higher education institutions, the ERP software product, and legacy information systems. This network is constituted by the relationships between these actors and indicates that other groups are being dismantled as a result of the enrolment with the VP and his vision of an ERP-based infrastructure.

For example, the signing of the development contract with Oracle represents the strengthening of the VP's network and a weakening of the connections between those who preferred to upgrade legacy systems. Similarly alternative network alliances with vendors such as PeopleSoft are closed down when the Oracle contract was signed. This moment of enrolment is an interesting

starting point for inquiry into the change process. As Latour says 'let us study the bombardment of offers for contradictory social groups because by sitting at the controversy of group formation we can compare group *making* to group *making*' (Latour, personal communication, 2001).

The creation of one group over another is an act of enrolment and a translation of interests: a process that illuminates the back and forth transformation between collectives of human and non-human actors (Latour, 1999a). Following acts of translation provide insight into how individuals and groups negotiate for the dominance of their working rhythms, ordering of the world, and pace of activity. Translation is a process of reordering the dominant temporal landscape and cycles of activity by making decisions about 'what will be carried forward into the future, and what will be left behind to make room for the new' (Latour, 1999a p. 71). This transformation is a key tenet of actor-network theory where translation results in the formation of a new network configuration where the present is similar but different from the past.

For example, powerful actors from the VP's core group made the choice during Project X to leave behind the so-called 'checkbook' grant accounting functionality in favour of an approach informed by budget practices popular within corporate America. Whilst these team members decided to replace key concepts from the legacy environment, they were later forced by faculty pressure to carry forward commitment accounting practices and incorporate this functionality into the ERP. The translation of legacy grant accounting practice into the phase-one system created an ERP-enabled administrative environment that was informed by the past but fundamentally different because of its design within an integrated technological platform underpinned by standardized business processes. As such, users of the ERP were confronted by a system that was

not wholly new but rather a hybrid of familiar Ivy concepts and foreign business-oriented tempos and working rhythms.

The three situated descriptions of Ivy's project initiative illuminate the ERP technology as an active participant in the future of the University and our narratives were constructed to illustrate different networks translating the technology in an attempt to enrol it as a representative - a delegate actor – speaking on behalf of their interests. The phase-one system was the outcome of multiple translations throughout the Project X initiative resulting in an Oracle solution for higher education that is both similar and different from the Oracle Government Financials (OGF) suite that was the basis for the Ivy-Oracle development partnership.

4.2.3. Following interactions: Summing up to the ERP

The meta-narratives of the previous section afford a broad sense of agency to human and non-human collectives, and illustrate processes of negotiation. In addition, these translation points describe relationships between actors of varying size and proximity to the University. The organizing principle for the narrative case description and the data analyses that follow in part II is to show the relationships between actors without setting an *a priori* boundary on the scope of the research context. For example, in traditional sociological studies the millennium bug which was of concern to many IT-enabled organisations at the end of the 20th century might be studied as part of a worldwide research project on contemporary Western society, whereas the faculty PI Report, of interest only to a small group of actors within a single university, might be the subject of a locally situated case study. However in this dissertation these issues are connected and afforded

equal status because of their mutual involvement as actors impacting the future outcome of Ivy's IT-enabled change initiative.

A critique of actor-network theory is that its conceptual apparatus produces analyses that privilege micro-level negotiations but fall short of explaining the dialectic between macro-level societal structures and these negotiations (Winner, 1993). In response to this critique Latour (1999b) has argued that the foundations of ANT are based on tracing relationships between actors rather than on their relative size – or scale. For example when studying accounting practice within a prestigious US university, the narratives of actors should determine the action and transport the research focus. US society becomes an actor within the study only when and if interviewees define it as such. It is not interpreted *a priori* as the macro-level structure that influences local action but rather is a resource employed by delegate actors. For example, the VP and his core group feel they have been influenced by the US business context and as such they employ it within narratives as a rhetorical device to legitimise their perspective. We argue that producing an analysis able to transport the reader between traditional levels of sociological inquiry is particularly powerful because it illuminates how the agency of seemingly global and distant actors like Y2K interpenetrate across actor-networks and are present in local negotiations.

Leaving the unit of analysis open means that researchers constrain their field study in terms of the concepts and vocabulary of ANT but do not predefine what they will describe and analyse – this instead is born out of the method. The three negotiations from the previous section are constructed accounts of the change process that derive from an analysis of narrative interview transcripts. It is through attention to language that the networks become visible. Traditional

sociological analysis might classify these three events as adopting a macro (VP), meso (project), and micro (faculty) level focus. Instead, we argue that the global, collective, and local negotiations are connected as a result of relationships under investigation.

A comparative example is drawn from Latour (personal communication, 2001) who relates levels of analysis to a Russian doll where increasingly smaller versions are hidden inside the shell of the 'macro-doll' and each level of analysis is considered separately from the other. In such a research project the scientist might study the algorithms constituting the ERP's accounting application. This is visually represented in figure 4.1. In contrast, an actor-network perspective views the world as flat where connections between actors circulate within and over time (Latour, 1999b). An actor-network theoretician attempting to understand how the ERP came to be an accepted matter of fact would be interested in 'chains of transformations' that link the accounting categories to the trend for ERP within higher education regardless of their relative size. This perspective is represented in figure 4.2. Having said this we recognise the difficulty in expressing connections that constitute a flat world. As such we at times employ language (global, collective, local) that might traditionally be associated with isolated levels of analysis.

Time-phased budgeting

ERP bandwagon

Y2K

Large research universities ——————— PI Report

accounting classification focus

uncertain future

accounting classification

Core group

Matter of fact
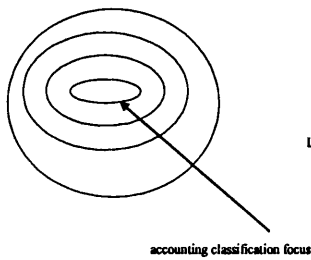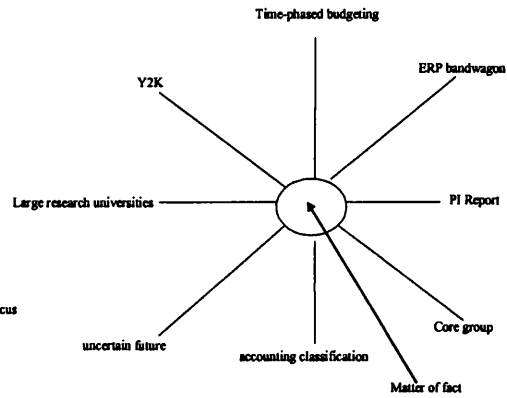
figure 4.1   figure 4.2

The ERP system that becomes localized within Ivy is a "*summing up* of interactions through various kinds of devices, inscriptions, forms and formulae, into a very local, very practical, very tiny locus" (Latour, 1999a, p.17). We consider this summing up process in chapter five by making connections between a change in an accounting category and the professionalisation and risk management agenda driving the ERP initiative. This accounting category was *big enough* to stall the naturalization of the phase-one system into Ivy's academic community. In this way when we move along a chains of transformations we are shifting frames of reference (Latour, 1999b) but always hold these frames in relation to one another in order to emphasize the process of change and order that occurs over time.

4.2.4. Creating a working information system: The achievement of order

The three interconnected meta-narratives of negotiation illustrate the ways in which Ivy was connected to the world during its ERP initiative. These significant events emphasise multiple agencies of change and order providing a non-linear account of negotiation. The creation of the phase-one system represents an 'achievement of order' in which the University has managed to create an ERP software package that will be sold by Oracle Corporation as its integrated solution for higher education. However, creating a standard ERP package is not the same as achieving user acceptance of that standard. Creating and maintaining an organisational fact accepted and used by the entire organisation, requires just as many (if not more) resources to conscript users into the ERP and away from alternatives like Excel-based shadow systems, commitment accounting, and the data derived from the customised bolt-on.

The three moments of negotiation from chapter four present a narrative landscape that illustrates not only significant events that occurred over time but also how these disruptions were progressively repaired or neutralized. Over time, those actors that were able to negotiate a voice for themselves and get written into Ivy's official enterprise system, were able to shape its boundaries. Despite the legitimisation of certain narratives, workers who were pushed outside the boundary of the system often became recalcitrant, choosing to remember that which had been deemed unimportant. We argue that the extent to which this recalcitrance is ignored, limits the achievement of order.

While Ivy is involved in the ERP project initiative, organisational actors confront an intense pace of work and must negotiate multiple and conflicting work rhythms, priorities, and deadlines if the

University is to transform its administrative infrastructure. It is through narrative accounts that actors articulate their situated understanding of these negotiations and how they relate Ivy traditions to a future operating environment. We are concerned with crafting an analysis that illustrates this transformation by highlighting the interconnectivity of detailed negotiations over time. As Latour (1999a) says, when their goals are frustrated actors take detours through the goals of others resulting in a general drift. The temporality of one becomes intermingled with the rhythms of the other, and the drift that emerges represents not solution two overtaking solution one, but a fusing of multiple interests.

4.3. Concluding comments about the case interpretation

As we have illustrated and described, the focus of this dissertation is defined in terms of the negotiation process where our actor-network perspective emphasises movement through time. ANT is a theoretical apparatus for understanding 'change and order'. As such, when it is applied to field research ANT concepts help highlight the controversies and connections involved in forming, transforming and transporting networks over time. The remainder of this dissertation analyses the 'complex and subtle processes of creating and recreating' a working information system (Sahay, 1997). These analyses are organised into two main chapters each emphasizing a particular analytical focus. The concluding chapter draws the dissertation together through a discussion of research findings, and considers the theoretical, methodological, and practical implications of the study.

Chapters five and six analyse the findings of our empirical research and refine the general research question informing the study. The analyses draw upon theoretical concepts complementary to our actor-network perspective that help us consider the power of software design and best business practices to shift the boundaries of normative administrative practice. Chapter five asks and answers: What are the nature of negotiations that might threaten the ERP achieving matter of fact status within Ivy, and how might these negotiations impact who and what is valued within the University? Chapter six continues the analysis by considering the question: How is such a controversy accommodated when the interpretation of the ERP as a fact is challenged?

Chapter five discusses and analyses the introduction of the ERP software package designed during the Ivy-Oracle project initiative which resulted in the radical realignment of faculty-based accounting practices. We consider how the values and agendas of different network alliances influence the creation of the phase-one ERP, and how it would be applied within the University. The results of this analysis are interesting because they point to the power of accounting to influence the acceptance of the entire integrated ERP suite. For example, the ERP system managed to temporarily squash the valued academic fiefdoms of many faculty researchers despite the power of these faculty within the wider University community. This shifted the administration effort out into academic departments placing the onus of time-phased budgeting onto faculty support staff. This shift was temporary however because faculty joined together in an act of recalcitrance and rejected the 'ERP solution'. The phase-one system that had been interpreted by the core group as an organisational matter of fact was challenged, and its stability as a viable system was reduced.

Chapter six analyses the negotiations that propelled the naturalisation of the stalled phase-one design forward in order to create a working information system for the University community. We argue that through an unconscious process of customising technology and organisational relationships, a viable information systems begins to emerge at Ivy. This system is not wholly an ERP solution, but rather fuses together valued traditions with future operating priorities in order to create a hybrid administrative infrastructure that links together disparate organisational agendas.

This has implications for the future of the University's administration in terms of expertise, organisational priorities, and the nature of the academic values within a globalising society. Besides illustrating the process of negotiating change during an IT-enabled modernisation effort, chapter seven makes additional contributions by considering Ivy's experiences in the broader educational context and discusses the appropriateness of implementing ERP technology within global university settings.

Part II

5. The margins of accounting: squashing organisational silos

Shifting the margins of accounting

"By making a decision to go with Oracle financials senior management either consciously or *semi-consciously* - I think it was for former - was making it impossible for [Ivy] to continue doing business in *fragmented silos*. Like it or not, you've got to work with a new way of accounting. *It's integrated – it's slower, it's a pain in the ass.* and the blue-haired ladies who used to do it the old way for years decide *it's absolutely terrible* - they don't want to do it *'cause its not Ivy's way*. But implementation is about *setting up an environment*. You make a set of decisions - a set of changes at the top that *force change* regardless of whether it's consensus or not – 'cause you say - *you change their ability to do it any other way*. You just can't **do** grant accounting like you *used to do grant accounting*! *Nothing you do is going to change that* - no amount of moaning is going to change it...*They can fire [the VP], they can fire [the controller], they can fire me, but nothing's going to change the fundamental* **you can't go back and you can't spend enough money to make it look like it used to.** So you're options have been *limited* and you have to *move on. You don't like it?* You're out of the consensus picture. If you are more inclined to accept the changes and deal with them, *then you are in the narrow universe of people we will work to have consensus with.*"

[interview with technical leader]

This quotation alludes to the way in which Ivy's phase-one ERP was a delegate for senior management interests working to professionalise Ivy's administration through the design of the phase-one system. As we illustrate in part I of this dissertation, multiple stories exist within organisations. This narrative represents Central management's 'all-or-nothing' approach to implementation where order is achieved by silencing those who disagree. We shall see the implications of this design and implementation strategy by studying the ways in which the phase-one system shifted who and what is valued within the University. To this end we ask and answer the following research question: what is the nature of controversy that might threaten the phase-

one system being accepted as a University matter of fact? To achieve this the chapter is organised into four sections. The first three correspond to the squashing of organisational silos as a result of controversy that took place at the margins of Ivy's normative accounting practice. The final section presents the conclusions of the chapter and summarises the outcome of introducing the phase-one ERP into the wider University community.

When the phase-one system went live, the University community was presented with a radically different conceptual model of financial budgeting, accounting, and management that flattened pockets of administrative activity within academic departments. Historically, local academic fiefdoms enjoyed high levels of autonomy that perpetuated stove pipes of technology. These pockets are referred to as 'silos' by Ivy actors to denote the discrete, ad hoc computing environment supported since the late-1970's by in-house systems development. These silos were metaphorically *squashed* by the integrated design of the ERP and the conceptual shift to University-wide financial management.

This shift was contentious for faculty and indicated not just an administrative change, but a purposeful squashing of academic priorities in favour of institution-wide control over the nature and extent of University management. Previously, academic departments were organized to support various programmatic agendas such as grant research, clinical activities, and teaching responsibilities. As such they could control the administration of these programs without much intervention from Central management. In this way the departmental silo was independent from other Ivy units. With the introduction of institution-wide processes departments were spatially reorganised by the ERP's horizontal design connecting administrative activities across the

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University. No longer could programmatic agendas drive the administrative process. Instead, functions such as human resources, payroll, and accounting were linked within an integrated platform and changes made by one department could potentially impact all others.

The conflict that arises in response to the squashing of organisational silos surrounds faculty reporting preferences as described in chapter four in terms of the Principal Investigator (PI) Report, and is a precursor to further negotiations which are analysed in detail in the next chapter. This chapter's analysis 'shifts in' from the longitudinal focus of chapter four to concentrate on the way the core group negotiated with the ERP to create time-phased budgeting. The goal of this analysis is to illuminate the 'chains of transformations' connecting seemingly mundane, back-office practices such as an accounting category, and the ability to generate and print financial statements, to concerns about financial audit risk and the commercialisation of higher education. Within the dissertation as a whole, this chapter analyses a significant event around which voices coalesced. The event is representative of change as a process of selectively negotiating with actors in order to create an institutional matter of fact.

Our analysis is directed at Ivy's margins of accounting where legacy practice is problematised, and support for an alternative approach is garnered. We argue that it is here at Ivy's margins, just inside the boundary of accepted work practice, that silos of accounting were determined to be problematic by the project team. It is here at the margins that proposals for change took place amongst the core group of managers in control of the ERP project. It is here that Ivy's legacy grant accounting practices were squashed without consulting the academic stakeholders, and it is here that the naturalisation of Ivy's ERP system is stalled and the grand narrative of the University

is at risk. Therefore, it is here at the margins that we examine the net consequence of squashing Ivy's accounting silos and the subsequent 'bringing into account' of an enterprise-wide approach informed by business-oriented accounting practice.

This methodological approach is informed by the scholarship of science and technology studies and is reflected in the design and content of this dissertation. For example, in chapter four we focused on the relationship between actor-networks *at work* as they negotiated through longitudinal change culminating in the controversy surrounding the Principal Investigator Report (PI Report). The chapter illuminated the multiple and interpenetrating times constituting the ERP system at Ivy. This chapter 'shifts in' to focus on the organisational dramas such as the PI Report in more detail. We attend to the collision of perspectives that resulted from one accounting agenda being purposefully 'inscribed out' of the ERP system.

Simultaneously we hold in mind the position of this controversy within the larger ERP project. Just as the VP's vision was informed by macro-narratives of Y2K and globalisation, we shall see that Ivy's accounting leadership is entangled with the delegate actors of *trust*, *risk* and *accountability* who act on behalf of an audit society. We make explicit the relationship between redefining normative accounting practice and the influence of trends within contemporary society.

As a body of knowledge, accounting is an 'historically situated and ad hoc accretion of previously marginal activities, calculative methods and rationales' (Miller, 1998). The negotiations that ensue result in the shifting of network boundaries and the legitimisation of new practice. Along

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with this shift is the de-legitimisation of legacy practice deemed by the project team as no longer useful or appropriate for practice. It is this tension between inclusion and exclusion that we seek to illuminate in this chapter in order to highlight how 'accounting is re-made at the margins of practice where societal, historical and geographical concerns spark debate about its constituent knowledge' (Miller, 1998).

The conflict between faculty and the phase-one ERP represents a significant event within the history of Ivy where its grand narrative of an Ivy League institution is threatened by assimilation into a business-oriented storyline. Winner (1978) speaks to this phenomenon as 'reverse adaptation' where he argues that organisations adapt to technology. This chapter considers the power of ERP configuration and design activities to inscribe the values and politics of professional managers over traditional academic standards. The result can be controversial, having potential to reorder the working activities of actors and/or stall the localisation of the system into the organisation. Focusing on these activities helps us think about the implications of redesign – of squashing legacy practices – when the ultimate goal is to find a way to co-ordinate and govern an organisation. In this way perceived success or failure of an ERP design is secondary to understanding the power of technology to act as a delegate for a particular world view, and a silencer of others.

We argue that accounting itself tells one of the most powerful stories of contemporary organisations through financial reports which narrate an organisation's past activity. These reports of organisational accountability are often generated through calculations and classifications of data that reside within information systems. When actors tell the ERP, through

configuration, what to 'take into account', they are defining what is valuable to know, record, and analyse within their organisation. Simultaneously they are telling the ERP what it can discard as irrelevant. These negotiations with technology impact external reporting capabilities as well as what it means to govern an organisation. As such, an analysis of these activities is crucial if we are to understand and theorise technology's role in contemporary society.

Very limited literature exists within the IS field that discusses ERP in relationship to its financial module (Change & Gable, 2000; Caglio & Newman, 1999). The detailed negotiations comprising accounting change are overlooked in favour of studying the technology as a single, integrated artefact. An actor-network perspective enables an analysis that can see both the ERP and its constituent parts by summing up negotiations, and inscriptions. This chapter illuminates the centrality of the accounting application in the overall ERP configuration and suggests that researchers should try to understand these links rather than black-boxing them as unproblematic. Further we argue that the question should no longer be – 'what is success and how do I achieve success?' but rather, 'what is valid knowledge, and how do I negotiate in order to design this functionality into the information system?'.

In answer to this question chapter four began to consider the process of 'bringing into account' a new administrative infrastructure. We gave insight into the chains of transformations that connects life beyond the standard ERP package and its technical implementation. This chapter considers the implications that can be drawn from a back-office ERP initiative. We consider who and what is valuable to know in this organisation and what can be disregarded and branded as irrelevant. We consider the extent to which those making the assessment of what constitutes valid

knowledge have a clear understanding of organisational ethos. Chapter six analyses the re-negotiation of valid knowledge by recalcitrant faculty members. This results in a further modification to Ivy's grand narrative and dramatic shifts to the administrative platform. The final chapter considers the implications of creating a matter of fact that can neither be classified as a success or a failure but is none-the-less accepted and used within daily work life.

In order to illuminate these issues we compare Central management's narrative with what we interpret to be the culmination of Ivy's academic narrative. The Medical School's post-implementation story expresses the shock of realising that academic working preferences had been excluded from the ERP. We focus on Medicine as a delegate for the academic enterprise because their faculty rely heavily on external grant funding which accounts for 80% of the University's total grant dollars. As such, Medical School faculty are subject to an incentive compensation plan where their salaries are commensurate with their level of grant awards. In this way changes to how the University accounts for, and manages grant dollars directly impacts the measurement of professional performance. This has the potential to impact the personal and professional livelihood of Medical researchers and clinicians. For this reason we felt the Medical perspective effectively represented the interests at stake related to the management of academic funding.

In the next section we draw on theoretical concepts commensurate with our actor-network perspective that help explain the relationship between problematizing legacy work practices and realising a newly organised administration. Just as this study relies on the notion of scalability for crafting its analysis chapters, we employ this concept in relation to our theoretical framework. The authors whose work we employ in this chapter are broadly sympathetic with an actor-network

perspective and their work is particularly useful for theorising the squashing of Ivy's accounting silos.

We draw upon Miller's study of accounting practice as an evolving collective of aligned interests that is influenced by a 'flat world' that is moving in from the margins. This is directly related to Latour's (1999b) notion of chains of transformations that connect actors of different size separated across time and space. Rather than concentrating on a local, or global study of accounting practice, Miller argues that by tracing trends of practice we can understand the ways in which norms form within the field. He follows the evolution of several calculative practices that are currently taken for granted as 'facts' by accounting professionals back to a time when they were considered marginal practices. It is at the margins of practice that a controversy occurs between the previous standard and the marginal practice. These actors negotiate for a dominant position by calling upon contemporary issues in order to translate interests and inscribe preferred calculative methods. We complement this study through our empirically-based analysis of Ivy's accounting margins.

The work of Star and colleagues (Star, 2002, 1989; Bowker & Star, 1994, 1999; Bowker, Timmermans & Star, 1995; Star & Griesemer, 1989; Star & Ruhleder, 1996) also informs this chapter's theoretical perspective because it emphasises the work involved in creating technologically-mediated systems. In particular we employ concepts from Bowker and Star's (1999) monograph to illuminate the work that occurs in order to shift accounting margins. Where Miller helps focus the analysis on boundaries of practice and the motivations for challenging

normative practice, these authors help us consider how practice is redefined during what they call 'classification work'.

In addition they highlight the power of classification to impose a standard spatial and temporal configuration within which actors must work. A temporal lens is an evocative way to emphasise classification as inscribing particular values and politics into artefacts and standard work processes. The pace, rhythm, and tempos of work inscribed within an information system can be at odds with legacy practices. A design that radically alters the working lives of actors will create a contentious environment that may spark recalcitrance on the part of those the system hopes to enrol.

These theoretical ideas provide the basis for an analysis emphasising the confrontation of ERP working rhythms with faculty interests. We argue that the phase-one system might be an indisputable fact in that it has too many resources behind it to return to a time when alternatives to ERP were viable (Callon, 1991), but the details comprising the ERP are far from achieving fact-status within Ivy. As such the ERP cannot be said to be a working information system at the time of installation. In the next section we consider these theoretical concepts in more detail before turning to our empirical analysis.

5.1. Theory: Reclassifying accounting practice

This section introduces the chapter's theoretical base by drawing further on the field of science and technology studies (STS) from which actor-network theory (ANT) is informed. Miller's

accounting research (1998) and Bowker and Star's (1999) classification work focus on the relationship between creating standards and shifting boundaries of practice. Both sets of authors advocate an analytical research focus on the margins of stable actor-networks where narratives of change help us understand how standard practice is built. The inscription of narrative perspectives within artifacts works to delineate a 'calculative centre' used to act and manage at a distance (Latour, 1999b, 1987; Callon, 1998a, b; Law & Callon, 1994). The creation of an information system allows for computer-mediated calculations that determine the nature and extent of legitimised organisational knowledge. Inscribing practices within system boundaries is an act of creating and recreating an organisational grand narrative by giving voice to, and silencing, particular perspectives (Star, 2002).

We argue that the core group's configuration and customisation activities during Project X reclassified Ivy's accounting practice to meet a particular institutional agenda. The phase-one system reordered the temporal features of University work life and disrupted the personal and professional biographies of its members whose preferred work practices were excluded from the design. We turn to these authors to provide an interpretive frame for viewing Ivy's attempt to reclassify, and then naturalise its accounting practice. This focus illuminates the power of information technology to shift the boundaries of standard practice by redefining centres of calculation within an organisation: who and what will be legitimised and valued.

5.1.1. Margins of Accounting

Miller's (1998) study of the margins of accounting is part of a well established body of qualitative accounting literature that focuses on the role of accounting and accounting systems in reflexively

shaping, and being shaped by organisational contexts (c.f., Power, 1994.; Hopwood, 1983; Burchell, Clubb, Hopwood, 1980) This literature interprets accounting practice, its methods, and tools, as ordering and reflecting organisational reality and providing insight into individual meaning making practices (c.f., Boland & Pondy, 1983). More specifically, Miller's work contributes to a research stream within the field of accounting that draws upon actor-network theory as the theoretical lens through which to view such accounting change over time (Chua, 1995; Ezzamel, 1994; Miller, 1991; Preston, Cooper & Combs, 1992; Robson, 1991, 1992). Importantly, scholars working at the cross-section of accounting and information systems have found actor-network theory a particularly effective analytical tool for theorizing the agency and role of non-human actors in shaping and being shaped by change over time (Briers & Chua, 2001; Quattrone & Hopper, 2001; Boland & Schultze, 1996a; Bloomfield, 1995, 1991; Bloomfield & Best, 1992; Bloomfield, Coombs, Cooper & Rea, 1992;).

Despite the abundance of ERP literature in the information systems field, our discipline is worryingly quiet about the role and influence of accounting technology and calculative methods in shaping these enterprise-wide systems. Interestingly, the ERP packages develop from software vendors' core financial systems and software vendors claim competitive advantage based on the strength of their financial module, yet emerging ANT research focused on accounting and enterprise technology remains the domain of accounting scholars (Briers & Chua, 2001; Quattrone & Hopper, 2001). This thesis employs an actor-network perspective to emphasise how new accounting practice emerges and the extent to which these activities will come to constitute Ivy's administrative practice. This analytical focus helps us begin to understand that calculative practices shift during ERP projects and this impacts not just the work of accounting within an

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ERP-enabled organisation but also the nature and content of its grand narrative, the interpretation

of organisational reality, and its underlying temporal features.

When Miller (1998) comments that 'accounting has become almost synonymous with

management', he provides insight into the pervasiveness and power of this body of knowledge for

contemporary organisations. Current state-of-the-art accounting practice is inscribed within the

majority of organisational management and executive information systems. Therefore, changes to

such systems can revise organisational calculative practices and realign the governance of

institutional activities to favour accounting professionals. Whilst accountants are often harangued

as precise and pedantic professionals, existing in isolation to contemporary society, those working

within its boundaries understand accounting as a reflexive process, the standard practices of which

are formulated through interaction with multiple contexts. This distinction is nicely highlighted

through the retelling of an in-house accounting joke:

> "There once was a business owner who was interviewing people for a division manager
> position and had a variety of individuals applying for the position. He decided to select the
> individual that could answer the question: how much is 2+2? The first candidate was an
> engineer. He pulled out a slide rule and showed that the answer was 4. The second candidate
> was an attorney. He stated that in the case of Svenson vs. the State, 2+2 was proven to be 4.
> The final candidate was a [Certified Public Accountant] CPA. When asked what 2+2
> equalled, the CPA did not respond immediately. He looked at the business owner, then got
> out of his chair and went to see if anyone was listening at the door. Then he returned to the
> business   owner   and   said,   'what   would   you   like   it   to   be?'"
> [www.Personal.buseco.monash.edu.au/~themin/laughs/accounting.html]

Without touching on the ethical implications of this humorous scenario, the story presents the

accountant as 'involved in-the-world' (Introna, 1997): an actor whose domain of expertise is

based upon and adjusted to reflect contemporary society. Interpreting accounting practice as

situated in time and space helps illuminate 'actors, arguments, calculative devices and

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mechanisms that emphasise its epistemological base as a collection of relatively stable practices which evolve over time and in relation to historical and societal concerns' (Miller, 1998).

Furthermore, accounting's epistemological base is determined through both practitioner interpretations of the financial world and the accumulation of local shifts to accounting practice within contemporary organisations. As organisations seek to value and account for evolving business activities, the boundaries of relevant accounting practice shift. Therefore, research focusing on the emergence of these controversies over time provides continuity between the past, present, and possible futures:

> "...Analyses of the claims and counter-claims made in relation to a particular accounting practice, the ideals and aspirations that articulate a role for it, together with analyses of the conditions of emergence of such arguments, can help us to understand and explain why it is that a particular practice comes to appear problematic, and is eventually seen to be in need of modification or replacement. For it is through this activity of problematizing that the definition of what might count as a possible 'solution' emerges...It is the emergence of such temporarily stabilized ensembles or assemblages at the margins of accounting that we need to attend to...For it is through such processes that accounting as a body of expertise is formed and re-formed." [Miller, 1998, pp. 176-7]

This empirical study extends Miller's reference to 'problematizing' by focusing on the role of technology in inscribing new ways of accounting within Ivy University and shifting administration toward a more professional paradigm.

5.1.2. Classification work

We argue that the boundaries of organisational accounting practice do not shift merely as a result of controversy. Rather, as we recall from chapter three, the creation of a stable network occurs through the inscription of multiple and interpenetrating temporalities within artifacts, practices,

methods, and tools. Our presentation of narrative data in the previous chapter illustrated the implications of negotiating local times into global software packages where the resulting system creates a hybrid temporality informing Ivy's future administrative work. This temporal frame is not wholly local or global, but a fusing of temporal features that must be negotiated into the fabric of Ivy's working life if the ERP is to be naturalised within the organisation, and a master narrative is to continue guiding organisational actors.

As Bowker and Star (1999) note, time is problematic within systems that classify data into pre-defined categories because technological design often fails to account for the multiple temporal frames of users trying to access these categories in a meaningful way. The essence of an information infrastructure is that it exists and is spatially interacted with, however it abstracts away from the temporal processes of work. In other words, standard administrative infrastructures like ERP disconnect the spatial-temporal union that underpins action by inscribing, through configuration, only one standard way of working into its technological design (Bowker & Star, 1999).

Several studies focus on the details and implications of designing and using a classification system within particular contexts (Bowker & Star, 1999, Bowker & Star, 1994; Star & Griesemer, 1989). For example Bowker, Timmermans, and Star (1995) analysed the creation of a nursing classification system that sought to professionalise and standardise the activities of nurses whose daily working lives involved varied administrative and patient-based activities. Their work ranged from easily classifiable tasks such as administering medication and updating patient charts, to ambiguous activities such as interacting with patients to improve their sense of well-being.

Through the categorisation of these practices, nursing work became technologically mediated and the system of classification took on fact-like status within the nursing profession where its categories were interpreted as representing all that nursing work was, or could be. Bowker and Star note this classificatory system impacts the story of the nursing profession by clearly delineating the boundaries of their work and work lives.

Difficulty arises with classification work when the spatial and temporal frames of actors fail to match those inscribed into the classification system. Bowker and Star (1999) name such conflict 'torque', the definition of which links spatial and temporal dimensions to create a 'twisting between the formal classification system and the myriad of personal and professional times upon which it is imposed'. In this way the design of classification systems can be problematic when they are forced onto people. Through an evocative example of race reclassification under apartheid in South Africa, Bowker and Star (1999) illustrate classification systems as "sites of political and social struggle" (p. 196). Individual trajectories are enabled and constrained by the categorisation of race as defined by a small group of powerful interests. The following example of mixed race children living during apartheid helps illustrate the power of classification work:

> "They are both White and not White at the same time. They are in a White school and there they 'must' be White: the law is witness to that. Yet 'everybody' knows that they are not White, not really. They are something in between. But the law, which is an ass, knows no in-betweeness. It dichotomises inflexibly, imposing a clumsy disjunction upon the subtly variegated flux of reality." [Watson, 1970, p. 114 within Bowker & Star, 1999, p. 212]

Those citizens who did not fit neatly within the available race categories highlighted the 'power of classification work to create and perpetuate an ecology of discrimination despite its abstraction of local specificity' (Bowker & Star, 1999).

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Classification involves the necessary formalisation of categories in order to standardise and account for normative social activities. However, as Law (1992) reminds us, order is never achieved without cost. The individual biographies of Africans able to 'pass' as white fundamentally altered as a result of apartheid reclassification when their mixed blood ancestry redefined them as 'coloured' - meaning they became second-rate citizens. Through the work of (re)classification, local stories, specific needs, and contingent events are silenced. In its extremity, the South African example speaks to the power of classification work within organisational contexts to shift the centres of calculation and thereby *give* and *take away* legitimised status.

While order was achieved during apartheid, the cost was great for many actors living within that network. As Bowker and Star (1999) note:

> "Each standard and each category valorizes some point of view and silences another. This is not inherently a bad thing – indeed it is inescapable. But it is an ethical choice, and as such it is dangerous – not bad, but dangerous." [pp. 5-6]

Stable organisational reality relies on classification systems to inscribe, delineate and support normative work practice. ERP systems are built on this premise and attempt to create order and standardisation by connecting discrete silos of classification through an enterprise-wide infrastructure. We argue that the naturalisation of ERP within contemporary organisations is largely a matter of negotiating through a 'politic of reclassification' where local values are abstracted in the name of professionalisation. In this abstraction local interests either become inscribed within ERP mandated 'best business practices' or, are pushed outside the boundaries of legitimised practice. The result is not only a shift in normative practice but also in the societal agendas that might impact the ethos of the organisation itself.

The negotiations involved in classification work are not the sole domain of high-profile mandates. Rather as Miller (1998) notes, at the margins of accounting we can follow the shift in management practice. 'Exquisitely boring things' (Star, 2002) like accounting calculations and the distribution of administrative reports have the power to reclassify the working lives of the University community. The remainder of the chapter focuses on two narratives of accounting change that might have easily been overlooked as pedantic arguments of little significance to the overall naturalisation of Ivy's ERP system. Our actor-network perspective sums up the relationship between an accounting category and the struggle between administrators and academics as they fight to define Ivy's future.

5.2. Proposals to change the margins of accounting

The remainder of the chapter focuses on Ivy's margins of accounting where the project team problematised legacy accounting practices they felt no longer worked effectively for the University administration. The section is divided into three parts that together analyse the accounting controversy that squashed faculty silos and stalled the localisation of the phase-one system into the wider Ivy community. The first subsection discusses how Central leadership problematised legacy accounting practices. Next, we illuminate the margins of accounting by juxtaposing time-phased budgeting with commitment accounting (CA), and argue that the former is underpinned by an extended notion of time and space that attempts to link accounting with past expectations and future plans through time-phased analyses. The core group argued that University financial management should be designed to place on a continuum previously disparate

processes of budgeting, accounting, reporting and, account reconciliation. Integrating these activities and standardising their business processes across University departments was expected to foster institutional accountability, professionalism, and fiduciary responsibility.

The motivation for shifting accounting practice during project X is analysed in the third subsection by considering the influence of the audit society and the commercialisation of higher education as modernisation trends that acted as delegates for the core group's professionalisation agenda. We argue that the rhetorical power of these meta-narratives helped legitimise the conceptual changes advocated by the core group and resulted in their inscription within the phase-one system. Focusing on the voices that coalesce at accounting margins provides access to the ways in which an ERP system can inscribe multiple interests to form an accounting landscape that 'links the demands, expectations and ideals of diverse social and institutional agencies' (Miller, 1998, p. 175). In addition, we become privy to the silencing of multiple voices and consider the implications of this for the nature and agency of administrative work.

5.2.1. Problematising 'commitments' at the margins of accounting

As mentioned in the case background section of chapter four, a main impetus for choosing Oracle's Government Financials (OGF) package was the strength of its accounting functionality. Ivy spent a great deal of time trying to acquire trust in their financial activities because their information systems no longer reflected the nature of their complex business. As such, Ivy accountants had to reconcile between institution analyses and detailed accounting activities occurring within Distributed University departments and schools. The Budget Director is a

spokesperson for Ivy's institutional perspective stressing the importance of accountability and control for Ivy's future:

> "...[I]t's *increasingly* complex and I think when it goes back to the Oracle systems, I think certainly the motivation for having this more high powered enterprise software is that the *place has become more complex* and we need *better data*. We need to make *better decisions based on data*...it's a recognition of the need to do that because we're running a **huge financial behemoth**. We're the *highest graded financial institution in the state*. All these...for-profit companies aren't rated as highly as we are. We're 'Triple A': **'Triple A'** in *both* Moody's and Standard & Poors. I mean - *you know* - **it's extraordinary**. We have a **billion dollars of debt**. That's a *billion dollars of bond holders out there* that are, *you know, trusting us* with *their money*. **So it's extraordinary**, I think there are changes in Higher Ed as we become incredibly complicated businesses even though we're not-for-profit..."

This quotation summarises the institutional perspective of Ivy as a business – a huge financial behemoth - that can use enterprise technology to professionalise its operations. This story attempts to persuade the reader of the need for an IT-enabled modernisation initiative, if for no other reason than to be fiscally responsible debtors.

Instituting new accounting practice within Ivy wasn't just about increasing the control of financial transactions, and addressing accountability through official statements of record. Shifting normative accounting practice was also about using financial data to manage future operating activities through iterative cycles of planning, budgeting, review, and reporting. If financial accounting figures represent what has happened within an organisation, then budget management is the process of monitoring the present state of accounts in relation to past expectations and future plans. The brainchild of the Budget Director was to encapsulate monthly financial monitoring into a single conceptual idea called time-phased budgeting. The value of this was seen to be a 'raising of the intellectual bar', forcing employees to ask different questions and generate more meaningful analyses of their financial position.

Of particular concern to Central leadership was the governance of complex research and clinical activities constituting Ivy's academic programs. Increasingly these activities are funded through external grant awards that must be managed in compliance with third-party regulations. Ivy's twenty-five year old financial systems could no longer accommodate University needs because the design too rigidly categorised financial data based on an outdated organisational model. This rigidity limited reporting functionality and made the reclassification of data into management information a fragmented process that occurred outside system boundaries, within distributed silos of accounting.

Ivy leaders felt it was no longer enough to check the validity of expense and revenue transactions each month by 'ticking and tying' or confirming the correlation between line items on a printed report regardless of materiality. The institutional risk was too high to allow an ad hoc review process to continue especially when its practice was contrary to Ivy's professionalisation effort. As such time-phased budgeting was designed as a translation point between transaction processing and budget planning. Linking accounting with budget practice was possible in an integrated, process-oriented system. The ability to shift the concepts underpinning financial management would be more challenging. The Budget Director, supported by the VP and the core group sought to modify faculty experiences of time and space by inscribing a standard way of working into the ERP design. This is interpreted as an overt attempt to align faculty practice with professional managerial values.

The primary concern from a faculty research perspective is the receptivity of the academic market to their scientific findings. Principal Investigators (PI) are working within a volatile, political and competitive intellectual marketplace. The extended timeframe of academic research makes it difficult to assess the impact of their work in the short term. Delayed accountability and responsibility within the academic community in the form of scholarly publications and professional reputation is countered by appropriating a financial model for measuring success.

One short-term way that the University and granting agencies evaluate PIs as competent researchers is on their ability to generate grant funding. Faculty aim to spend all their grant dollars to further their academic research and project an image of productivity and innovation. From the Principal Investigator's perspective, grant money is a means to achieving a creative and academic end. Obtaining a 'zero balance' by the end of their grant is perceived by them as a way to control this end because it speaks to the financial health of their research endeavours. The time the PI is willing to devote to grant management is limited.

The PI's goal of spending a grant down to zero by the award end-date is very different from the institutional goal of properly allocating all costs associated with the grant. During Project X the core-group problematised legacy practices by arguing that poorly managed grant expenditures often meant that the full costs associated with funded research were not captured until the grant had closed. This occurred because the expenses were inappropriately allocated to other funds or the PI had neglected to inform her administrator of financial transactions. In the meantime, Principal Investigators continued to spend the inflated grant balance down to zero using money that should instead be reserved for the misallocated or remiss expenses.

Once realised, these expenses had to be retrospectively covered from University money belonging either to Central's general appropriation fund, departmental unrestricted dollars, or discretionary money belonging to the PI. Central argued that such cross-subsidisation occurred frequently and it meant that the institution could inaccurately report their grant activities and be implicated in internal and external audits as poor financial managers. In addition, the inability to plan for the future and formulate strategy based on this cross-subsidisation limited the accuracy of Ivy's corporate budgeting process. This had a knock-on effect of reducing the relevance of financially-focused institutional analysis.

We juxtapose the work practices inscribed within the legacy system versus those underpinning a customised ERP budget application, to point to the distinctly different perspectives of Central and Distributed administrators. First, commitment accounting is a locally designed system created by Distributed management and Principal Investigators to answer the simple, but crucial faculty question: "How much money do I have left to spend?". Second, time-phased budgeting was designed as Ivy's standard practice and was expected to improve institutional reporting and thereby reduce financial risk, and increase management reporting and analysis capabilities. We tell the story of these two systems in the first person in order to highlight the perspectives of each and italicise them in order to distinguish their stories from the supporting analysis. These meta-narratives are constructed by the researcher as a result of her iterative process of interpretation which involved speaking repeatedly with representatives of each perspective in order to understand the agency and role of each accounting system. Later sections of the chapter support these meta-narratives using extended quotations of primary data.

Commitment Accounting

I am a home-grown information system called the Distributed Accounting System (DAS) and was built by faculty and their staff to manage grant expenses once funds have been awarded by external granting agencies. These funding bodies typically make faculty jump through hoops in order to breakdown their monetary requests into detailed categories that sum up to a total grant award. This process is designed by the funding bodies to show that the Principal Investigator (PI) has thought through the way she will run the project and to make her and her university accountable for actual expenditures compared to the total award.

These imposed categories don't mean much to faculty on a daily basis because they are more concerned with doing what needs to be done to get their research accomplished. This often means that a PI will adjust her spending to suit research goals by perhaps moving money from one imposed category to another. At the same time faculty realise that the imposed categories can form the basis of a loose project management process and act as a point of reference for themselves and their administrators. Project management links the PI back to the funding body reminding her of what she said she would do to achieve her academic goals.

I am an information system that helps her adapt her working rhythms into the overall project management process required by funding bodies. I was written in Focus programming language by faculty and staff themselves. I have a very basic interface which allows users to enter and

download data from the mainframe financial chart of accounts. There are similar systems at other North American universities and we are well respected by faculty and their staff.

Faculty tell their administrators how much money to set aside for activities they expect will happen at some future time during the grant's duration. PIs named these obligations 'commitments' and designed me to keep track of them because the official financial system cannot. Faculty further classify these commitments into one of two conceptual categories: pending actuals and future plans. The former represent expenses that have been incurred by the PI but for reasons of timing, have not yet 'hit' Ivy's general ledger and will be excluded from that cycle's financial reports. Whereas committing for future plans takes into account activities that faculty expect will occur at some point during the grant's duration.

*I embody the value of academic freedom because I allow each faculty member to create his/her own financial report by summing up whatever **they choose** to define as commitments. Principal Investigators meet with their administrators and through informal discussions, the administrators encourage faculty to earmark as many dollars as possible from the current instalment of the grant. In this way faculty are involved in identifying, classifying, and accounting for their future spending patterns. They use numbers to manage their intellectual and scientific work processes based on their situated understanding of the future. The granularity of these discussions and the frequency of their occurrence are a locally negotiated outcome. Individual temperaments, available time, departmental norms, professional working relationships, and the stage and nature of research, all influence the extent to which future expenses are identified, entered through my*

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interface, and classified as commitments that will occur during a specific grant period (see table 5.1).

As a result of this informal management process, I begin to work for the faculty. I store contingencies that faculty like to think of as 'money already spent'. In this way once a faculty member gives me a commitment, they don't have to worry anymore, because in their mind it is accounted for, and will be reduced from their pool of money. At the close of each monthly financial cycle, I pull actual grant expenses from Ivy's main financial system and I use rudimentary matching logic to cancel corresponding commitments. What remains is a report of actual expenses and outstanding commitments.

I then work with the administrator to create a monthly PI Report designed to answer the PI's number one question – 'how much money do I have left to spend?'. This report is a valuable artefact that faculty rely upon in order to make meaningful their state of research. A single number on a piece of paper tells the PI how much money she is free to use. This figure is a point of translation for the PI who is able to link the pace of her scientific working rhythms, with the remaining surplus of money she has to accomplish her goals. I am particularly valuable to the PI because I speak to her in her language, and she can very easily interpret her financial standing through our shared language of commitment accounting.

Time-phased budgeting

I am the time-phased budgeting approach made famous at Ivy by the Budget Director. I was conceptualised as a result of his twenty-years experience as a business man. I have been proven to work at Ivy because I've been used by both the Director and his staff when they conduct institutional budgetary analyses for the University. The Director named me time-phased budgeting because I budget financial transactions by category (expense, revenue, capital) and then distribute that lump sum figure over time. Then my job is to compare how closely the faculty come to their budget plans. In order to do this, I rely on faculty and their administrators to mimic the pace and rhythms of their research projects and then map those rhythms to the fiscal year calendar.

I am not interested in the process of academic work. I am accountable in a different way - I want to see what the school's risk position is, as I'm responsible for their treasury operations. What I expect PIs to do is strip all the detailed categories out and turn their projects into a time/cash flow line against which an overall position can be marked. My design says 'here is your lump sum grant award, spend it on whatever you want to spend it on to achieve your academic goals. Stop thinking in terms of lot of little fuzzy boxes and categories, and start thinking about a line on a sheet of paper that flows through time. Keep summing up to whatever number reflects the current grant balance and adjust overall expenditure to match the budgeted cash flow. Do this because the line representing your budgeted cash flow on this graph was designed to accommodate your stated needs and leave you with zero by the end of the grant period' (see table 5.2).

My design encourages faculty and staff to monitor their plans in comparison to their monthly financial transactions. This encourages reflexivity as part of the financial management process

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thereby enabling timely and corrective interventions that can affect the financial health of a grant. I view budgeting not as a control mechanism to limit spending above an approved budget figure, but as a process of periodic monitoring between actual activity and a budgeted spending pattern. Rather than forbidding financial transactions, I allow all activity to hit the financial statements and I then expect administrators to review these charges in retrospect. During this review process I want faculty and their administrators to think – 'where am I in relationship to where I thought I would be at this time, and what does this mean for the future?'. This requires more work by faculty and their staff but it is necessary because research is a complex business whose activities must be professionalised.

The ad hoc process of commitment accounting is its main shortcoming and accounts for my design in an attempt to institutionalise the practice. If we can get people to spend less time 'ticking and tying' between different source reports and more time analysing the appropriateness of charges and the rhythm of grant activities, then we can instil a grants' management paradigm focused on reflexive and timely judgement calls. We didn't invent all these detailed categories that academics seem to feel compelled to work by, Ivy isn't interested any longer in spending time unravelling this odd DAS system designed by faculty. The Budget Director decided that one way to stop people from thinking in low-level bookkeeping terms, like they did with the DAS system, is to design me and the project-centric accounting system without the ability to print monthly statements. This saves Ivy money in printing and distribution but it also makes users reflect on financial numbers in a new light. Numbers are seem as ephemeral – fixed only for a short period in time before they change. When numbers are moving there is little point to try and tie them down and definitively say like DAS did 'this is how much money you have left'. That is the wrong

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question. Instead I am designed to instil a fluid tempo to the process where numbers are managed

and interpreted based our shifting interpretation over time.

External Grant Category	Estimate	Actual (work activities that I'll figure out over time)
Office supplies	nnnn	My administrator will keep me on track.
Research Postdoc wages	nnnn	Really don't monitor as long as work gets done.
Conference Travel	nnnn	I worked for this money, if I don't use if for what I first thought, there are other things I can think of doing with it.

Table 5.1: Example of Commitment Accounting
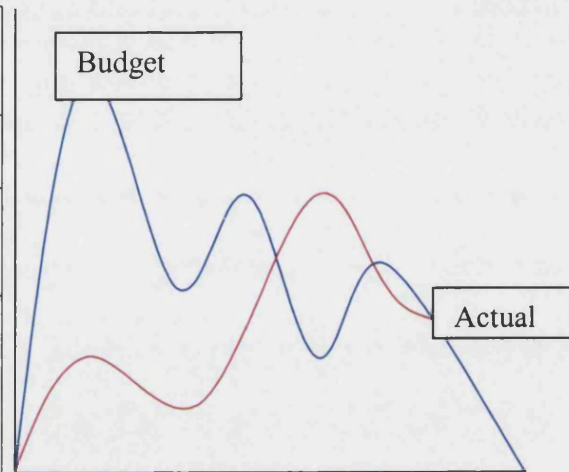
Table 5.2: Time-phased budgeting rhythms

These two stories of accounting practice illuminate the margins of accounting at Ivy during the vendor selection process and throughout Project X. The juxtaposition of these perspectives highlights the legitimisation of time-phased budgeting through the problematisation of commitment accounting practices. What was originally the brainchild of the Budget Director gained popularity during acts of translation, perhaps most importantly marked with the enrolment of the VP who incorporated time-phased budgeting into his vision of Ivy's future and vocalised this perspective throughout the duration of Project X.

5.2.2. Delegates for professionalisation

In preparation for analysing the phase-one environment in which the Medical School were presented with time-phased budgeting, we step back in time. We consider how the time-phased approach, and its narrative of faculty as poor financial managers, gained momentum within Project X resulting in a powerful alliance imbued with strong properties of irreversibility.

This begins with the VP's full support of a time-phased approach. He illustrated to the project community his collusion with the Budget Director and TPB by assigning its design to the Financial Planning and Management (FPM) team charged with developing a budget application and the data warehouse. This team was headed by the Budget Director whose vision was further legitimised by being assigned a direct reporting relationship to the VP bypassing the Project Manager and other team leaders. This broad scope of authority enabled the FPM team to spearhead the redesign of all financial planning, management, and reporting through the data warehouse.

In order to illustrate the collusion of these two powerful actors we provide excerpts from interviews with them held separately but during same week. Their stories are interestingly similar, using an example of inappropriate faculty spending on a grant as a rhetorical device to enrol the interviewer into their time-phased perspective. Not only do these actors use a similar story to problematise legacy practices, but they invoke the notion of financial audit risk as an impetus for shifting the boundaries of normative practice. We begin with the Budget Director's story immediately followed by that of the VP:

"People would be spending dollars ad hoc just because they think they have money left without thinking about what they've done in relation to a plan – that doesn't make any sense to me. and it also doesn't make any sense to me that there should be large accounting transfers that happen late in the life of a externally funded grant - because *while it may not be fraud*, if I was an auditor it would be - certainly *raise my flag* of where I'd want to look because there is inconsistency – like – 'what do you *mean you've been spending $4,000 a month for 10 months and the last 60 days charged $85,000 because the money was left'*. Well *I* would call those calculations **suspect**." [interview with Budget Director]

This quotation conscripts a hypothetical financial auditor as an actor that legitimises the need for a shift in accounting practice. This is compared with the VP's narrative where he too legitimises the time-phased budgeting vision:

"People spend *enormous* amounts of time here looking at relatively *small* expenditures. At the same time *they go all the way to the end of the grant* and they find that they have - you know - $10,000 *left over*. and then they go in with their administrator and re-estimate the amount of labour they put in on a grant – *they go back and re-adjust the labour allocation so that the $10,000 gets spent.* I mean let's be honest what we would like to have - you know - I can't say this because the government will come in - you know - and say - 'well you're not keeping proper account of your time'. But really - what we want people to do is to keep *proper account of their time* so that - you know - so at the end of the day they aren't looking back and saying – 'well I'm going to adjust it and make it get to zero'. *That should be your target up front* and you should *manage* how you're going to do that" [interview with VP]

This is a story of faculty and their staff as inefficient and irresponsible financial managers. It is a powerful justification for shifting the boundaries of accounting practice and was told to me multiple times by Central administrators over the duration of the study. During Project X this story translated project team interests and increased the stability of the time-phased approach to such an extent that this story became *the truth* about legacy grants' management practices. In this way the story itself was a delegate that justified the need for modernising faculty-based accounting practice.

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The truth claims contained within this narrative are based on the need to inscribe a reflexive process of financial management. TPB was expected to link the present state of accounts with PI's expectations and formalise the analytical process which provides increased control in terms of research practice, the University, and granting agencies. For example, we see from the stories of the VP and Budget Director that the DAS system recorded commitments based on what the faculty communicated to their administrator causing inconsistent interpretations of financial management. The argument is that this led to problems summarising grant accounting at an institutional level. The commitment accounting application never mandated that faculty plan how they would spend their money over time. As such, administrators had to rely on their tacit knowledge to determine faculty members were on-track. It was felt by Ivy accountants that the DAS system left too much power in the hands of PIs who do not think critically about managing money.

The Budget Direct argued that this decentralised practice perpetuated a skewed tempo of grant activity that didn't represent what was 'really happening'. Instead, in the last sixty days of a grant, PIs would visit their administrative offices with a plethora of information about expenses they were remiss in previously communicating. As grants come to a close PIs want to try and reach a zero balance so that they don't have to give money back to the funding body. Except the VP and Budget Director argue that what often happened is that PIs, who are not good financial planners, and don't have the tools to do a time-phased budget, end up accidentally overspending their grant funds. They call this a 'bottom heavy' spending pattern and argue it is a result of poor planning, monitoring, and a failure to actively manage the rhythm of expenditures over time.

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However as we shall see in the next chapter, this is just one version of events. This narrative was highly contested by the Medical School when they were presented with the phase-one system. The School took offence when they realised that their administrators and faculty were being portrayed in a negative light in order to legitimise a shift to business-oriented management practices. However, by this time the system had been designed, the narrative inscribed within its business processes and software code, and reversing those network alliances would prove challenging.

However, the privileged position of the Budget Director and by association, the FPM team was not enough to gather the momentum necessary in order to integrate time-phased budgeting into the ERP. Designing an integrated budgeting application required that the FPM team garner the wholehearted support of technical experts. In addition they sought to inspire the intellectual curiosity of the core group because they believed this would be the most effective way of shifting accounting margins and translating time-phased budgeting from a concept into normative accounting practice. In order to enrol the whole of Project X into the network of time-phased budgeting, the VP and Budget Director called upon meta-narratives of contemporary society to act as delegates for their approach. We consider the concepts of commercialising higher education, and the audit society as actors linking Ivy's local change initiative to broad societal trends.

The concept of time-phased budgeting within Ivy was presented by the Director and VP as an opportunity to restructure Ivy's work activities and regain trust in the financial management of

Ivy's research practice. We argue that the choice to exclude commitment accounting functionality from the ERP development agenda was an attempt by the Director and VP to reinvent Ivy's grant management activities as a project of Central control. Their managerialist (Trow, 1994) perspective meant they hoped to fashion University accounting on a corporate business style designed to increase administrative efficiency and made faculty accountable through adherence to a standard.

As noted in the beginning of the chapter, the Director defines higher education as a network of "incredibly complicated businesses even though we're not-for-profit...". As such, the Director vehemently argued that University faculty should bring their accounting practices in line with the rest of the University and manage their research projects as professional businesses. He explains the commensurability of business-oriented concepts with the non-profit mission of providing exceptional teaching and research:

> "Our value here is the creation and transmission of knowledge. When I ran my own business, my value was *making the most money*. I mean *that's very clear*. I don't find the tools to get to those values very different. Given the same data, you would make a different decision *depending on the purposes of your organisation*. So what I want to do is get to the point where we can make the **best** decisions given our cultural paradigm. But I think the - what I *don't like* is backing into the decisions cause we kind of make either soft assumptions, or don't know, and don't take the energy to find out."

As we noted, this perspective of lazy financial management enrolled the Vice President into TPB despite this approach being at odds with commitment accounting practices that were standard within multiple research universities. We argue that the Director and VP were influenced by broad societal trends focused on the commercialisation of contemporary universities and the importance of professionalising governance activities in order to stay competitive within an

increasingly global marketplace. The audit society was a legitimising device through which to do this.

In previous times, trust was acquired through an active relationship amongst local actors. The complexity and uncertainty of contemporary society means that this local trust is often withheld, shifting institutional confidence to independent and standardised evaluation processes (Power, 1994). This is a societal trend where 'auditors are trusted before operatives'. Similarly, the ERP and more specifically, time-phased budgeting are 'technologies of mistrust' (Armstrong, 1991 within Power, 1994) that encourage organisations to revise locally valuable centres of calculation in an effort to meet the institutional needs for audit assurance:

> "The audit society is characterized by active processes of making environments auditable, structuring them to conform to the need to be monitored rather than to what may be regarded as their own primary logic." [Power, 1994, p. 300]

This quote alludes to the tension between acquiring institutional order and accountability whilst maintaining the integrity of local work practices.

As fiduciaries of grants and contracts from external funding agencies, Ivy is subject to external audits to ensure regulatory compliance. In addition, these activities are closely scrutinised by legal counsel and Ivy's Internal Audit department who work in collaboration with external auditors. Therefore, audit compliance was a foremost concern to Central leadership when they chose to modernise Ivy's administrative systems. The narratives of the Budget Director and VP support this argument and illustrate the rhetorical power of audit for justifying shifts to valued legacy accounting practices. As Power (1994) notes, although financial audit was designed as a

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post hoc review tool, and is often conducted at the final stages of an accountability cycle, it has now taken on a dominant role within contemporary accounting practice. He argues that the nature, content, and expectations of audit within organisations often drive actors to problematise work activities and design alternative calculative practices such as time-phased budgeting.

The ERP and time-phased budgeting are audit technologies used to reduce institutional risk by 'inhibiting the deviant actions of agents' (Power, 1994) through compliance to a standard set of scripts. As Brunsson (1990) argues, audit is a political technology that has become less about gaining institutional control and more about making particular groups accountable by allocating responsibility. We draw on this point to argue that time-phased budgeting legitimates itself as an audit technology that assigns responsibility to faculty and their staff by inscribing a standard grants' management practice that would be centrally controlled. Interestingly, Power (1994) argues that these technologies emphasise the significance of being audited or monitored, over the details involved in operationalising that process.

However, that was not the case at Ivy. While the ERP design did not necessarily preclude the development of an auditable commitment accounting application, the concept connoted a locally negotiated process of low-level bookkeeping activities that did not fit well with Ivy's professionalisation agenda. Instead the Director and VP chose to create a customised budget application which purposefully excluded the notion of commitment accounting from its design. In this way the time-phased approach was both about assigning responsibility to faculty and standardising the methods that constitute that practice. As we shall see in the next section, it was

the latter form of standardising the process of grants management that stripped faculty of their

autonomy and stalled the naturalisation of the phase-one system into the University community.

The standardisation of administrative activities within Universities is a contemporary trend

recognised by Agre (2000) in his article about the 'networked university'. He defines this

phenomenon as 'the potential to create a university which is connected to all other universities

around the globe' by employing technology as an incentive for integration. Agre's perspective

gives voice to the university as part of a collective that must professionalise its practices in a

standard way if it hopes to be perpetuated as a bastion of contemporary society. In the following

quotation we understand the crux of Agre's argument related to standardisation:

> "The key [for universities] is to preserve information by *standardising everything that does
> not make a difference*...The great opportunity here lies in the efficiencies that are to be
> gained by standardizing and networking all of the practices, in *accounting systems for
> example*, whose difference make no important difference to the local circumstances of a
> given campus." [emphasis added, p. 499]

Standardising accounting practice within Ivy University involved disrupting many silos of activity

that were valued by powerful faculty. Whilst Central leadership were informed by Agre's

perspective, we shall see that shifting the margins of accounting within Ivy was far from

unimportant for faculty who relied on flexible reporting practices. The reclassification of

accounting made a significant difference to the working lives of University actors and stalled the

professionalisation efforts of the core group.

5.3. Squashing organisational silos: classification and reordering work

This section focuses on the result of reclassifying faculty-based accounting practices. Central leadership, the project team, and the core group joined with Oracle's ERP technology and formed a hybrid collective of blended interests. This actor-network justified their reclassification of local accounting practice through the agenda of reducing audit risk, and increasing managerial professionalism. This collective valued standards and integration over locally controlled operations. Project X provided a time and space within which to inscribe their hybrid temporal zone into University financial practices. This resulted in a phase-one ERP design that effectively squashed academic silos and mandated administrative practice at all levels of the University. This had the effect of reordering the working lives of Principal Investigators and their administrative staff.

Squashing accounting silos shifted work efforts from Central administration to Distributed departments. This environment made it increasingly difficult for faculty administrators to act on behalf of both their departments and the institution. In time, faculty and their staff exhibited recalcitrance and rejected the phase-one system. The collision of perspectives illuminates the vulnerability of the ERP to be accepted as a matter-of-fact and raises the question – how do we move forward in spite of conflict in order to create a working information system?

We interpret ERP technology as a classification system both through its integrated, warehouse-based design which enables sophisticated classification of data, and also through its configuration as an information system. The phase-one system was expected to include the categories needed to

govern the University through administrative practice in general, and grant accounting in particular. Designing these standards into technology is an inherently political process that involves uncovering invisible work for inclusion in the system and covering visible work deemed inappropriate for normative practice. Claims that the resulting system is complete and wholly representative of work activities creates what Bowker & Star (1999) call "double invisibility" of issues that were identified but consciously excluded by the designers of the system.

Activities are first made invisible by being pushed outside system boundaries and second through narrative truth claims about the representativeness of the system as an accurate abstraction of organisational reality. We argue that Ivy's legacy commitment accounting practices are on the verge of becoming doubly invisible. First, through the design of time-phased budgeting which purposely excluded legacy functionality from its boundaries. Second, through the claims of Central leadership narrative related to the effectiveness of the time-phased approach to meet and surpass legacy functionality for the entire University.

Ivy leaders felt it was no longer enough to check the validity of expense and revenue transactions each month by 'ticking and tying' line items regardless of materiality. The institutional risk was too high to allow an ad hoc review process to continue especially when its practice was contrary to Ivy's professionalisation effort. As such time-phased budgeting was designed as a translation point between transaction processing and budget planning. The phase-one system shifted the nature and agency of grants' management in order to align faculty working rhythms with professional managerial practice.

Like many financial professionals, the Budget Director consistently and emphatically argued that numbers reported on a financial statement perpetuate a sense of 'false precision' amongst users. Numbers on an official statement are symbolic of a moment in time – they provide a snapshot of financial activity, but their usefulness is limited because they are interpreted as facts rather than as management tools. In contrast, the time-phased approach sought to inscribe a new way of thinking about numbers by linking budgeting within accounting.

The classification of accounting data in terms of budgets rather than commitments was an attempt by the core group to shift the *level* and *horizon* of grants' management. The design of TPB made evident temporal issues such as the grant's duration, and the relationship between the present moment, past activities and future plans. It inscribed out of the process, the ability to pinpoint exactly how much money was left at any given moment in time. Instead of providing tools that would perpetuate the detailed tracking of financial commitments, faculty and staff were asked to investigate 'materially significant' variances to the budget plan always holding in mind the present moment in relation to the grant's timeline. Persistent overspending should be investigated because it could impact a grant's horizon if the pattern continued. Whereas a single variance during the height of grant activity might be judged by the administrator to be immaterial.

The phase-one system inscribed a new paradigm of working that was expressed in terms difficult for faculty to understand and did not provide an alternative to legacy practices. In addition, grant agencies continue to request from PIs detailed financial categorisations within all grant

applications. From the faculty perspective they are still expected to report to external funding bodies, their work practices are disrupted with the new system, and their support staff are stressed. In addition, faculty are concerned that they will have to invest the time to learn a different way of managing their research projects quite soon. Faculty were expected to compare their financial plans, as represented in the budget numbers, with their actual expenses, thereby reinterpreting the financial health of their research project each time they reviewed the grant. By inscribing the notion of commitments out of the phase-one system, faculty would not easily be able to determine how much money remained unallocated. Instead the numbers reported through time-phased budgeting would tell PIs where they were financially in comparison to where they *thought they would be* based on their budget plan.

The uncertain and emergent nature of academic experimentation makes standard budget meetings with administrators a daunting and perhaps unrealistic project. Faculty are expected to access the future, estimate the working rhythms of their research projects over time, and translate these activities into financial language. Where previously faculty would inform their administrators of all known commitments as they arose, time-phased budgeting proposed a shift in the tempo and pace of these interactions. The business process informing TBP requires substantial budget planning at the inception of the grant and regular monitoring of actual expenses in comparison with budget plans.

The shift in administrative effort is compounded when we consider that faculty have multiple research projects and various grant awards. The rhythm and tempo of each grant project differs based on the Principal Investigator's innovative process, the amount of time they can devote to

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this endeavour, the ebb and flow of creativity and a myriad of uncertain and contingent events that emerge over time. A grant's financial health offers faculty a displaced, but timely, measurement of academic accomplishment that is controlled and administered by the PI's administrator whose salary is indirectly subsidized through the tax faculty pay on all their awards.

Although faculty are capable of financial management within the time-phased budgeting system, their incentive for accepting this model of work is limited. Academic departments and individual faculty members are charged an administrative fee to process, and manage every dollar of revenue they bring into the University whether those funds are classified as grants, gifts, or sponsored research. At .635 cents of indirect costs per dollar of grant revenue, the faculty argue that they pay for an administrative service which should be performed on their behalf by administrative staff. This is expressed by a Medical School PI whose time is allocated to several non-governmental grants:

> "I don't bring in money *for the hell of it – to support the administration*. **They support me!** [Ivy] gets **almost double** what I see and *I expect them to work for me* when I give them those dollars. *You don't want to work for me anymore?* **Fine**, gimmee my dollars back and *ill do it myself*, or ill hire my admin *to do it for me*. [long pause and breath] Don't tell me that you are going to fix my salary based on my *performance as a researcher, teacher, and clinician and then turn around and employ a huge amount of professional managers* whose performance is **laughable**. It's **Laurel and Hardy** trying to work for me! We [the faculty] want to know - who are these *experts* and just how did [Ivy] decide they were *experts in grant accounts?*"

A goal of the ERP system was to reclassify academic work to fit Central's standard accounting practice thereby eliminating 'leaks' between institutional reporting and local financial management which could damage the University's risk position. The core group expected that in

the ERP design process they would create a classification system that would meet both needs simultaneously.

Aggregating grant activity and reporting on it is a goal that intersects the needs of multiple University networks such as senior leadership, Central management, school chairmen, deans, and CFOs, departmental administrators, PIs, and project members. From an institutional perspective, grant activity must be 'rolled-up' and reported alongside all other University funds for two main reasons. First, improper management of grant dollars can potentially increase the University's risk position. In fiscal year 2001, grants and contracts revenue accounted for close to 30% of the University's total operating budget making it a significant area of financial activity. Second, the mismanagement of grant funds can become a liability for the institution who often cover overspending by PIs which in turn, limits their ability to fund worthy but low-profile research programs that have difficulty receiving external grant awards.

However as Bowker and Star (1999) note, classification work is an act of abstraction and in the process of creating a standardised reporting environment the temporal features inherent within grant activity becomes invisible. Aggregating grant activity to meet institutional needs meant stripping the multiple and interpenetrating timeframes of each grant award in order to abstract to the fiscal calendar. Ivy's fiscal year follows a steady twelve-month timetable with the year beginning in July and ending in June. Financial audits are organised to this timeframe. Similarly, the University-wide budget process follows a standard twelve month cycle beginning in April. Since the rhythm and tempo of grant funding differs by award, Ivy's fiscal and budgetary calendars provide a standard classification system through which to categorise grant activity.

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Creating a system that could meet both institutional and academic needs was a challenge that has

yet to be met.

Budget monitoring from a time-phased approach involves a process of interpretation where the

analyst considers the extent to which the present state of actual accounting activity matches the

time-phased rhythm of activity for which she initially budgeted. For example a faculty member

with a $500K grant budgeted to spend $140K by the end of the first quarter. She finds during her

review of first quarter financial statements that she spent $150K - $10K more than planned. Such

a realization should compel her to investigate the variance and evaluate how to adjust the rhythm

of her remaining time-phased budget and/or the pace of spending levels.

Somewhere between the past and the present, 10K of unexpected activity has been recorded in

Ivy's financial records. The process of comparing past plans with current financial reality (as

recorded by the official statement of record), and then adjusting future activities in light of this

knowledge, is the core concept underpinning a time-phased approach. This process of periodic

sense making is the essence of what a Project X accounting leader defined as fiduciary

responsibility in the following extended narrative:

> "I think we do [time-phased budgeting] at **all levels** of the University because I think we
> should *just be better fiduciaries*. I mean we have an audit risk as an institution and that's a
> motivation for doing it but in terms of making adjustments, moving dollars around, or even
> having good reasons why faculty need or *don't need* all the resources they budgeted should
> be part of a **normal management process.**

> "I mean I can't imagine going to a bank without a business plan and saying 'we expect to
> have $3 million dollars in sales next year, but I *won't know what it is, and I'm not going to
> look at it till the end of the year.*' I think of it more as a *business plan* where [the faculty]
> say 'this is what I thought I would do'. and if it turns out differently, they should start

thinking about **why** it's different from what they thought it was going to be last time they looked at it, and either adjust the plan, or adjust expectations, *or whatever it is*. I mean *the point is* that it isn't so much *the answer* 'how close am I to my budget projection' - it's keeping looking at the data and saying 'where am I compared to my plan, and *does this create a problem or not*'?"

In other words, the work of time-phased budgeting embodies the notion of emergence (Adam, 1995; Mead, 1980) because it formalizes the relationship between budget creation, financial review, and management where accounting activity becomes intertwined with the work of evaluating future scenarios based on current knowledge. This concept was first introduced in the methodology chapter during a discussion of narrative where sense making was described as the reordering of the past and the future based on the narrator's interpretation of the present.

What is most interesting when considering emergence within the context of the ERP is the way in which its design inscribes a new sense of temporality and shifts the effort of translation from one network to another. Time-phased budgeting activities were designed by the FPM team to be carried out directly in academic departments by administrative staff and faculty members. In addition, time-phased budgeting purposely excluded valued legacy accounting functionality because the VP and his core group of managers wanted to inscribe a process that would shift the intellectual discussion. Raising the horizon from reconciling activity for a moment in time, to reviewing the pace and rhythm of grant work in comparison to plans, was a shift requiring a reordering of what it meant to work as a Principal Investigator and departmental administrator.

TPB reclassified the nature of grants management and reporting and in the process *inscribed out* of its design the reservation for financial commitments. Where the DAS system allowed the PI to

inscribe meaning into his/her remaining balance, TPB re-categorised finances and only reported on the variance to budget. To be successful, this reclassification from commitments to budgets requires the academic enterprise to shift its epistemological base away from an historically embedded and valued process to a foreign practice imposed upon them by administrators. Ivy's research practice had in commitment accounting, a system that met the needs of faculty in a timely and effective manner. These academics found that time-phased budgeting took away their time - their most valuable resource. Successful academic researchers aspire to act as 'time lords' – autonomous actors who work to balance their multiple clinical, teaching and administrative responsibilities against their research agenda. Shifting the analytical and administrative effort of translation onto the PI, who must interact in a more formalized way with their administrative staff, meant that the value of academic freedom was undermined by mandating a standard process of accounting.

5.4. Conclusions: Mandating the nature and agency of work

The phase-one system was presented to faculty and their administrative staff and caused great distress because the University's world was rapidly re-ordered. Their stories tried to reconcile leadership promises of improved working conditions and the creation of an administrative centre of excellence with the design of time-phased budgeting and a paperless administrative environment. The future of Ivy looked radically different in that moment of emergence than what faculty had expected, and it was at that time that the ERP become connected, for better or worse, to the faculty network.

The emergence of this controversy is important to consider because while the project team had

long been informed by the ERP and they had come to share a hybrid temporality, the phase-one

remained foreign to many Ivy end users. The ERP can be interpreted as a local Project X resident,

a matter of fact for the core group where the team are hard pressed to recall a time when the ERP

was a contentious foreigner that needed to be hosted by Ivy. The project team introduced the

system with the best intentions but soon realized that the ERP administrative mandates related to

the nature and agency of work would not sit well with previously autonomous University actors.

This created a sense of torque for Distributed managers who were obligated to both work within

the ERP environment and meet the interests of faculty which remained unchanged from the legacy

environment. The professional working rhythms of the academic enterprise were designed out of

the ERP standard work processes meaning that the effort required to meet these faculty needs

became an issue of 'working around' the ERP design:

> "I see the Central University continuing to call us bad partners, I see them too far down the
> path to admit they should have zigged when they zagged, and I see them never fully
> developing what would be required to even make time-phased budgeting really work. I
> hope you understand that it's not time-phased budgeting itself that is at issue. It's the lack
> of understand and regard for the people bringing in the money and the people doing the
> work that is so frustrating." [follow-up email interview, 2002]

As noted earlier, audit technologies are powerful tools for allocating responsibility. This

quotation indicates that faculty were not averse to accepting a more standardised, professionally

managed approach to accounting. The conflict lies in mandating what that approach will be and

whose values will inform its design.

Central's 'all or nothing' strategy for shifting the boundaries of standard accounting practice

failed to enrol powerful allies. This heavy-handed strategy tried to make doubly invisible

previous accounting traditions that were greatly valued by the academic enterprise. First through the exclusion of legacy reporting functionality and second, through the core group's righteousness of purpose. The time-phased budgeting example illustrates the values and politics of University leadership as they conscripted the ERP to act as a delegate for their institutional interests resulting in the squashing of organisational silos.

The tempo, rhythm and pace of accounting work within Ivy's faculty-based departments were anchored to embedded, physical artifacts. As Miller (1998) notes, 'tensions and malleability of accounting always exist but it is through proposals for change, where tensions, arguments and disputes are rife, that these qualities become clear'. What is interesting about the negotiations constituting this organisational drama, is that neither Central or Distributed management were averse to the vision of an integrated grants management solution. In this way the boundaries of accounting practice seemed poised to shift. However, the method by which to shift that boundary, inscribe new temporal working rhythms, and enrol users into an electronic environment were fiercely debated. In a final illustrative example related to the printing of monthly financial statement, we transition to chapter six by indicating the ways in which the ERP failed to consider those activities at the margins of normative accounting practice which could potentially impact the organisation's risk position and the localisation of the phase-one system.

Medical School leadership were poised to reject the reclassification of accounting work and the shift in translation effort that accompanied the ERP. Their wealth and power within the University meant the ERP's electronic reporting environment was not effective as an obligatory passage point. Instead of moving through the ERP and adopting its inscribed temporality, the

Medical School chose to reclassify its working rhythms in an alternative way. This is exhibited in the seemingly mundane debate about statement generation and distribution:

> "In a year or two not printing statements is a *great* policy. That's the *exact* direction you want to move with this - electronic records. I mean why print out a paper just to file. But you've got this whole period where no one has ever seen the new system, they don't know what the new statements are going to look like, they don't know the new terminology and they've *always had paper*. So we in the Medical School have elected for six months to print out statement and to have along with the statements - to have orientation sessions. Whereas across town they're saying **don't** print them out, you can look on the screen. and I just - you know - you *really* have to kind of know where people are to move them where you want them to be. You need a transition there…I think we weren't as sensitive to what it meant on *daily basis* to the people who actually *worked* with the systems and what those changes meant to **them**." [interview with Medical School leader]

This Medical School leader is attending to the history and local needs of her managers and faculty members when she speaks about a slower pace of change.

Rather than trying to silence established work practices, she argues for the inclusion of paper-based statement production as part of Ivy's normative, ERP accounting practice. In this way she is a delegate for all Distributed managers interested in subverting the move to electronic reporting. The printing of financial statements operates as a category encouraging conversations about the limits of controllability within a University despite conflicting perspectives. However, if this issue is to be a point of translation joining together Central leadership and the academic enterprise to create a hybrid temporality, then compromise must be achieved. The University's Budget Director narrative indicates just how far from compromise Ivy is:

> "Then we ought to *fire 'em* and get new - then we ought to **fire 'em** - and get new users! I mean - because this is - this is - *first of all*, their users are the highest paid people on campus because we *supposedly* hire better people in the Medical School, for more complex business. *I mean that's the theory* and therefore - if that's what we're going to say - then they're not being - then they're not being *managed properly*. I mean - I **really** believe that.

I mean - I just think it's a - you know - it's *retreat*...All you're doing is delaying what's going to happen. You know, I taught Karate for many years - *you know what*? If you're afraid to fight, **you'll never fight!** Got to decide to get up there *and get hit.* and it may not work perfectly and the argument that we need to [print] - you know - you're spending *millions and millions of dollars* to go **forward**, not to *duplicate what we had.* So I mean - I just - you know - is this going to *blow up and not work*? Gee, I don't - *I really don't believe that.* Besides it doesn't matter. You see if the data is wrong, something isn't working, it doesn't matter whether somebody's doing it on a *screen* or a *piece of paper.* All that a piece of paper is, is a print-out of what's on the screen. So the risk, I tried to explain this to them, *the risk isn't there*...If you have it on a screen - you know – somebody - a user can always press print. But the idea of having a *gigantic*, centralised printing service and delivery of these things is **the old** - you know - *we don't do that here any more.* I mean - *we just don't!*" [interview with financial manager]

The rhetoric of this narrative is such that the interviewee excludes the possibility of compromise in favour of squashing the old ways of working. In his mind, the boundary of accounting practice within Ivy has already shifted.

Printing statements are excluded from his understanding of normative accounting practice as are all those recalcitrant enough to work at the margins by advocating paper-based statement production. This Central leader is one of the most vocal delegates for an epistemological shift in Ivy's accounting activities. In his mind, there should be no torque between the ERP work practices and the personal and professional working rhythms of the academic enterprise. Furthermore, he doesn't entertain the idea that this change will result in a shift in the effort of translation. Faculty will accept this new way of working and will not require Distributed management to work around the ERP. If this is not they case, the answer is to remove these actors from Ivy's network rather than modify the integrity of the system's business processes. Although his story is meant to convince us that the temporal working rhythms of Ivy have shifted to create a University that does not print statements, Ivy surely does continue to print statements. His

defensive tone speaks to the power of Distributed management to slow the pace and nature of change from the margins.

Excluding marginal accounting practices like shadow systems, process workarounds, calculative short-cuts, and reconciliation practices from the design of a financial infrastructure like ERP has the power to make those activities appear invisible to auditors through their exclusion from official accountability mechanisms. However, this study finds that invisibility failed to actually immobilise these legacy work practices. On the contrary, trust relations between the ERP delegates and those excluded from the time-phased accounting narrative were damaged, creating a faculty-based network whose recalcitrance against the official financial infrastructure dangerously stalled the naturalisation trajectory of the ERP system.

Within 3-months of this interview, the recalcitrance of the Medical School and other faculty administrations was felt by Ivy's most senior leadership. The paperless office initiative may have 'brought into account' a clear Central management agenda, but in so doing it dramatically shifted Ivy's grand narrative to embrace a corporate ideology moving in from the margins of University work life. The time-honoured values of academic freedom and scientific separateness were silenced through the phase-one design. In the next chapter we consider the negotiations that followed the squashing of faculty silos of activity and analyse how Ivy managed to propel the project forward despite the chasm between Central leadership and the academic community.

6. Boundary objects create a matter of fact

> **The power of the supposedly squashed**
>
> "Starting over was not an option *apparently* so we still do not have either system fully in place...Department [administrators] clearly understand that the faculty are their customers, and try to provide them the services they most need and value. Why has Central management become invested in changing - for an extremely large revenue stream - from a tried-and-true system proven to be both efficient and well-accepted by the faculty, to one that has not been tested with these types of accounts, and is less efficient and useful for the faculty? My guess is that there is too much water under the bridge to go back. Which is why we are building our own. This is the most fascinating part of the whole story! I wish I knew how it turns out, or even how to turn it around!"
> [interview with Medical School manager]

This quotation indicates the recalcitrance of Ivy's faculty network to challenge the phase-one ERP as an organisational matter of fact. The ERP development alliance between Ivy and Oracle helped create the vendor's "higher education industry solution" which is being marketed on their international web site as an appropriate package for universities across cultural and geographical contexts. However, what Oracle's narrative doesn't tell is that Ivy is still radically customizing its business processes, organisational structure and ERP technology in an effort to create a local information infrastructure inscribed with a hybrid temporality that re-orders, but does not forget the past.

As we illustrate in part I of this dissertation, narrative accounts of change provide insight into the controversies which divide us as well as the ways in which they are repaired. We shall see the implications of faculty recalcitrance for the phase-one design, Ivy's grand narrative, and the potential of the Oracle package to be sold as a standard for higher education. To accomplish this we ask and answer the following research question: How is such controversy accommodated

when the interpretation of the ERP as a fact is challenged, and what are the organisational and professional implications of this process? To this end the chapter is organised into three sections. The first concentrates on complementary theoretical concepts that will enable the analysis of sections two and three. Our analysis corresponds to the post-installation environment when actors reflect upon and respond to the phase-one ERP first through recalcitrance and then through design modifications. The final section presents the conclusions of the chapter and summarises the outcome of introducing the phase-one ERP into the wider University community.

Of primary importance to this chapter are the concepts of methods standardisation and boundary objects defined by Star and Griesemer, (1989) as two main strategies for sharing and managing information within a heterogeneous network of actors. In keeping with our actor-network perspective, this chapter focuses on the application of these two strategies within Ivy's ERP project initiative. We introduce the notion of scaleable boundary objects as an analytical tool for interpreting the relationship between these networks where standards and boundary object can shift when the analytical lens is reframed.

As we see from the previous two chapters, changes to back office systems can impact who and what is valued within an organisation. Ivy's phase-one ERP attempted to standardise the administrative infrastructure in order to meet institutional needs. This strategy was at times problematic for two reasons: it squashed accounting silos, shifting the effort of translation from Central units to the academic enterprise, and imposed a standard classification system through which this work effort must be carried out. This phase-one system was designed as a centre of

calculation enabling Central administration to manage at a distance the distributed work of the academic network.

However, this resulted in faculty and staff experiencing end-user *torque* (Bowker & Star, 1999) because the system provided only a single point of translation through which Ivy's heterogeneous community must move. As we saw in the last chapter the personal and professional working rhythms of faculty and their Administrators were in conflict with the temporal zone underpinning the grant accounting system. As such, the academic enterprise pulled against the ERP and inhibited the naturalisation of the ERP by stalling the localisation of the Project Accounting application.

This chapter considers what happened after Ivy's silos were squashed. The coexistence of academic and administrative leadership within Ivy's organisational hierarchy resulted in the phase-one ERP system creating conflict rather than cooperation amongst the end-user community. Faculty, whose silos of accounting were squashed in the phase-one design, no longer acted as-if they trusted Central to control and account for their academic activities. Rather, they expressed their recalcitrance by demanding that the system be changed to meet their needs. These negotiations resulted in compromises which were then inscribed into administrative artifacts.

Following the contentious 'naturalisation trajectory' (Bowker & Star, 1999) of Ivy's ERP system as the University tries to create an integrated administrative infrastructure helps us understand the ways in which order is achieved despite conflict and complexity. As Bowker and Star (1999) note

"it is not predetermined whether an object will ever become naturalized, or how long it will remain so" (p. 299). Rather, categories and objects become naturalised, or taken-for-granted, through their membership within an actor-network or community-of-practice (Lave & Wenger, 1991), where shared understanding forms the basis for an "ontological network" (Callon, 1998b). However, in order for Ivy's ERP system to become a naturalised part of its community, amenable working arrangements *across* actor-networks must exist. The creation of sustainable *boundary objects* (Star & Griesemer, 1989) provide a means of translation across social worlds creating integrationwithout requiring the standardisation of knowledge, temporal working rhythms, and preferred work practices. We expose the revision of the phase-one standard as an unconscious strategy for creating an integrated environment without forcing homogeneity into an autonomous academic enterprise.

The VP for Finance and Administration was the visionary of this IT-enabled professionalisation effort. He drew on his business-oriented background to inspire Ivy toward an ERP solution, resulting in the Project X initiative. His goals were two-fold: to create a global standard for the administration of higher education institutions that would be sold by Oracle Corporation, and to provide Ivy with a locally accepted, enterprise-wide system. The first goal was realised when the Ivy-Oracle ERP package became available as the 'higher education industry solution' on Oracle's international wed site. However, for the VP's vision to be realised within Ivy, the phase-one system had to be radically customised, meaning that the global standard for higher education failed to translate the interests of Ivy's local community.

For this reason, the ERP initiative at Ivy University provides a novel research setting for understanding 'ERP-in-the-world': 'technology in use' as Ivy actors move forward to create a viable solution that will justify their investment. In addition, Project X represents an important stage in the professionalisation of higher education administrations, providing insight into the tensions between academics and managers that are taking place within many Western university contexts. Unlike many well documented cases of business institutions adopting ERP technology as a 'best business' model and as a tool to legitimate certain networks within the organisation (c.f., Koch, 2001; Davenport, 2000; Soh et al, 2000), Ivy administrators are still struggling to gain credibility. Ivy's academic leaders are viewing the ERP initiative as a further attempt by administration to solidify their role within the organisation and shift the balance of power. For administrators to gain further professional recognition from faculty members, the ERP system will need to meet the goals of institutional fiduciary control as well as the seamless support of Ivy's academic enterprise. As we have seen in the previous two chapters, multiple actor-networks have worked toward a common mission of making the ERP work for Ivy, however their vision of what that has meant has been radically different.

We argue that the phase-one ERP failed to enrol the academic enterprise who instead created (and are still creating) boundary objects (Star, 1989; Star & Griesemer, 1989) in an effort to negotiate through Ivy's political economy. These objects provide an alternative means of translation through which the academic enterprise could interact with the enterprise system and succeed in providing a bridge over which the stalled ERP naturalisation began moving again. We consider the political economy of post-installation Ivy as the core group adopt a strategy of selective customisation in an effort to obtain the promises of an integrated and standardised administrative

infrastructure. We highlight negotiations between conflicting networks as they work to gain important concessions in the post-implementation development agenda.

The chapter then examines how the University managed this resistance and worked (and is still working) to create a locally accepted information system. We argue that contrary to current ERP findings, the University chose to customise their ERP system in order to meet the needs of its academic, scientific enterprise where an integrated infrastructure was achieved not through an organisation-wide mandate for standardisation but a more locally-sensitive approach balancing standards with boundary objects. This hybrid infrastructure creatively updates the University's loosely-coupled organisational form for the 21st century. In so doing, it begins moving Ivy forward whilst not forgetting its past.

Post-implementation design activity is counter-intuitive to our current understanding of ERP functionality. Rather, ERP technology is sold 'off-the-shelf' and claims to eliminate the need for in-house designs efforts. ERP suites inscribe standard, best business practices that can be configured for particular local contexts and as such local design efforts are considered redundant and inferior to the 'solution' proposed by the ERP. However, recent higher education practitioner literature reports that universities tend to substantially customise ERP systems (Swartz & Orgill, 2001) and should instead move toward a flexible boundary-crossing operating environment (Katz, Goldstein, Dobbin, 2001) where cooperation not consensus should be the driving force (McCredi & Updegrove, 1999). Yet there is no academic research to support or discount these claims.

Instead, research on ERP implementations within business organisations report that the primary goal of maximising profit drives leadership to adopt the 'best business practices' inscribed within the standard technology package. We argue that current ERP process-oriented research tends to polarize ERP implementations by emphasising and categorising their outcome. For example researchers report that organisations either: fit their operations into the ERP template, invest heavily in technology without redefining their business processes, or needlessly overhaul processes that may have been efficient and effective for the local environment (Markus, Petrie & Axline, 2000; Soh et al, 2000). During the implementation phase of the project, Ivy could be classified as adopting the final strategy. We recall Power's (1994) thesis that within an audit society, organisations often sacrifice the local 'good' for institutional process and practice that will ensure control and accountability through third party audit evaluations. In this chapter we see that Ivy's strategy shifts over time from being a project of Central control to a balancing act between administrative leaders and the academic enterprise.

6.1. Theory

This section introduces theoretical concepts of particular relevance to the analytical focus of the chapter. Chapter five analysed the ways in which local changes are impacted by societal trends that can redefine who and what are valued within an organisation. Drawing empirical examples from Ivy's accounting margins we understood the power of ERP technology to shift normative University practice. This chapter introduces complementary ideas that 'shift in' from our overall actor-network approach in order to highlight the way in which order is achieved in spite of the conflict relating to the ERP's phase-one design. We draw again from the work of Susan Leigh Star and colleagues (Star, 2002; Bowker & Star, 1999; Star, 1989, Star & Griesemer, 1989) whose

notions of standardization, and boundary objects help theorise the post-installation activities of Ivy University.

The chapter begins drawing together our thesis of negotiating with ERP to create an institutional matter of fact. We consider Ivy's emergent strategy for propelling its modernisation effort forward in spite of conflict between Central administration and faculty researchers related to how the system should be designed. A great deal of rhetoric surrounds ERP technology as providing integrated systems that standardise the workplace. In a recent publication, Alvarez (2002) argues that ERP helps perpetuate a 'myth of integration' within organisations seeking to standardise work practices through increased control. She provides the following explanation of the term integration which is useful for our study:

> "For the most part, integration is used in organisational theory to define the level of collaboration between specialized units or individuals. Firms develop functional specialists that tend to have patterns of behaviour and thought that are in tune with the specifics of their job and training. The different specialists may have conflicting thoughts and patterns about getting the job done. Integration, then, involves *achieving the coordination and collaboration of these specialists* through mechanisms such as *communication* and *conflict resolution*" [emphasis added, Alvarez, 2002, p.27].

We draw attention in this quote to integration being defined as an achievement of coordination and collaboration across special functions within an organisation. The author argues that this is accomplished through communication and conflict resolution. If we take the above definition of integration as a starting point, then negotiation is the process by which to achieve coordination and communication. We argue that this process of negotiation is often suppressed during ERP projects in favour of standardising work practices as a way to achieve integration. Modelling process flows and system configurations based on what is deemed by the vendor to be 'best

business practices' for that industry creates a standardised local work environment. However, we argue that this approach to integration is particularly problematic within the university context because the organisational form has to facilitate multiple and often conflicting administrative agendas. Therefore, the strategy for achieving integration within a university is at odds with the approach inscribed into the ERP (Allen & Kern, 2001).

Star and colleagues (Star & Ruhleder, 1996; Star, 1989; Star & Griesemer, 1989) provide an alternative conceptual model for achieving coherence within heterogeneous communities such as universities. They argue that rather than forcing actors through a single obligatory passage point which requires intellectual consensus, a strategy of tempering standardisation with flexibility allows for multiple points of translation amongst a diverse community. Star and Griesemer (1989) talk about this process in terms 'standardising the methods of conducting work in order to develop a common ground through clear and precise tasks'. They emphasise that higher-order questions about work should not be standardised because these are more theoretically based ideas of what work is, and why it is done. This is explained in the following quotation:

> "Standardizing methods is different from standardizing theory. By emphasizing *how*, and not *what* or *why*, methods standardization both makes information compatible and allows for a longer 'reach' across divergent worlds" [emphasis added, p. 407]

When one begins to mandate epistemological positions, integration can be achieved only through homogeneity, or forced acquiescence. This is counter to the university's loosely coupled organisational form underpinned by semi-autonomous reporting relationships.

The creation of boundary objects facilitate interdisciplinary cooperation whilst allowing individual communities of practice to maintain a high degree of autonomy (Star, 1989; Star & Griesemer 1989). They seek to reduce torque experienced by actors whose preferred working rhythms are excluded from the system. These objects straddle multiple communities of practice 'and satisfy the informational requirements of each of them' (Bowker & Star, 1999) thereby facilitating operational integration whilst allowing for flexible work activities and the preservation of differences.

Boundary objects are created when two naturalised classification systems do not communicate across communities of practice:

> "Boundary objects are those objects that both inhabit several communities of practice and satisfy the informational requirements of each of them. Boundary objects are thus both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use and become strongly structured in individual-site use. These objects may be abstract or concrete...Such objects have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation. The creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting communities." [Bowker & Star, 1999]

In this way integration is achieved without having to fully standardise work practices across heterogeneous networks. More specifically, Star's (1989) study of boundary objects used within an academic community's artificial intelligence system, found that scientists using this system were able to retain their theoretical viewpoints and:

1. cooperate without having good models of each other's work;
2. successfully work together while employing different units of analysis, methods of aggregating data, and different abstractions of data;
3. cooperate while having different goals, time horizons, and audiences to satisfy. [adopted from Star, 1989 p. 46]

Through the creation of boundary objects these heterogeneous scientific networks were able to coordinate their activities while maintaining their independence.

The notion that 'off the shelf' software packages can appropriately meet the needs of all organisations within particular industry segments while being flexible enough to allow for local difference has been one of the selling points of buying packaged software rather than building it. However, as we saw from the previous chapter, the phase-one system failed to accommodate these three aspects of cooperation and communication in spite of ERP technology being touted by vendors, and management consultants as possessing qualities of a highly configurable boundary object.

Theoretically, an ERP suite could be classified as an 'ideal type' (Star & Griesemer, 1989) boundary object because its standard technological design abstracts away from local context enough to create a general template for administrative practice. The administrative modules comprising the ERP technology have a hard outer shell allowing it to be understood by all organisations, but is plastic enough on the inside to allow each organisation to configure the suite to create a robust, local solution. The ideal type is one of four original categorisations made by Star and Griesemer (1989). We briefly introduce the remaining types here in an attempt to help the reader consider the various forms that such objects take. However, in this chapter we refer to boundary objects in a more generic sense in order to communicate their value for facilitating coordination and communication amongst disparate communities. This is in keeping with the

most recent writing on the subject where authors chose not to focus on specific *types* of boundary objects but rather on the objects' relationship to standards (Star, 2002; Bowker & Star, 1999).

'Repositories' gather and store data in a standard format that can then be extrapolated for specific purposes. Oracle's warehouse environment is an example of a data repository boundary object that allows for the reconfiguration of financial data through its standard report generator. Users are allowed to select appropriate fields from the database from which they can generate a meaningful management report. While the data remain the same within the database, the output can be customised to meet the local needs of multiple networks. 'Coincident boundaries' describe common objects that share boundaries but not internal contents. These objects become prevalent when different approaches to aggregating data exist between cooperating actors. Ivy's project-centric chart of accounts can be interpreted as a coincident boundary object because it is bound by standard accounting classifications such as asset, liability, expense, and revenue. This boundary is shared across organisational units. However, the internal content of the chart of accounts differs when it becomes populated by actual financial activity.

'Standardized forms' help communicate across time and space without changing the nature of the information being transported. These objects allow for flexibility in local work practices but require standardisation in the collection of data. ERP technology can be interpreted as consisting of standardised forms through its input-screens, design interface, user-manuals, and process-orientation. These objects standardise 'how' the work of local contexts is translated into the common information system.

Star and colleagues (ibid) have focused on how infrastructural devices *become* boundary objects that facilitate heterogeneous cooperation. While participants within an interdisciplinary network maintain different visions and motivations for collaborating, certain artifacts and processes over time emerge as the glue that enables cooperation (Star, 2002). This study focuses on the unconscious use of boundary objects as a strategy for tempering an overly standardised design strategy. As Star (2002) notes it is the *selective* creation of boundary objects and their layering with standards that creates an information infrastructure such as an administrative, enterprise-wide system:

> "Infrastructure is composed of a complex matrix of boundary objects and standards, imbricated in the way a stone wall is put together. Each stands on top of the other, supporting, but not in a smooth or seamless fashion. Some stone walls fall down; some survive for thousands of years. Some are added to and maintained, some neglected" [p. 19]

The notion of boundary objects and standards imbricated as infrastructure is particularly relevant to this thesis both in terms of creating an accepted system, and considering the potential for the imbrication to shift over time. Star continues:

> "The metaphor [provides an] evocative picture of uncemented things producing a larger whole. Imbrication also implies that each part may shift in character over time as the whole is 'edited or rearranged. Thus, a keystone at one time – a rigid standard, say – may become a minor interchangeable end stone at another time."

As we will see in this chapter, Ivy begins creating a hybrid administrative infrastructure during the post-installation phase of Project X by tempering the standardisation efforts of the core group and designing flexibility into the margins of the ERP. What results is part ERP, part shadow system, part process flow, part functional silo. The challenge for Ivy will be to negotiate with this hybrid

administrative system so that ERP technology remains a keystone, and is not reclassified as a boundary object positioned at the margins of normative practice.

The remainder of the chapter employs the actor-network concept of 'summing up' that was introduced in chapter four to analyse the notion of scaleable boundary objects. We consider the extent to which the ERP, and accounting practice act as boundary objects for traditional university administrations. The final section of the chapter considers the material arrangements of the Ivy system. We analyse the imbrication of boundary objects and standards and discuss the implications of this configuration for other traditional university administrations.

6.2. Scaleable Boundary objects

This section is organised into three subsections. First, we consider the extent to which the phase-one ERP can be considered a boundary object within the context of the study. The phase-one system provides a means of translation connecting Ivy to the meta-narratives of audit, administrative professionalism, and higher education as a 'business industry' thereby linking the University to a flat world. However, we analyse the extent to which the system is overly standardised making it difficult to link with the faculty network thereby limiting its interpretation as a boundary object.

When we speak of boundary objects as a strategy for facilitating autonomy and communication across diverse communities, we hold this strategy in relation to an overarching standardisation initiative. As such, our second point focuses on accounting as a boundary object. We interpret

accounting systems as constituted by standard classifications which are not traditionally designed to accommodate heterogeneity. Ivy's inherent multiplicity and decentralised use of grant accounting data and management reports meant that the complexity of the ERP system's design outstretched the knowledge-base of many University users, and failed to inscribe valuable faculty classifications. In the third subsection we consider the unconscious customisation initiative that that resulted in the inscription of flexibility into the administrative infrastructure in order to bridge the gap between Central accounting experts and Distributed end users. This had the effect of re-igniting the stalled naturalisation trajectory of the phase-one ERP by beginning to bring forward valued stories of Ivy's historical administrative practices.

6.2.1. Standardising theory: The ERP struggles as a boundary object

We focus on the naturalisation of the ERP system across disparate Ivy networks during the post-installation phase of the initiative. As such we interpret standards and boundary objects as scaleable entities. In this section we analyse the phase-one ERP as a single unit of analysis; a hybrid actor attempting to position itself as an ideal type boundary object for Ivy. The ERP would link Ivy to a flat world by providing a sense of the University in relation to global education and business trends. Whilst the phase-one ERP can theoretically be considered an ideal type, we see that the narrative of 'integration through standardization' falls down during Ivy's naturalisation of the ERP. We argue that the standard ERP package created during Project X and currently being sold by Oracle Corporation, must be localised by Ivy through much the same process that will be encountered within other Universities. Therefore, in an attempt to understand the extent to which the ERP might act as a boundary object for an emerging higher education industry, we analyse

Ivy's experiences trying to link a forward focused business orientation with faculty values through the phase-one design.

As we noted in the previous chapter, classification work 'makes society durable' by inscribing the values and priorities of an organisation into an information system. The design of the Ivy-Oracle global standard prioritised institutional accountability and control in order to provide a high degree of reliance on the quality of distributed administrative work activities. The ERP shifted the effort of translation further out to departments, but in so doing also prescribed the methods by which work must be done. In this way Ivy hoped to create a system that would close any gaps in business process and work flow thereby ensuring an institutionally sound infrastructure.

However, in creating this institutionally rigorous system, the ERP began to mandate the nature and extent of administrative practice inscribing *out of* the system autonomy and locally negotiated outcomes. The result was a silencing of Ivy's grand narrative which had informed University actors for many years. We argue that traditions and values were silenced because the phase-one system inscribes working methods but also mandates higher-order administrative decisions related to what administration *is*, and why it should be conducted in a particular manner. This is what Star and Griesemer (1989) have defined as standardising both method and theory arguing that epistemological concerns should be mediated through boundary objects rather than trying to achieve a consensus of world views.

The strategy accompanying the installation of the phase-one system was to silence all heterogeneity and create a master-narrative of integration through a homogeneous operating environment. We argue that Ivy's end-user community was well primed after years of ERP rhetoric, to translate their interests from silos of activity to an integrated IT environment, giving up a degree of autonomy as a result. This is supported by our earlier discussion of the VP's vision which acted as an immutable mobile (Callon, 1991) transporting his message across time and space to inspire the entire Ivy community with promises of an administrative centre of excellence. Despite end user loyalty to both the VP and the institution during Project X, we saw in chapter five that the ERP failed to enrol large portions of the Ivy community. We interpret the recalcitrance of the academic community as resulting from an overly standardised Ivy-Oracle 'solution' where the core group mandated a conceptual shift to a time-phased approach.

Our analysis of squashing accounting silos pointed out that political technologies such as time-phased budgeting can be used within organisations to allocate responsibility to particular user groups in order to increase confidence in the nature and content of their work (Brunsson, 1990). In this way the primary purpose of the technology is to audit and monitor, and only secondarily to regulate the process by which the audited practice is conducted (Power, 1994). This argument is in keeping with the Medical School's perspective who speak on behalf of Principal Investigators when they argue that a causal link did not exist between an integrated financial management approach and time-phased budgeting:

> "We are not aware of any other major research university monitoring sponsored agreements and grants with a timed-phased budgeting approach, or of any institutional advantage that might be gained by making such a profound change. We agree that grants are a huge source of operating revenue that needs to be managed well. and monitoring and managing any huge revenue stream in an integrated system is a good thing. We agreed here, this was our

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common ground - but then [the project team] went and developed a system that is not fully incorporated, supported, and built with the end users in mind, and so it falls short of this 'integrated' goal.

Why did the integrated technology have to be TPB when we had one before that worked for the faculty? I mean the legacy commitment accounting system could have been fully integrated as an ERP - it was technically supported as one, but was only ever managed and used at the departmental level. Why not design that as the integrated, standardized technology??? It worked for faculty for years...I hope you understand that it's not time-phased budgeting itself that is at issue. It's the lack of understanding and regard for the people bringing in the money and the people doing the work that is so frustrating." [follow-up email interview, 2002]

While administrators and PIs indicated in interviews that they were open to shifting the level and horizon of grants management, they resented an institutional mandate of which they were not a part. Commitment accounting was a classification system that worked for Ivy's academic community precisely because it did not attempt to mandate the analytical process of budgeting and management. Analysis occurred in the minds (not the computers) of faculty and their administrators who then interpreted a single remaining balance for their specific local needs.

The Medical School's perspective is provocative because it implies that for the phase-one ERP to become an institutional matter of fact, its design would have needed to carry forward valued commitment accounting functionality. This indicates that accomplishing translation across heterogeneous groups (such as faculty and administrators) requires the standardisation of methods – 'how things are done' as well as the purposeful design of flexibility allowing networks to negotiate 'what and why' they categorise.

Standard methods allow for cooperation amongst these networks without requiring that they share a common theory or agenda of work. This distinction is nicely illustrated through the following narrative belonging to an Ivy project leader whose story vocalises her contemplation regarding the core group's choice to standardise conceptual ideas like time-phased budgeting during Project X:

"You know that in the olden days they used to say - do you remember? [pause] no you are *much* too young...So - Barry Goldwater ran for president and he was running against Lyndon Johnson. Lyndon Johnson of course was sponsoring all the civil rights legislation after JFK was assassinated. Barry Goldwater was running this campaign against Lyndon Johnson and he said *'you can't legislate love'* and *he was right*, you *can't* legislate love. But, he didn't take it far enough. I think what happens is - I think you change the administrative architecture [and] slowly the culture changes to adapt to that architecture.

So I don't think the *overall mission or direction* of [Ivy's] going to change, and that's really where all the power and movement is, or *lack* of movement [laugh], that's where it *really all is*...out there in the research and academic departments. But I think that the *culture of administration* is going to change in response to this [project]. *So, maybe you can legislate love. Okay?* **Maybe you *can!*** Maybe you can say - 'we're going to make this change in architecture and the cultures of doing accounts payable, and payroll, and purchasing are all going to have to change'".

This manager's narrative draws a relationship between Ivy's ERP project and US domestic reform sought by President Johnson in 1965 in order to create what he called a 'Great Society'. He hoped to standardise the country's social and economic values as ones of equality amongst all its people. Johnson first created a legal framework in which all had equal access and then he mandated differential treatment through affirmative action in an effort to create equality. Johnson's declaration of an "unconditional war on poverty" led to further governmental legislation that tried to redistribute social amenities considered necessary for a prosperous nation (Grolier, 2000).

In chapter five we saw the controversy that arises from squashing organisational silos and legislating 'what is valid knowledge' for the University. Whilst the project leader tells the story

of Ivy *as* Lyndon Johnson, she hopes that one can legislate for *some* people and related to *some* issues. We argue that her story indicates the challenge of trying to achieve integration through consensus where the unifying story of an organisation like Ivy, or of technology like ERP, tries to homogenise perspectives and create a single epistemological 'master' narrative that dominates all others. However, we have seen in the literature reviewed in chapter two that this all-or-nothing approach to ERP implementations has proved challenging for organisational actors.

Although ERP technology provides a vision of integration through the standardisation of administrative practices, the ways in which this vision are interpreted within organisations differs. We interpret this struggle to translate platitudes into *stories that work* to inform action as the attempt to create a 'visionary boundary object'. This phrase was coined by accounting scholars Briers and Chua (2001) who argue that conceptual objects can be used to 'successfully change organisational accounting systems through their mediation of diverse interests'. For example, the notion of *integration* as an organising concept for contemporary institutions gained a high degree of legitimacy during the last decade of the 20th century. We could therefore interpret the general concept as commonly applicable across organisations and becoming more strongly defined as the practices underpinning the notion of integration is interpreted within individual sites. As we have seen in Ivy's attempt to legislate love through the ERP's interpretation of integration through standardisation, faculty and their staff have very different meanings about how integration should be achieved within the administration.

As Star (2002) notes, academic communities are not predicated on the notion of consensus, but rather are better defined as 'knowledge disciplines whose constituents don't have to agree to

coordinate, just commit to engage in disagreements' (p. 20). The point is that debates will always exist about what constitutes valid knowledge within the field and how that information should be inscribed into artifacts and work processes such as databases, management tools, and accounting practices. It is in these debates that the foundations of the academic community are formed (Star, 2002).

Johnson's political agenda parallels the core group's attempts to create a standard administrative system for Ivy that in turn redefined the characteristics of the University's grand narrative that would reflexively shape the end-user community. This included an attempt to shift the epistemological position of independently minded academic researchers and their staff away from preferred working rhythms. Senator Goldwater's argument that love cannot be legislated speaks to the contentious nature of trying to enrol people into a political vision – a grand narrative – of how the world should be organised. The congressional record accounts for his opinion in the following quotation:

> "I'm frankly sick and tired of the political preachers across this country telling me as a citizen that if I want to be a moral person, I must believe in 'A,' 'B,' 'C,' and 'D.' Just who do they think they are? and from where do they presume to claim the right to dictate their moral beliefs to me?" [Congressional Record, 1981]

Goldwater's comments could very well have been spoken by Ivy faculty who resent the encroachment of business concepts into their research activities. We illustrate the similarity between these perspectives through the narrative of a young scientist at the Medical School responding to his encounters with the phase-one ERP:

> "I mean [laugh] – we [the faculty] paid for a *good chunk* of the Oracle system out of our *indirect-cost rates* - now the reward is we get [Central leadership] telling us how to

manage our research with [spoken slowly] *time-phased budgeting*. **It doesn't work! Our** administrators *cry* over this stuff. So I want to know [pause] *who decided* that [Central leadership] knew better *than me and my department* the best way to *run my lab* and *manage my money?*"

As we discussed in chapter five, the classification work involved in designing the phase-one system validated the core-group's 'moral order' and silenced the faculty network and Ivy's administrative traditions. As Bowker and Star (1999) note this process of system design "is not inherently a bad thing – indeed it is inescapable. But it is an ethical choice, and as such it is dangerous – not bad, but dangerous." (pp. 5-6).

Just as President Johnson sought to create a political and social infrastructure that would uniformly and universally legislate for the needs of American citizens, the core group expected to define, create, and operationalise an administrative environment that would meet all Ivy's needs. In this way the ERP would become a 'lingua franca' (Star & Griesemer, 1989) providing a basis of communication for administering, managing and governing the University. While Johnson had visions of a great society, the cultural changes that he hoped to make were far less successful than the infrastructural shifts. These challenges were part of complex negotiations involving both domestic and foreign policies during Johnson's presidency. While not the focus of this thesis, his challenges are indicative of the resources required to mobilise a shift in societal values and highlight that such translation requires far more than putting programs, processes, and structures in place.

The same has been the case at Ivy. In the previous chapter we saw that legislating love *is* problematic, in part because changes to tradition are always complex, but also because the core group have attempted to craft a grand narrative that embraces the future of the University as a complex business, without remembering its collegium culture. Legislating methods through system design activities means prescribing the boundaries of standard practice. For example, users will work within an integrated environment, follow these process flows, and account for activities in compliance with a fiscal year calendar and particular transactions cycles. Whereas mandating *what* should be administered (time-phased budgeting, project-centric accounting) and *why* (because it is more appropriate from an institutional business perspective) is a dangerous business when leadership is not democratically elected, and fails to survey its population about issues of governance and management.

We recall from chapter two's discussion of the contemporary university, that despite attempts to professionalise university work practices through what is called a managerialist approach, "the 'traditional university' remains an important self-image or paradigm for most university institutions" and this vision is held in the "heads of people who constitute it" (Cornford, 2000). We extend this comment and say that the values underpinning the traditional university are expressed and enacted in the stories of the people who constitute the university. Together these stories sum up to an organisational grand narrative which inspires agency and imbues the heterogeneous collective with a sense of stability in uncertain times. We argue that the core group failed to recognise the importance of incorporating aspects of this narrative into their story of Ivy as a business, and began to construct a future cut off from its past.

The all-or-nothing approach of the Budget Director and his Financial Planning and Management (FPM) team steamrolled Ivy's long held values and traditions. Ironically, in their 'love' for, and commitment to Ivy, the core group fundamentally changed the grand narrative that constituted the University. As Latour (1999a, b) reminds us, negotiating change is a process situated in time, and shifting over time. As such, the process should involve making room to create 'the new', but also selectively prioritising values from the past that will help foster continuity across time and space. In this way the ERP itself could become a boundary object straddling Ivy's past and future and enabling cooperation between actors with different goals, time horizons, and audiences to satisfy (Star, 1989). The result is an environment that fuses the familiar with the novel – it is an ensemble of heterogeneous temporalities that can find sympathy for one another through the grand story of 'making it work' in spite of different theoretical perspectives.

The story of 'legislating love' was told to the researcher during the first year of system use when the academic network had drawn battle lines between themselves and Central administration. Having actively participated in the design of the phase-one system, this manager is faced with the realisation that Ivy's faculty and support staff are refusing to have their 'love' standardised by the core group, instead holding steadfast to Ivy's traditions. After years of project work and human resource cost, this manager is trying to make sense of the extent to which the administrative culture of Ivy can be reclassified. In hindsight she tells both the researcher and herself that she doesn't think the academic and research cultures of Ivy will shift after all. We interpret this as a poignant moment of accommodation on behalf of the project team.

This narrator is a powerful delegate for Central leadership and her story illuminates a moment of emergence where the past and future are reordered. She ponders the future of the ERP, a system that does not speak to faculty who have been, and will continue to be, the protagonists of Ivy's grand narrative. The story marks an important moment in time for Ivy because it indicates a growing trend amongst the stories of Central administrators. Grandiose rhetorical stories begin to be replaced by narratives of repair.

The emergence of these stories is in part attributed to the opening up of Ivy's project-based network. During the first year of system use three powerful spokespersons for the phase-one ERP and its time-phased approach all chose to leave the University. The VP, Budget Director, and Financial Controller announced their plans to pursue new career opportunities leaving a great deal of the visionary work to the remaining members of the VP's core group. These actors were suddenly delegatesfor a vision that was no longer as durable, embodied, as it had been in the past despite the physical presence of the phase-one system. Instead, the core group began to prioritise accommodation and compromise over 'being right'. This is expressed in the comment from a senior accountant and core group member:

> "I used to feel anxious as if I couldn't make any mistakes, or disagree with the status quo. You know [the project leader] *was strongly taken aside* by [the VP] and told to *shape up or ship out* because she criticised time-phasing so much. Now we *know* its not perfect, key visionaries are leaving and we are really getting stuck in to try and find out *what faculty need* – we accept that there is no perfection, and that mistakes have been made and will keep being made – that's how the 'real work' began. We have all changed. We all make mistakes"

These stories of repair not only indicate a shift in the priorities of Central leadership but also speak to the overly legislated design of the phase-one system which left behind defining aspects of

Ivy's culture. In the next section we will see how Ivy worked to recreate a durable vision for the future by focusing on the unconscious creation of accounting-based boundary objects.

6.2.2. Creating an integrated system: Accounting as boundary object

In this subsection we shift analytical focus to the network of relationships between Ivy and the phase-one system. We argue that it is useful to analyse the components that sum up to the ERP in order to analyse the interplay between boundary objects and standards. We flip our interpretation of the ERP as a boundary object between Ivy and higher education and global work times, to analyse the phase-one as Ivy's 'standard', the constituent parts of which were designed to integrate its administrative practices. We recall from the previous chapter that the core group's standard design was less than well received by Ivy's heterogeneous community.

The squashing of academic silos met with faculty recalcitrance and large parts of the ERP were rejected. This stalled the naturalisation of the system and as we analyse in this section, boundary objects were created as an alternative means of translation through which to communicate with the ERP. These boundary objects tempered the core group's rigid standardisation because Ivy actors were able to work around the system and maintain a degree of preferred working rhythms. Pushing the time-phased theory of accounting and budgeting to the margins of the ERP modified the design of the system, and pulled forward through time aspects of Ivy's grand narrative. This had the effect of connecting previously disparate networks thereby igniting the ERP's stalled naturalisation trajectory.

Historically, the material arrangement of Ivy University has been relatively decentralised in order to provide individual service to students and faculty members. This organisational configuration impacted the agency and role of the phase-one ERP system. The ERP's introduction into a stable network of University buildings, lines of authority and reporting relationships, temporal-spatial arrangements, and operating silos enabled and constrained the way in which the technology could function. Similarly, the ERP's design was configurable during the Project X initiative, but it was also limited by design in the ways in which it could be modified. The collision of these two durable socio-technical assemblages was most prevalent when the accounting functionality was introduced to the faculty network.

We argue that this is because the normative design of IS-based accounting functionality assumes a level of sophistication, and a knowledge base fundamentally at odds with the current arrangement of University work. This is because Ivy is organised in such a way that accounting responsibilities span levels of organisational expertise. Central financial leaders often hold the professional qualification of Certified Public Accountant (CPA). Whereas professional managers and departmental administrators' grasp of accounting theory is limited to their programmatic agendas. Finally, unionised clerical staff have little or no understanding of accounting as a body of knowledge. One Central CPA explains:

> "People don't trust the system because *they don't trust their knowledge of why it's changing.* It's too complicated. and [Ivy] - higher ed - its just a *different kind of environment.* I mean - most big organisations that use these ERP systems - yeah they might have *100 offices worldwide* but most people *in those offices are accountants* and they *know what they're doing* – [laugh] - *you know*? They don't have to deal with the 'secretary C [clerical salary grade]' that doesn't know a *debit from a credit* that's talking to a faculty member whose a *Nobel Prize winner* whose *very angry* and is contacting the Provost because the secretary C cant explain this number on a grant report. *It's a really different environment.*"

As Steinbrenner (2001) notes, back-office ERP technology is designed to improve institutional business processes such as accounting and payroll rather than end-user service. As such, the technology assumes high level use by specialists in particular functional areas who may be separated by time and space but share expertise. For this reason we hear of multinationals implementing ERP to integrate worldwide administrative functions. However, within Ivy the reverse is true: while the scale of time-space distanciation is less that that of a global corporation, the gap in depth of functional expertise is wide. While functional specialists reside in the Central administrative units, and spend their working days concentrating on one area of expertise, many academic administrators are experts in the program for which they work, but not in particular administrative functions such as accounting. Therefore, the design of the ERP shifted the nature of expertise needed within Ivy's administration. This acted as a barrier to the academic network whose users were more interested in easy data access for information retrieval and decision making.

The vision of the Budget Director was to further decentralize the budget management process by removing administrative intervention and asking faculty to monitor, review, and report on their grants. This is expressed in the following narrative:

> I mean let's give the job *directly to the faculty*. It doesn't take a *Noble Prize winner* to say I've got $50, I spent $65, I'm in trouble for $15. That's really *all we're talking about*. and it doesn't take a Noble Prize winner to do a business plan that's timed out by months or quarters. So *you know*, when we talk about somebody who is a secretary who's put into a position with the ERP that is now *totally too complicated* for them, that's *really different*. I mean if you had somebody with an IQ of *90* and it's a job for a person with an IQ of *110*, **there's a problem.** But with the faculty - the fact of the matter is *they're all smart*! I mean they may be *nutty as hell* but they're **smart** and there's nothing here that they can't figure out...I really believe - you put pressure on people to take responsibility for things that they should be *responsible for* and then you *hold them accountable for it*. It's like the

old thing that somebody once said, if you treat people like children, *they behave like children*. If you treat them like *adults*, they *behave like adults*.

The quotation speaks to Ivy's leadership vision of the ERP as a vehicle for the professionalisation and decentralization of administrative activities. The expectation was that administrative personnel acting as intermediaries between Central functional departments and the academic community could be removed from the business process and accountability redistributed.

This gap was further exacerbated by the core group's emphasis on standardising accounting theory through time-phased Budgeting which failed to translate the interests of the academic community. While managers at the beginning of the Project X initiative agreed that the shift to a project-centric accounting approach was appropriate, the regulations attached to the way in which grants had to be accounted for hindered the basic activities of the academic enterprise. What had initially been conceptualised as a system to support and improve the working lives of all Ivy actors, became a singular obligatory passage point – a master narrative about what was legitimate accounting practice. The conceptualisation of accounting practice that underpinned the ERP's design created a narrow translation point that didn't allow for different perspectives. As such the seemingly innocuous phase-one ERP became the terrain for a battle between an encroaching global, business orientation and historic values of scientific separateness and academic freedom. Below we consider the different material inscriptions that resulted from post-installation customisation efforts where the core group attempted to enrol the recalcitrant academic enterprise. What resulted is a hybrid administrative infrastructure that resembles nothing the core group would have wanted to envision at the start of Project X.

6.2.3. Creating a matter-of-fact: Boundary objects make ERP work

This section analyses how Ivy overcame the controversy that coalesced around the time-phased budgeting application and the shift to a paperless administrative environment. The value of extending the analysis beyond the installation of the phase-one system is that we focus on *achievement* as a unit of analysis. The 'irreversible arrow of time' will not allow Ivy to retreat to its past. Stagnation is always impermanent and the University is compelled to move forward in order to continue its three-hundred year legacy of elite teaching and research. If we wait long enough we see that Ivy finds a way to move forward. This is accomplished through compromise, and is expressed in narratives of repair that speak to the progressive negotiations involved in creating an organisational matter of fact. We consider the creation of three boundary objects which were fundamental to the localisation of the ERP. These objects speak to Ivy's resilience during complex change initiatives and also challenge the post-modern perspective that there is nothing but small stories in contemporary society. A grand narrative exists at Ivy and it is informed by the blood, sweat, and tears of its actors, and also informs those actors as they move forward in uncertain times.

The Business Support Centre (BSC) was conceptualised in early 1993 when senior managers were considering the reorganisation of administrative work at Ivy. The rationale behind these talks were to save money institutionally by sharing administrative activities across Ivy's seventy-eight small to mid-size departments by organising 'regional' centres that would mediate between multiple departments and Central administration. The BSC would become a boundary object between academic departments and the University Provost thereby providing a durable way in which to share administrative resources and enable cooperation across academic networks.

However, this strategy was rejected by faculty who wanted their personalised administrative service to continue. As such, all discussions about the reorganisation of Ivy ceased.

Interestingly, these conversations of reordering the administrative network began again when the phase-one system went live because the ERP's complexity began to legitimise a regional model. The shift of administrative effort from Central units to Distributed departments meant that faculty support staff were overworked. Ivy leadership were unwilling to subsidise the cost of hiring additional employees for each department, and faculty refused to pay additional indirect costs in order to increase staffing levels to support a system that they felt ignored their needs. A regional model began to sound advantageous to both faculty and Central leadership – a compromise between full administrative service, and what faculty perceived to be inadequate support in the post-installation environment.

Central leadership were concerned that administrators within Ivy's smaller departments would not have enough interaction with the ERP, or the accounting sophistication to master its functionality. Rather than hiring an ERP expert for each department and requiring they become proficient with each module, the phase-one design led Ivy to conceptualise an alternative administrative support structure. The head of the BSC articulates the rationale behind the centre:

> "...It became immediately obvious to some of us that embarking on this new product was going to introduce a *whole new level of complexity to the University*. And the University's structured with these very small departments, about 70 of them, 60 or 70 of them *at least*, and in many of them, their administrative head is this *clerical* person. So these are people who are not paid a lot of money, their unionised, and most of them - about *80-90-95%* of their job *is not administrative* - it is *programme directed*. It's getting the classes scheduled, helping the director of undergraduate studies, helping the director of graduate studies, helping the chairman, all basically focused in on academic issues - dealing with graduate

students, dealing with undergraduate majors. and a very small part of their job is to get the paperwork through. **Fine.** So we realised that this is going to be *extremely complicated.* So it made very little sense to teach this group of people *all the complexities of Oracle.* So then we decided that we would establish a Business Support Centre - which is my centre - that basically, of maybe the 15 or 16 major administrative processes, of the 16, we took over basically 12. and one of the criteria was - if it's *complicated* and you do it *infrequently, you shouldn't do it.*"

Faced with the Ivy-Oracle system, faculty and their administrators were happy to have a temporary centre that would shift the effort of translation from their personal assistants to a Central administrative unit. As such, the BSC was created but was always communicated to the Ivy community as a transitional department. The design of the BSC took advantage of economies of scale by acting as a boundary object "inhabiting several communities of practice and satisfy[ing] the informational requirements of each of them" (Bowker & Star, 1999).

The centre is comprised of three full-time data entry clerks who input data related to departmental financial, human resource, and labour distribution into the ERP system. In addition, BSC staff are required to possess analytical skills so that in their questioning of the validity of departmental transactions, they eliminate the need to make post-hoc accounting corrections. This control mechanism requires a smooth flow of data into the ERP and is expected to facilitate a reflexive learning process between departmental administrators and ERP business processes. In addition, as the administrative manager of seventy-eight departments, the Central leader works to support the departments in their remaining ERP responsibilities. He holds training sessions, monthly luncheons, and one-on-one sessions where ERP trainers are sent to user work sites to teach administrators the functionality for the four remaining business processes that have not been 'outsourced' to the BSC. In this way the BSC is a boundary object that facilitates cooperation

between networks without requiring them to have good models of each other's work. The centre has the skills necessary to act as a liaison between local departments with specific concerns and yet maintain its identity as a temporary regional centre across those departments.

This model was praised by the smaller Ivy departments and caught the attention of powerful science departments who began asking for increased staffing levels to support their work practices. In response, Central leadership tried to translate the interests of these departments through the BSC but this move was rejected by the faculty who didn't want to be combined with smaller, less prestigious departments. A group of science-based administrators joined together to express their concern about the unique challenges associated with the change-over to an integrated environment. They sited a powerful example of recording faculty appointments in the ERP system as illustrative of the added complexity and time that the ERP would require.

What had previously been done in five minutes by filling out a form and sending it to the Central Human Resources unit, now involved twenty-six Oracle interface screens. Appointing faculty is a prerequisite to all academically-based financial transactions such as the payment of faculty salaries and allocation of their grant dollars. One manager explains the Oracle business process:

> "Oracle is so time-consuming. To enter faculty human resource details it takes 26 screens -
> *and* you had a wait to go *between* screens, the wait times between screens were like *five
> minutes*. You could go out and have a *cup of coffee* or something because it took *so* long."

The inefficiency of this proposed administrative environment coupled with the phase-one system's lack of important grant accounting functionality, prompted administrators to forewarn their departmental chairmen that when the new academic year began in September, they should

expect lots of administrative difficulties. The Chemistry department's Business Manager enrolled her very powerful chairman into helping garner support for the science community. The chairman was 'the chair of all the science chairs' and had a direct and close link with the University Provost and he requested that she invite top Project X leadership to a luncheon in order to speak about the concerns of the science faculty.

As a result of this meeting, the Transaction Support Centre (TSC) was set up to complete the clerically-based, administrative work of science departments. This centre is considered by some to be a satellite of the BSC as it is advised and mentored by the head of the BSC. However, the centre is officially viewed as working on behalf of Ivy's science-based faculty. The segregation between the BSC and the TSC indicates the agenda of academic departments to maintain some degree of autonomy by choosing to categorise themselves as having different needs to the smaller departments. Interestingly, while the faculty join together and present a united front when negotiating with Central leadership for the inscription of commitment accounting into the ERP, faculty intra-relationships become weakened when it comes to sharing a finite amount of administrative resources.

Another important distinction between the centres was emphasised in interviews with both science managers and the BSC leader who view the science-based Transaction Support Centre as a *processing unit* which does not *analyse* or *review* transactions. We interpret this as an important distinction because it speaks to the BSC leader's pride in his department whose staff are involved in analysis rather than just keypunch work. An alternative story related to the creation of these boundary object centres belongs to science administrators who made it clear to the researcher that

they were outsourcing *only* the data entry function to the TSC and that the administrative expertise remained within each science department. While the content that passes through these centres differs in terms of the level and horizon of administration, each acts to facilitate cooperation between Ivy's ERP architecture and faculty networks. This is precisely the value of boundary objects in that they grow to support the needs of heterogeneous networks by inscribing flexibility into work practices.

The Transaction Support Centre is comprised of four ERP specialists each with a primary area of concentration but all staff are cross-trained so that they can cover for one another if need be. Two of the four specialists concentrate on accounting functionality with one staff member acting as a translation point between Ivy's old chart of accounts and the project-centric chart. This means that she speaks with science-based administrators and clerical workers helping them to make the connection between the legacy and ERP environment. The other financial specialist is concerned with processing accounting transactions she receives from the departments. These entries include grants management (OGM) and labour distribution (LD) transactions that are wholly new to the financial management of Ivy.

The TSC specialists are all young, African-American women, locally raised, without college degrees. The centre is viewed by some Ivy actors as quite a menial clerical unit of workers who aren't *really* Ivy employees because they are on long-term temporary contracts. One manager called the centre Ivy's "fully trained temp agency" implying their work would never become a permanent part of the University. Despite this perspective, the specialists are gaining valuable Ivy-Oracle expertise and work directly, and on a daily basis with high level science

administrators. We argue that this indicates a shift in what constitutes University expertise from value being placed on long term Ivy experience to the ability to work with technology and provide an administrative service. The creation of boundary objects such as the BSC and TSC are helping to reorder the University's grand narrative to suit an ERP-enabled environment where as predicted in the story of legislating love, administrative practice is shifting in order to accommodate faculty-based values of autonomy, scientific separateness, administrative service, and elite teaching and research.

The work efforts of TSC staff have been commended by the coalition of science faculty and administrators and their responsibilities are increasing. Like the more analytically focused BSC, the centre still exists at the time of writing, over two years after the installation of the phase-one ERP. This indicates the stability of these boundary objects within the administrative infrastructure. The manager of the Transaction Support Centre interprets the enrolment of the centre into the Ivy community and invokes a sense of pride about the contribution that the centre is making to Ivy University and its story of the future:

> "So we are able to do a lot of trouble shooting. We get **a lot** of phone calls. We help people on-line, we talk people through things, people walk down, walk in, ask for help. In the beginning it was *extremely stressful* 'cos all these administrators worked very hard and they seemed like they're not getting anywhere and they have a lot more work to do. And we come and we bale them out, so to speak. I mean people were, people were stressed out to the point of tears. They were just totally - because they're trying to do their job the best they can and they've done it so well in the past and the system's not letting them do it. So they're, some of these people were just totally broken up over this. So - but luckily our people are *nice and calm* - say '*don't worry*, give it to us, *we'll get it in*'. and we met *every* deadline for people and first quarter production was *over 3,000 transactions* for the implementation. Now some people might have thought that that would have dropped off sharply after the first quarter assuming - you know - they were assuming that people would have time to do more of it themselves. But the second quarter production numbers were actually *slightly higher* than the first quarter. I think partly because we have taken responsibility for

additional departments - we took on some professional schools, we're helping the Graduate School, we helped the [undergraduate] College. So we have, we have *a lot of territory*."

Not only has the territory of the TSC increased but it is now producing paper-based monthly financial statements and distributing them to departments. Despite the dismay of Central leadership, this administrative task has been well received by the departments and is substantial with production levels totalling 35,000 pages during the first quarter of the ERP-enabled fiscal year.

The shift in translation effort brought about by phase-one design meant that Ivy departments sought a solution for helping ease their work load. Unable to turn to Central administrative units for help, they began relying heavily on these two centres. Similarly, Ivy's wealthier professional schools such as Medicine designed their own support mechanisms very similar to the TSC and BSC model. The Medical School instituted what they call a Business Centre which has branch offices of every major institutional process. These branches shift the point of translation back to their Medical School network by executing work in-house rather than sending it for Central processing. The Business Centre has Medical School representatives responsible for answering staff questions, understanding and interpreting policies, procedures, and the interpreting the project-centric chart of accounts.

By autumn 1999, the academic calendar was once again in full swing and faculty and students were arriving on campus demanding the time of departmental administrators. There was a high degree of anxiety in the departments about how well the phase-one system was working. The

financial controller and Project X change manager were invited to lunch with the science chairs to talk about two specific ERP-related concerns. First on the agenda was the need for the two centres to continue indefinitely because phase-two of the implementation was going much slower than initially planned.

Secondly, the chairs demanded that the core group outline a strategy for providing them with commitment accounting functionality in the new environment. They required that the legacy system remain functional in the interim so that their administrators could simultaneously run the two systems. In an interview with the Project X change manager, he tells the story of the chairmen's concerns related to a time-phased approach:

> "The problem is that when you start dealing with grant accounts, you start dealing with other people's money. In other words the faculty have expectations right now that their administrator acts like their bookkeeper – you know they think 'that's a service that I *expect* and *if I can't get that service then I'm going - then I want some of the administrative dollars associated with my grant back* so that I can do that *myself.* So - **do it for me or I'll do it myself!'** So that is what an administrator is up against in departments with faculty. They say to [the core group] 'so where do I put the commitments?' and we say - 'well, you don't need commitments anymore.' and they say – 'well *no, I need commitments. Either* you give me a way to manage my commitments or I have to manage my commitments off-line because *I have to be able to* tell the faculty member, when they walk in, how much money they have left.'"

This meeting was coupled with an ultimatum from the Medical School to either recognise the need for commitment accounting functionality to be built into the core ERP system or they were going to start the development of a major shadow system that would be shared by departments in the School of Medicine. This power play by the Medical School is reflected in the chapter's opening quotation which states that they are building their own system in response to the

continued Central position that time-phased budgeting will meet University needs. A spokesperson for Medicine continues:

> "I don't understand why they insist that we are asking the *wrong question* – they say its about managing to a ***budget plan*** – asking 'where am I in relation to where I was three months ago', but *who are they* to say what questions *we should be asking*? I think its that they spent almost *four times more* than they *originally planned* [pause]. Maybe **faculty** should *tell them* **they** need *time-phase budgeting!* They would **love** that! [laughter] So they spent *millions* and didn't meet the business needs of the community, *that's hard to take* and I think they are having a hard time admitting they were wrong."

As we recall from chapter four, the design of the time-phased budgeting (TPB) application was reclassified by Oracle as non-essential functionality and scheduled for phase-two development. TPB was designed as Ivy's institutional budget system which the core group expected would also satisfy the grant accounting needs previously met by the legacy Distributed Accounting System. Faculty members and their business office staff were frustrated that a business-oriented rationale had been prescribed by the Project X team without consulting them about such a significant conceptual shift. In addition, they felt insulted that the grant accounting functionality was not considered a priority by the core group and Oracle. In response to this pressure, the core group agreed three things. First, they agreed to leave the mainframe legacy system running until ERP functionality was created. Second, they would meet the faculty functional requirements by designing ERP-based commitments. Third, the BSC and TSC would be left running at least through the end of the fiscal year.

These concessions were made by the core group in an attempt to keep faculty and their support staff enrolled in the ERP phase-one system in spite of their anxieties related to accounting functionality. It was during these negotiations that the core group began to lose the enrolment of

the Ivy community and network alliances splintered. The expectation that the phase-one ERP would act as an institutional matter of fact, maintaining order within Ivy as a standard administrative system was being challenged. This had implications for the VP's vision of Ivy that had been inscribed into the phase-one ERP and mobilised by the project team because they were confronted by an alternative narrative of how Ivy should be managed and governed.

This perspective was held by faculty and their staff whose interests had not been translated over the course of the three year Project X initiative. Rather, these actors were still wholly informed by the Ivy's grand narrative where local expertise and history are valued above all external expertise. We argue that the ERP failed to act as a boundary object straddling the Central administration and faculty interests because it standardised both the methods associated with accounting practice and the conceptual apparatus informing those practices. The post-installation customisation efforts helps to temper this rigid design as the core group became open to ideas of design flexibility.

The core group reorganised phase-two development priorities and created ERP-based commitment functionality within thirty working days. This customised application was 'bolted' onto the accounting application. The core group sold this as a user-friendly solution with a web-based interface and promptly turned off the Distributed Accounting System (DAS). The bolt-on was meant to further enrol the recalcitrant academic community by keeping administrative work activities within the boundaries of the ERP. Instead, the business mangers used the bolt-on to shift the boundaries being straddled away from the core group and toward their needs. The bolt-on eliminated the need for the DAS system because it converted raw financial data into commitments through particular algorithms but it didn't keep the managers from using their Excel

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shadow systems for the creation of PI Reports. Rather, administrators would download from the ERP all commitment data applicable to each faculty member. They would import this data into Excel where they continued to create their reports.

The bolted-on DAS acted as a boundary object between the ERP and the academic network in that it enabled administrators to reconfigure ERP-based data into meaningful DAS reports and subsequently into Microsoft Excel PI Reports. This process was more convoluted and time consuming than in the legacy environment but it was successful for the Business Manager who needed to have control over faculty financial commitments in order to answer the all important question "how much money do I have left to spend?". The administrative process underpinning this quasi bolt-on-ERP system required business office staff to duplicate all of their financial transactions in two systems. This hybrid process required administrators to flip between different definitions of what it means to work and manage grant accounts on behalf of faculty. The bolt-on created a fusing of two design rationales, two views of the world which acted as a boundary object for these administrators. However, the administrators themselves still were required to themselves act as 'marginal people' (Bowker & Star, 1999) who sit at the crossroads between faculty expectations and managerial initiatives.

As the administrators began to develop levels of trust in the bolt-on and the support centres, they begun asking BSC and TSC staff to do their financial account reconciliations. This has not been well received by the core group for three reasons. First, as we noted in the previous chapter, Central want to discourage detailed monthly reconciliations by clerical staff in favour of a conceptual shift toward time-phased budgeting involving periodic review and management of

plans against accounting data. Second, they want the centres and the bolt-on to be viewed as temporary parts of University culture that could be disbanded in favour of a full migration to the ERP by departmental administrators. Reliance on these boundary objects meant that the level and horizon of financial management were unchanging. Administrators were becoming further entrenched in their preferred legacy accounting practices because they were able to maintain their preferred temporal working rhythms when communicating with the centre. The centre would then be responsible for translating this language into the ERP. This was worrying because the departmental users whose silos had been squashed were expressing a backlash against the project team's attempt to shift the translation effort.

Third, the drive to rationalise administrative paperwork and accompanying work processes was diminished because each administrator could interact in their own way with centre staff based on the personal relationships that were developing. Together these three concerns indicate the power of the supposedly silenced to challenge the achievement of order within the University. We see in the creation of these boundary objects that in an attempt to negotiate for more flexibility with regard to higher-level administrative issues, the faculty network were able to gain methodological concessions as well by appropriating the process through which they would interact with the phase-one ERP.

Whilst the bolt-on acted as a boundary object for Ivy's academic network, the core group could not claim to have designed an enterprise-wide administrative infrastructure. Rather, the information system that was being naturalised within Ivy was a hybrid in that its design fused together the values and politics of multiple networks and blurred the boundaries of administrative

practice. What will become Ivy's locally accepted system certainly has to include within its margins of practice, Microsoft Excel software, the bolt-on, the interim support centres, and the business processes accompanying these artefacts. In addition, when interpreted from the perspective of devout time-phased budgeting advocates, the bolt-on acts less as a boundary object connecting disparate communities, and more like an obligatory passage point through which they reluctantly had to pass in order to remain as key players in the grant accounting and budgeting negotiations.

Since parts of the TPB functionality had been reassigned as part of phase-two development, its theoretical perspective had not yet been made durable at the time the bolt-on was created. The core group were going to have a difficult time enrolling the academic network away from an historically proven practice of grants management toward what was viewed as a professional managerialist approach. Attempts to do so were based on trying to create a PI report that married time-phased budgeting concepts with commitment accounting on a single sheet of paper. This design process was overwhelming and complicated and was again dominated by Central actors. Representatives from the Medical School provided the only academic perspective and a great deal of work was done by one Medical School delegate liasing between the design group and individual faculty members willing to chat about their reporting needs. Rather than give up on the TPB approach and focus on getting users out of the Excel shadow systems, this group insisted that a solution could be found that would translate diverse interests through a single solution. The following manager recounts a story signifying the complexity of these new hybrid PI Reports:

> "Were trying to make things as simple and straightforward as possible and we've failed
> miserably so far, to be honest with you. Its, we've, in terms of the grant reports, the grant
> reports are the best example of the difficulties we have...I don't know if [the change

manager] told you about the Economics professor? [pause] That used to be the Provost and used to be the VP for Finance and Admin - he used to have [the VP's] position. Who's now an Economics professor - called the Provost really angry because he couldn't read his PI Report. and the [Financial Controller] sat down with him and every concept he was asking for was on that report. But he couldn't see it and his Business Manager couldn't explain it. and that happens to be an issue with that particular department but its - *but this guy's smart*! He *knows what he's doing* and he can't even *read the report* and I thought that was pretty telling."

Nowhere on this report were the valued faculty categories of 'Commitments' or 'Remaining Balance' listed. These two concepts would have certainly helped to naturalise the report within Ivy because they are familiar to faculty from their legacy PI Reports. Instead, the hybrid report proposed alternative categories as standard. These included but are not limited to: Grant Budget, Award, Instalment, Inception To Date, Award To Date, Instalment To Date, Budget To Date, and Fiscal Year to Date. Rather than creating a boundary object that enabled communication and cooperation across disparate groups, the design failed to enrol either community. The report was an actor that epitomises the saying 'jack of all trades, master of none'.

A member of the core group and PI Report design team informed us that their design sought to find the right blend between complexity and simplicity because:

"To simplify it too much you run the risk of people interpreting the information wrong and doing bad things with it. But to be totally straight about exactly what everything is complicates it to the point that they can't understand what they're looking at."

This comment speaks to the role that the core group has appropriated for themselves within Ivy as controllers of financial information and institutional auditors of departmental work practices. The quote is reminiscent of paternal relationships where the worldly-wise adult (the core group) is protecting the child (faculty and staff) for her own good against harmful and complex things that

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might be misinterpreted by a naive reader. This interpretation of power relations by the core group speaks to the essence of the problem in translating the interests of the academic community who refuse to be patronised by accountants and professional managers. Even attempts by the group to create boundary objects that would enrol faculty and staff whilst allowing a degree of autonomy have failed, and at the end of fiscal 2002, three years after the ERP system has gone live, the Medical School is embanking on a large-scale design of a grant accounting system, and the main campus of Ivy are working within shadows systems to do a great deal of their grant reporting and analysis.

This leads to concluding comments for the chapter which draw on the theoretical point of 'imbricated infrastructure' to consider the material arrangement of Ivy's administrative infrastructure which is being accepted as an organisational matter of fact. ERP standards, and locally designed boundary objects combine to meet the heterogeneous needs of University actors, however there is potential for the character of this imbrication to shift over time with the ERP being pushed to the margins of practice. The extent to which Ivy actors become resigned to boundary objects becoming accepted standards, can reorder the imbrication. This has implications for both Ivy's future and the future of contemporary organisations who choose to actively negotiate with ERP.

6.3. Conclusions: Boundary objects become standard

First we conclude this chapter by stating that it is not yet know if the Ivy-Oracle ERP package will act as an ideal type for a globalising higher education market. However, we do argue that the

problematic post-installation phase of Project X may point to a shortcoming of the ERP to act as an ideal type for higher education. If Ivy cannot naturalise the global standard that it helped design, how can other universities be expected to do so? Just as the design of an ERP abstracts from local context in order to create a standard classification system, our interpretation of the ERP as a potential ideal type for the higher education industry is challenged by issues of scale.

This in-depth study has shown that the ERP failed to act as an ideal type within Ivy and, therefore, the extent to which this package will successfully act as a global standard is questionable. The phase-one system failed to become the glue holding together heterogeneous university networks because its design attempted to mandate far too much. Universities that choose to adopt the Ivy-Oracle package in its current form will have to be willing to adopt its embedded theoretical view of the world which could impact the academic network in a manner similar to the controversies that arose at Ivy.

The Ivy-Oracle development partnership was an attempt to construct a global ERP standard for the higher education 'industry' as defined by the software vendor. This sub-section considers the extent to which the ERP might become an ideal type boundary object for traditional university administrations. As an ideal type the Ivy-Oracle ERP system would offer a standard technological design to higher education institutions by abstracting away from Ivy's local context enough to create a general template for administrative practice. In this way the ERP 'sums up' the detailed classification work conducted during Project X and offers it as the template for contemporary university administration.

Contemporary universities, moving away from local design initiatives, are implementing the Ivy-Oracle ERP system with the understanding that the technology will act as a point of translation, helping them straddle the juncture between local practice and global standards. Their expectation is that the ERP standard will allow them to embrace a globalising future, and through configuration they will be able to carry forward valued aspects of their past. In this way the ERP modifies, but does not supplant locally-based grand narratives. As such, actors incorporate a sense of the 'global present' (Adam, 1995) in their stories – holding themselves in relation to other universities – but also remaining informed by important organisational values and a sense of history.

An ERP package successfully marketed and sold by Oracle as the higher education standard would connect up the social present experienced within individual universities throughout the world, with a 'global present' where actors who were previously isolated by distance acquire an interest in the strategies, plans and actions of those within the social network (Adam, 1995). We argue that in an era of the networked university (Agre, 2000) and the commercialisation of higher education (Noble, 1998a, b; Winner, 1997), university leaders routinely incorporate the global present into their decision making. The ability for Oracle to capitalise on these experiences of global times, will see the ERP trend proliferate throughout traditional university administrations. However, to accomplish this is a challenge as a backlash against ERP has already begun within practitioner literature (Economist, 1999; McCredie & Updegrove, 1999) as the standard packages fall short of meeting local needs. In this concluding section we question the extent to which the phase-one ERP package can be interpreted as a highly configurable boundary object – capable of

linking individual universities to a global present without sacrificing the character of local work practices.

As Adam (1995) notes, we are called upon to think theoretically about 'resonances and multiple readjustments where the old figures in the new and the new modifies the old' (Adam, 1995). At a fundamental level, this is the rationale behind all ERP technology where industry specific, best business practices, are inscribed within each functional module. These modules are then integrated into an ERP suite which provides a hard outer shell – a global standard - allowing the technology to be understood by all organisations. The claim is that the ERP design is also plastic enough on the inside to allow each organisation to configure the suite during implementation in order to create a robust, local solution. As Star and Griesemer (1989) note, an ideal type is a boundary object "adaptable to a local site precisely because it is fairly vague; it serves as a means of communicating and cooperating symbolically – a 'good enough' road map for all parties." It can certainly be argued that within many industry contexts, ERP vendors have implemented the software as an ideal type facilitating a bridge between global, best business practices and local configurations. However, we argue that the 'good enough road map' is tenuous because there are problems with translating the standard design into local functionality.

The VP and Oracle were able to mobilise a network of functional and technical experts to create a standard administrative system for higher education that increased institutional confidence in administrative efficiency. Defining a precise set of methods for carrying out administrative work played a fundamental role in moving traditional administrative work practices out of silos and reorienting them by business process streams. These methods were designed within Ivy's local

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Project X initiative but were expected to have global applicability in that they could be adopted by multiple university contexts whose users might have little understanding or interest in the particular administrative issues of an Ivy League institution. At the same time, these methods define the boundaries of university administrative practice for all organisations adopting Oracle's ERP package. For example, all universities adopting the full Ivy-Oracle ERP would be constrained by its process-oriented work flow, the relationship between grants management (OGM), labour distribution (LD) and the other administrative modules.

The technological design of ERP suites is based upon the standardisation of work routines. The creation of a higher education package that would successfully be adopted in universities required a great deal of skill by the project team. This involved translating Ivy's legacy work practices into a higher education standard, reordering the Government Financials (OGF) technology that was designed for another industry, and developing non-existent technical modules. The methods of administrative practice that were designed into the phase-one ERP will shape the boundaries of normative practice for universities choosing to implement the Oracle package, just as they will shape Ivy's administration.

We see in these negotiations that Ivy worked to achieve order through coalition building where the interests of one group are translated by another. For example, the multiple translations that occurred during the faculty PI Report controversy illustrates how compromise gives diverse groups enough resources to make the ERP work by repairing conflict and building a 'good enough' solution to translate the interests of previously disparate networks. The moments of

negotiation emphasize the inclusion of heterogeneous concepts of work within artefacts expected to be used in daily administrative routines.

The bolt-on system shows that multiple and often conflicting perspectives can come to reside within a single technological artefact thereby integrating diverse organisational groups. The system that becomes 'part of Ivy's furniture' will incorporate a little bit of each of the groups and negotiations that preceded it as a matter of fact. Similarly, this system will continue to evolve over time as the constitution of interests change and organisational goals shift.

Rather than arguing that Ivy is a social structure that exists in-the-world regardless of the outcome of the ERP initiative, we argue that Ivy's contractual agreement with Oracle Corporation set in motion a change process that would re-form the University – altering both its position in-the-world, and its fundamental operating activities. From this analytical perspective the ERP is fundamental to what will come to constitute our understanding of the University. The software package brings with it very specific ways of making sense of the world, and as such will inform the pace and rhythms of work within an ERP-enabled organisation. In this way the activities constituting the IT-enabled change process remake the University. An analysis of narratives from the first year of system use foreground the interconnectivity of alternative perspectives, the presence of multiple risk positions within an organisation and the importance of legitimizing various operational agendas when implementing a standard technology package.

In this chapter we have argued that the multiple Ivy networks are joined together through the creation of the phase-one system in spite of the conflicts which accompany its introduction into the wider Ivy community. It is through the repair work of the core group and faculty administrators that the University begins to overcome the divisive design of the phase-one system. This results in the creation of boundary objects that have the effect of linking heterogeneous networks together without requiring the full subscription of epistemological position by either group. In addition, boundary objects help Ivy to link its past with its future through an emergent design process.

The grand narrative of the University is updated to incorporate the uncertainty of contemporary administrative practice. At the same time this contemporary narrative brings forward valued, time-honoured traditions that managed to negotiate a place for themselves within Ivy's future operating environment. In so doing you enrol far more actors into the story of Ivy because the narrative is sympathetic to multiple perspectives. As Latour (1999b) notes, maintaining an organisational matter of fact requires a great deal of resources that can enrol and maintain network interests. The more diffuse the network ensemble, the more difficult it is to retain fact-status because heterogeneity reigns and there will always be an alternative ontological network vying for dominance.

Considering the future of Ivy's grand narrative in relation to the administrative infrastructure might be best discussed in terms of Star's (2002) recent work related to the creation of imbricated infrastructures. As Ivy creates an administrative infrastructure comprised of ERP standards and locally designed boundary objects, there is potential for the character of this imbrication to shift

over time with the boundary objects being redefined as standards and vice versa. The core group vision to squash organisational silos through the inscription of the phase-one ERP, may come to be further marginalized by the powerful voices of faculty. If Ivy's academic network is able to continue creating boundary objects that connect the ERP to the working rhythms, cycles, and pace of activity favoured by faculty, Central leadership may fail to enrol their time-phased budgeting application. The likelihood of rigidly defining an ERP-based administrative boundary is further reduced.

Such an outcome would mean that the creation of shadow systems had become the dominant IT-strategy at the University and that multi-million dollar ERP system was acting as nothing more than a data repository; a boundary object through which actors could gather data to manipulate outside the boundaries of the ERP technological design. Although an orthodox ERP system might never become a matter of fact at Ivy, we interpret the unconscious design of artefacts fusing with the ERP to be a resilient and ingenious act of will. Above all else Ivy's grand narrative has been one of making it work – prioritising workable solutions over ideology and vision. Whether purchasing an ERP system with the plan to dramatically customize it, is a sound strategy is questionable. This is one strategy that provides an alternative to the narrative of the powerful ERP 'forcing' change upon the 'victimised' organisation. This emergent survival strategy was 'successful for Ivy in that they felt they had very few alternatives after investing so heavily in the technology.

Oracle's strategy of selling Ivy's standard working rhythms as a solution for their catch-all 'higher education market' assumes a high-degree of similarity between the missions of elite research

universities and small community colleges. This has implications for North American institutions whose activities are quite diverse but also for universities around the globe where the 'commercialisation of education' (Noble, 1998a) is a far less familiar concept. The alliance between Ivy and Oracle helped create the vendor's "higher education industry solution" which is being marketed on their international web site as an appropriate package for universities across cultural and geographical contexts. However, what Oracle's narrative doesn't tell is that Ivy is still radically customizing its business processes, organisational structure and ERP technology in an effort to create an administrative infrastructure inscribed with a hybrid temporality that re-orders but does not forget the past.

7. Conclusion

The purpose of this research was to understand the dynamics involved in creating a working information system from a standard ERP technology package and add to our knowledge of ERP in practice within organisations. We sought to elicit multiple and conflicting perspectives from actors within an Ivy League University whose working lives were intimately connected to this back office project initiative. Our motivation was to make sense of how it is possible for standard ERP packages to be naturalised – accepted and used by a heterogeneous university community - despite their legacy of problematic implementations. We found through a narrative research strategy and commensurate theoretical perspective that there are phases of change and order during such complex projects. Analysing these phases we argued that creating a stable information system necessarily involves the privileging of some voices as more valid than others. However, the relative stability of this organisational matter of fact will inevitably shift over time because order is an impermanent state of being. In addition, organisations that achieve stability in practice and create a working information system do so because individual stories of change coalesce around an organisational grand narrative that motivates actors to work when all else fails. This closing chapter considers the contributions of this study for developing our knowledge of ERP within organisational contexts. To accomplish this we summarise in the first section our main findings and contributions in a bit more detail. The body of the chapter discusses the theoretical and practical implications of the research. We finish the chapter with a discussion considering the stories that worked at Ivy as a pretext for further research.

7.1. Overview of the dissertation

To assist the reader this section of the chapter restates the research questions and summarises the major points of focus within the preceding six chapters. The dissertation begins with an introduction to the broad research context focused on negotiating through an IT-enabled change initiative. Over time the overarching goal of this ERP project shifted from the 'creation of an administrative centre of excellence' to the achievement of an accepted and used information system that enabled the organisation to continue its daily activities in an uneventful manner. This chapter introduced the premise that 'making a system work' is possible but difficult. It requires the interconnectivity of multiple, and often conflicting perspectives where individual actors and groups are informed by, and inform, an organisational grand narrative that propels the negotiation process providing a sympathetic story of achieving a workable system above all else.

The literature review in chapter two showed us that ERP is a dominant organisational software package the popularity of which is accompanied by problematic adoption and acceptance of the design configuration within organisations. We charted the development of the ERP trend as it proliferated Western organisational contexts at the end of the 20th century. The chapter then classified state-of-the-art ERP research based on analytical focus. The literature was divided into one of three categories: controlling the ERP implementation, future ERP innovations, and understanding the dynamics of ERP initiatives.

Chapter three presented the interpretive research methodology and the overarching theoretical perspective informing the study. The research question informing the study is concerned with

how a working system is created by organisational actors. As such, we chose a research approach that privileges the interpretations of those involved in this work by focusing on their stories of negotiating through the ERP initiative. After all, *what works* within an organisation is subjectively determined by its constituents. Our actor-network perspective informed the empirical design and helped seek out multiple voices and then analyse the interconnectivity of these narratives in spite of difference. We use the conceptual apparatus of social times to emphasise the tensions between interpenetrating agendas, priorities, conceptions of work and work life. These concepts are useful because the temporal-spatial dimensions of administrative practice shift when they become mediated through a newly designed and installed software package. This has implications for who and what will be valued within an organisation, and as such speaks to the implications of ERP within organisational contexts.

Chapter four presented our case description and examined the links between methodology, theory, and data. We provided a background of Ivy University as it began considering an IT-enabled modernisation of its traditional administration and take the reader through to the selection of an ERP package. The body of the case description is constructed as three meta-narratives that illuminate the theory of actor-networks and interpenetrating social times as groups negotiate through the ERP initiative. These three networks of negotiation provide the reader with a view of moving through the process of longitudinal change by highlighting the interconnectivity of networks whose perspectives differ. Major theoretical concepts are presented in the final section of chapter four in order to transition the reader from part I of the study to analysis of empirical data constituting part II of the dissertation.

The introduction of corporate 'for-profit' concepts into a non-profit educational institution was contentious and raised issues within the University about who and what was valued within the organisation. Different networks began to try and translate the technology to represent and become a delegate for their interests. These issues were explored in depth during chapter five where we analysed the faculty grant accounting controversy and answered the question: What is the nature of controversy that might threaten the achievement of a working information system? The chapter highlighted the connections between financial audit concerns, risk management, and the commercialisation of higher education as Zeitgeists of the late 20th century.

Through a detailed analysis in chapter five that focused on seemingly mundane changes to an accounting category, formula, and report, we summed up to the ERP's inscription of a more corporate approach informed by business-oriented accounting concepts. We examined the relationship between these forces and local changes to back-office technology and learned that whilst the ERP as a whole might be an indisputable fact – the details of its design are not. Whilst the physical presence of the phase-one system made the ERP easy to interpret as an organisational fact, its material form coupled with the VP's vision were not enough to convince faculty of the value of switching to a new budgeting and accounting approach. What was 'a fact' for Oracle and the VP's administration, was rejected as such by the collective voices of University faculty and their staff.

Chapter six continued the story of creating a working ERP as an institutional matter of fact which is informed by, and in turn informs, the organisational grand narrative. The chapter connected the faculty-ERP negotiations with the change trajectory that was first presented in the three meta-

narratives of negotiation. Over time the VP, Budget Director, and Financial Controller left the university, and in chapter six we began to see relationships develop that didn't previously exist. Accompanying these relationships are stories of compromise where the University agenda switches from an 'all-or-nothing' design approach to narratives of repair giving diverse groups enough resources to make the system work.

The chapter analyses how the University managed the conflicts that emerged between the academic network and Central leadership in order to reach a point of compromise that would enable the institutionalisation of the ERP into the academic community. Using negotiations related to changing accounting practice as our unit of analysis, the chapter highlighted the University's decision to balance local operational flexibility with institutional standardisation through the selective creation of local solutions. These compromises are helping Ivy balance its tradition of high-quality administrative service for faculty with the need for a standard operating platform that increases institutional control and encourages administrative professionalism.

In the next section of this chapter we consider the implications of Ivy's project initiative, analysing its drift from the original plan of big-bang implementation and University-wide adoption of corporate accounting concepts, to an emergent, unconscious response to unintended project consequences. We shift the research focus out from accounting classification, and customisation, to the analytical focus of Ivy and the future of higher education. This shift emphasises the chains of transformations that are encapsulated within this narrative study of IT-enabled administrative transformation.

7.2. Contributions

This section is organised into two categories which together constitute the contributions of this dissertation: theoretical and methodological, and practical. In this dissertation we have emphasized the relationship between theory and data by illustrating the ways in which the empirically grounded field study is informed by theoretical concepts and how these concepts in turn, illuminate particular issues from the data. In other words, theory becomes relevant in the dissertation through the application of empirical data. Further, particular analyses are possible because of chosen the theoretical lens. For this reason the next section focuses on contributions to the information systems community that have both a theoretical and methodological component.

7.2.1. Theoretical and methodological contributions

The theoretical contributions of this dissertation can be classified into two areas. First is the interpretation and use of actor-network theory to the field of information systems. Second is to the knowledge base of the information systems discipline. The contribution to the IS community is not only the particular interpretation and use of theoretical concepts, but the findings obtained by applying these concepts to an extensive field study. The application of this temporally sensitive actor-network approach coupled with commensurate ideas of accounting margins and classification work, may also be considered a contribution to the field. This theoretical perspective can be used to study the details of negotiating through computer-mediated change over time with an emphasis on understanding technology in practice, and the subsequent implications of this for work and work life. This shifts the research agenda from an outcome-

based focus on ensuring success to one of *in situ* negotiations where potential outcomes shift over time as a result of emergent debates and subsequent actions.

Minimizing failure by attempts to control the outcome of ERP project initiatives continues to be an issue of central importance to researchers within the IS field. We saw in chapter two that literature on ERP specific critical success factors (CSF) is abundant. This CSF literature is interpreted as a subset of management science research that emphasizes the 'strategic alignment' of information technology with organizational structure, business processes, and people. This catch-phrase is a conceptual tool for managers and business leaders interested in maximizing their economic performance by controlling the relationship between business strategy and information technology. Strategic alignment implies that IS projects are wholly rational initiatives the outcome of which can be planned for, and realized by adhering to factors for success and following a clearly delineated, linear path of change.

However, evidence related to the difficulties of implementing ERP within organizations illustrates that aligning IT with business strategy takes far more than a list of critical success factors. Markus et al. (2000) cite in their study that many ERP systems fail to be used to full functionality once installed within an organization. Limited functionality is an indication that ERP is being used as a transaction processing system rather than as a strategic tool. This state of affairs speaks to the limitations of scholarly knowledge about how ERP acts in practice. Yet, we continue to stockpile our knowledge by producing the same types of research that confirm the importance of reaching a successful project outcome. This offers practitioners incomplete advice as they try to manage multiple agencies of change and order that converge during an ERP project initiative.

Current scholarly research excludes from the story of ERP the details of change where multiple and often conflicting agendas must be debated as plausible options, and then translated into durable project artefacts and normative practices. IS scholarship is lacking when it comes to providing detailed insight into how the design and configuration of ERP can greatly impact the future operations of contemporary administrations.

For example, in a recent study by IS researchers three 'factors of paramount importance to implementing ERP' were identified as management support of the project team, appropriate balance between business and technical project team skills, and commitment to the change by all stakeholders (Parr, Shanks & Darke, 1999). Although the definition of *appropriate* project team skills shifted over time at Ivy University, the project maintained all three of these factors for its duration. Yet, the project cost four times the budgeted figure reaching close to a nine-digit monetary expense. In addition, the project deadline was overdue, and the ERP was installed with limited functionality. If Davenport (2000) is right that ERP is a prerequisite for operating in the twenty-first century, IS researchers have a responsibility to critically analyse ERP technology in practice – how it enables and constrains potential futures thereby influencing what work and for whom within contemporary organisations.

Ciborra (2000), in a recent book on information infrastructures challenges the perspectives that ground themselves in the notion of control. He argues that the 'management is control' credo of the industrial society locks organizations into a mindset where they seek more control as the only way to ensure a desired outcome. According to Ciborra (2000) this is a futile effort in today's complex environment where aligned infrastructure is a rare event in rapidly changing industries.

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Rather, infrastructure will inevitably 'drift' (Ciborra, 1996; Ciborra and associates, 2000) during systems development, and what results will be a product of complex processes of negotiation involving multiple interests.

Whether in terms of control or drift, the approaches outlined above explain the progress of software initiatives in radically different ways, but neither side of the debate adequately investigates the dynamics involved in reaching the project outcome, or theorises about the implications of this process. The agenda set by Ciborra (2000) specifically asks that researchers conduct empirically based research, that will help us move beyond the terminology and banners associated with project outcomes, and answer a call for better understanding of the dynamic processes involved in IS projects.

This dissertation empirically illustrated the process Ciborra might call 'a drifting ERP project' by extending the IS community's understanding of process data and theory. Langley (1999) notes the importance of process research within scholarly organization literature for making sense of events over time through in-depth, longitudinal studies. She also highlights the challenges associated with process data when scholars attempt to provide theoretical insights that will add to our knowledge base. The richness of the data is accompanied often times by what she calls 'messiness' making it difficult to abstract complex organisational contexts to theoretical ideas. This can lead researchers to adopt the post-modern perspective to which we referred in chapter one where we revel in the small stories arguing that to sum up to a grand narrative or theoretical perspective is to impose an unfair order on the multiplicity that makes organisations complex.

The rich descriptions obtained from process data are useful in themselves, but we argued in this dissertation that scale is not an issue when trying to gain theoretical insight. From a Latourian (1999a, b) perspective the grand narrative and the individual stories illuminate one another. We found that summing up the complexity of narrative data through theoretical abstractions or 'grand narratives' helped us more easily extend our knowledge of and propel scholarship forward. In an attempt to increase the value of process research for the 'sensemaking' activities of organisational scholars, Langley identifies narrative research as one of seven strategies that prioritise elements of process and can result in theoretical insights helping make sense of organisational change processes. The narrative approach adopted in this thesis added depth to the longitudinal nature of the empirical study and emphasised characteristics that help develop a more balanced picture of the impact ERP has had, and will continue to have, on the ways in which organizations operate, manage, and strategize in the new millennium.

Drawing on two key findings that arose from theorising the study's narrative data, we better understand what is involved in negotiating change over time. We elaborate on the characteristics of drift and show that actors are doing more than randomly moving through a project without control or predictive skills, at the mercy of circumstance. First, the notion of emergence illustrates drift dynamics as involving a relationship between past, present, and future. In other words, the ways in which we choose to negotiate are anchored in our understanding of the past. Project drifts are inscribed with narratives and processes over time. Every drift is different because they are comprised of stories that are unique and situated. Just as one can't construct an organisational memory in the form of a data warehouse without understanding context, so you can't understand

negotiating IT enabled change as a discrete event. History is being formed everyday, and so is drift.

In chapter three we stated that the present is the only locus of reality and as the present emerges, actors come to reinterpret the past and future. Negotiations are therefore informed by sensemaking activities where the future is conceptualised in relationship to the meaning attributed to the past and present. Whilst one may not be able to predict future negotiations, or control project drift, we can at times make choices about with whom we will enter into trials of strengths. This is linked to our second finding arising from the narrative data. Negotiation is selective and involves the necessary relinquishment of past activities or artefacts, in order to carry forward others. While the future is about the construction of a new environment, it is also about updating and bringing aspects of the past forward.

These findings are illustrated in through Ivy actors who incorporated the University's grand narrative of elite education and research into their stories of the ERP initiative as the creation of an administrative centre of excellence. This narrative informed actors' understanding of the future by relating it to a familiar past. As the core group began to reject this narrative in favour of a more corporate storyline, they too positioned themselves in relation to Ivy's past by juxtaposing historical practices with proposed administrative improvements. In order to shift the margins of administration, members of the core group problematised past activities and gained support for potential future scenarios. Through the silencing of Ivy's grand narrative during Project X, the core group created a phase-one ERP that left behind valued legacy work practices and changed the

meaning faculty attributed to the project. The creation of the phase-one ERP reordered Ivy's temporal landscape and foreshadowed project drift.

The realisation by faculty that valued aspects of the grand narrative had been excluded from the phase-one design, created a moment of emergence. The VP's past promises that ERP would benefit the entire Ivy community were reinterpreted by faculty as falsehoods. Visions of the future shifted as faculty reassessed their place within an ERP-enabled environment. Faculty recalcitrance created project drift which resulted in a post-installation environment of ERP customisation that could not have been predicted. So while drift is an emergent phenomenon we can open up the black box and analyse the activities that come to be classified as 'IT drifting' in order to understand emergent change as existing along a continuum between past, present and future. This links to Langley's (1999) call for inductive process research that employs empirical data to enhance our understanding of theoretical ideas. This dissertation has extended our understanding of project drift as a result of studying processes of change and order at Ivy. Planned project activities combine with emergent and contingent negotiations to create a working information system that fused together aspects of Ivy's past with its potential future.

The trajectory of IT enabled change is influenced by stories in which the narrator 'manages departures from the canonical' by moving from an ordered state, through negotiation, toward attaining goals (Bruner, 1990, p. 50). Understanding drift as a characteristic of meaning making defines the concept as a by-product of purposeful action. This definition can help guide the boundaries of IT enabled change initiatives by encouraging a sense of continuity across time and space rather than instilling a sense of arbitrary project drifting where actors are at the mercy of

autonomous technology. While project managers might be unable to predict and control activities that cause drift, they can benefit from emphasising these activities as originating from actors changing perceptions of their activities in relationship to history and proposed futures. This has two significant implications, firstly the information system being created will be vulnerable to political rearrangement as stories and alliances change over time. Secondly its design and configuration may fuel strategic drift accounting for significant organisational mutations as the information system is used and modified.

IS research that considers the impact of standardisation initiatives in practice is limited. We do not yet have a sense of how ERP design, configuration, and customisation efforts change work and work life within organisations. The longitudinal design of this study, coupled with the characteristics of the narrative data collected in the field has enabled an analysis that contributes to a fuller discussion on the IT-enabled standardisation process within organisations. In the past, literature in this area has focused on the role of technology in creating standardisation (Hansheth & Monteiro, 1997; Monteiro & Hanseth, 1996). This agenda was timely and helped the IS community to consider the power of technological agency to propel implementation projects. However, this study emphasises that the standardisation process is an interplay between technological design and human agency during which some common ground must be found if order is to be achieved. Fujimura (1992) notes, standardization is more easily achieved when one can create a matter of fact and a sense of network closure – to adopt a strategy of creating boundary objects encourages local modifications over integration and standardisation. This study enhances our theoretical understanding of standardisation processes because its analysis focused

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on the construction, deconstruction, and reconstruction of the ERP as an organizational matter of fact.

This dissertation contributes to Science and Technology Studies (STS) literature by showing through its empirical analysis what happens to a black box, or matter of fact in practice. Pinch & Kline (1996) have critiqued current empirical studies that adopt an STS perspective for failing to explore the ways in which facts, evolve through their use *over* time. This dissertation shows that matters of fact can be deconstructed over time and must be reconstructed if order is to again be achieved. We argued that the investment in the phase-one ERP made it difficult to reject the package as a whole and as such it was interpreted as an organisational matter of fact despite its contentious design. However, we also analysed the ways in which this fact status shifted over time emphasising that order is temporary. When the project team attempted to strategically align the wider University community with the phase-one ERP, they aggravated many socio-technical arrangements that had constituted Ivy's existence. In seeking to align faculty with a business storyline, the team were faced with a further round of negotiations, enrolments and translations of interest which ironically produced not so much alignment, as yet another matter of fact.

In conclusion we see that making a system work comes with a cost. As Fujimura (1992) notes, when the design focus is on building boundary objects, it is more difficult to create a matter of fact because boundary objects open the opportunity for other facts to form. The challenge for IS scholars is to reinterpret what constitutes a system, to challenge our understanding of boundaries of practice and to critically analyse the use of technology in practice. The hybrid information system that is at use within Ivy is a collective of boundary objects and standards the definition and

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boundaries of which will surely shift over time. Following this process provides insight into the re-creation of organisation, unifying grand narratives, and the socio-technical systems which comprise matters of fact.

7.2.2. *Practical Contributions*

In contemporary society the traditional academic institution of the university is struggling with its identity (Agre, 2000; Cornford, 2000; Brennan et al., 1999; McNay, 1995). Whilst the joint missions of research and teaching may remain unchanged, the context in which these activities are to be conducted is dramatically changing. Professional managers are running universities in the United States in an effort to compete within a higher education marketplace that has grown increasingly complex and competitive over the past ten years (Barnett, 2000; Gumport, 2000; Brennan et al., 1999). Whilst cultural contexts throughout North America, the UK, Western Europe and Japan and elsewhere differ, many of the universities in these countries are struggling to position themselves within the future global higher education marketplace in light of advances in computer-mediated learning (Agre, 2000; Cornford, 2000; Silver & Silver, 1997). This section of presents industry facing conclusions that consider how the changing university context might effect its organisation and governance.

This dissertation illustrates the struggle of contemporary universities with a shifting narrative of what education means. Winner's notion of reverse adaptation (1978) helps us consider the extent to which the historic grand narrative of universities can continue to uphold values of freedom,

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intellectual development, promises of prosperity, and bring them forward into the future operating environment.

De Boeur (1999) marks the decade between the late 1980s and early 1990s as a time when the participatory approach to the governance of the university came under debate. This occurred for several reasons (Table 2.3). Universities were facing mass education due to the growth of the student body and a growing global marketplace (Giddens, 1990). These students were seen as customers who had expectations about the service they were receiving. Not only did this introduce increased competition but also forced universities to consider the economics of its institution in a way it had not done before (Brennan et al., 1999; de Boeur, 1999).

In addition, university faculty had growing independence as their sources of research funding increased. While researchers were connected to the institution they were simultaneously developing as entrepreneurs. This context dramatically increased the complexity of the financial and budgetary responsibilities of the institution to manage the research and teaching revenues against the cost of running the university. Increases in external funding sources had an exponential effect on the complexity of complying with laws and regulations set forth by the government, federal and state taxes, and grant awarding agencies. Paradoxically, this environment spawned at Ivy and other universities both academic and managerial entrepreneurialism as the need for administrative control resulted in tighter governance structures that both compete with and complement academic agendas (Reed, 2000; de Boeur, 1999; Mahrer, 1999).

■ Global marketplace (Mahrer, 1999; Nedwek, 1999)
■ Mass education (de Boeur, 1999)
■ Student as consumer
■ Increased competition (de Boeur, 1999; Nedwek, 1999)
■ Increasing financial pressure
■ Shifting autonomy between faculty and administration
■ Increased entrepreneurial mission

Table 2.3: items impacting the university's struggle with identity

Universities have historically struggled with a tension between centralized administrative control and local departmental autonomy. Karl Weick (1982) describes the organisational structure of the university as a 'loosely coupled community of scholars' which consists of semi-autonomous units loosely governed by an administrative whole. The community of scholars organize themselves in this manner in order to maintain their individual identity and a degree of logical separateness. An often-used metaphor for describing this organisational form was noted during an ECIS (2000) panel session on the management of IS in higher education:

> "...Universities are like collections of fiefdoms where barons (and baronesses) are in charge of their own, independent realms, and vigorously defend their territories." (Allen, Kern, Newman, & O'Keefe, 2000)

This manner of organising supports independent scholarly work whilst simultaneously enabling the administration of the larger university community.

However, a tension does exist when managers seek to support and control scholars whose work is dependent upon their autonomy (Weick, 1983). De Boeur (1999) regards the tensions inherent in

this loosely coupled structure as a side effect of 'marketisation' of the university where in order to handle the changing university context, there is an increase in both the quantity of university administrators and their importance in relation to faculty members. This environment is defined by Trow (1994) and adopted by others (c.f., Reed, 2000; Gibbons, Limoges, Nowotny, Schwartzman, Scott, 1994) as 'managerialism' where the governance of the university is taken over by managers whose goal in to increase administrative efficiency.

Gradations of managerialism are articulated by de Boeur (1999) where a 'soft' perspective aims to retain a great deal of strategic power with faculty and the 'hard' perspective has an inherent distrust of academic agendas and aims to shape the university into a corporate business that can be governed in similar ways. Trow's (1994) bias against managerialism is clearly articulated in the article and expresses the sentiment that university identity is being negotiated: thus: "There seems to be a competition between managerial and academic values for possession of the university's soul" (Gibbons et al., 1994).

The managerialist approach to governance is similar to a corporate business style. This is nicely represented in McNay's (1995) model of universities as organisations. His topology describes university cultural as being dominated by one of four possible organisational scenarios: collegium, bureaucracy, corporation and enterprise. These models of organisation fall within a quadrant created by the crossing of "loose" and "tight" axes. The first axis refers to the nature of policy definition within the culture of the university, and the second axis relates to the degree of control found in implementing activities within the university.

McNay argues that universities are moving away from the traditional collegium culture where official policies are loosely defined and there is a high level of autonomy with little concern for implementing control. Instead, they are transitioning through the cultures of bureaucracy and corporation until finally transforming into an enterprise culture where fragmented work groups retain managerial and economic control of activities. These units will be connected as a larger organisation because of an overall mission. McNay expects that this progression will be facilitated by information and communication technologies.

In contrast, a two-year research project on the viability of 'virtual universities' as supported through ICTs has generated a number of papers on the way in which technology in general and ERP in particular impacts the university form (Pollock & Cornford, 2001; Cornford, 2000; Pollock, 1998). Cornford's research found that implementing ERP in order to transition to a flexible enterprise model meant that universities were actually confronted with technologies that "appear to be generating pressures for the establishment of a far more corporate form of organisation". He argues that technological design is making the structure more 'concrete' because previously tacit routines, policies and knowledge that were taken for granted, must become formalized and made explicit in order to become inscribed within the software and accompanying business processes. This process requires previously independent parts of the university to interact more regularly and in a standardized manner. Ironically, the form of future universities will be more stable, corporate and concrete than anyone would have imagined (Cornford, 2000).

This is particularly problematic for Cornford because he argues that despite the introduction of powerful technology inscribed with for-profit, corporate values, university actors are still committed to the *collegium* culture:

> "In spite of more than a decade of managerialist reform, the collegium or the 'traditional university' remains an important self-image or paradigm for most university institutions...'The university' appears as a highly heterogeneous and poorly articulated institutional ensemble, which to a large extent exists in the heads of the people who constitute it, and in a myriad of locally negotiated practices and interactions."

This quotation emphasises the traditional university form as a highly valued network or collective of people, roles, technologies, structures, lines of responsibility that together create a stable work environment for both administrators, faculty, and students. This perspective is in keeping with the study presented earlier by Allen and Kern (2001) who found stories of resistance to ERP within universities because the business assumptions underpinning the technological design were at odds with traditional ways of organising.

As universities struggle with their identity in order to compete within an increasingly complex environment (Barnett, 2000), both faculty and managers have turned to information and communication technologies for support. These information systems are infiltrating the teaching, research, and governance arenas of university work life. Yet almost without exception IS researchers have focused on technology in support of pedagogy (c.f., special issue of Information, Communication and Society, v3 no. 4, 2000). Interestingly, this phenomenon mimics the collegium culture because academic researchers tend to ignore 'back office' administrative issues as if they do not impact the research and teaching of the university (Darking, 2002). We argue that ERP technology should be a concern of administrators, students, and faculty alike because as

Scott (1998) aptly states, seemingly mundane systems can provoke a 'revolution under the cloak of normality' where organisational values are redefined through IT-enabled change initiatives.

7.3. Discussion and future research: Considering what stories work and for whom

This study suggested that creating an information system that is accepted as a matter of fact by constituent actors is more likely when the design takes into account valued legacy practices and incorporates the past into future operations. This was illustrated through the shifting of accounting margins at Ivy where commitment accounting functionality was determined to be a prerequisite for faculty acceptance and use of the ERP. We argue that the likelihood of a system being naturalised within an organisation increases when there is continuity between the legacy operating environment and the proposed future activities. The phase-one ERP failed to be accepted as a matter of fact because its accounting module ignored the grand narrative that had informed Ivy University for many years. We found that Ivy's overall strategies for the design of the phase-one accounting functionality were informed by business logic but ignored its academic mission underpinning budgeting and grants management activities. Naturalising the accounting functionality was more difficult to achieve than other ERP modules because the administrative tasks involved multiple and conflicting interest groups whose views of the world differed dramatically. This suggests that integration cannot always be achieved by mandating a standard view of the world to which all actors must subscribe.

The analysis of the post-installation customisation of the phase-one ERP showed that integration is better understood as a process of selectively negotiating with network interests in order to create

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a workable system – a 'good enough' solution that meets multiple and interpenetrating needs. The analysis of boundary objects and methods standardisation showed the relevance of a grand narrative in designing an information system. When manoeuvring through computer-mediated change initiatives, we must hold on to the historic values and ethics of the organisation because negotiation is two-fold. A vision for the future must enrol actors but so too must negotiators consider what works for the organisation based on its past activities, and its present mission.

It was in the post-installation environment that disparate Ivy networks experienced a moment of emergence where their past and potential futures were reordered through the rejection of the phase-one ERP. No longer were faculty silenced, and no longer could the core group strive for consensus. The project team had conceptualised Ivy University as a rational structure whose administrative backbone could be systematically reorganized according to a business-based paradigm. Underestimating the rhetorical power of Ivy's unifying narrative threatened the stability of its strategic mission. Whilst the phase-one ERP was indisputable as a technological artefact, its grand narrative of Ivy as a 'huge financial behemoth' – a *business* – was unable to silence the legacy of the University as a bastion of intellectual development and scholarship.

The academic network was determined to keep the historic grand narrative of Ivy alive and argued that any *working* information system must carry forward in time the values of scientific separateness and academic freedom. The grant accounting debate illustrates the power of faculty to transport these values into the present and enrol support for carrying the past into the future. The negotiations surrounding commitment accounting versus a time-phased budgeting approach represented trial of strengths over which the University's future was being decided. The question

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to be answered was not just about whose stories would be recognised as valuable but also whose perspectives would inform and guide the mission of University education and research.

An actor-network analysis provided insight into Ivy's struggle to answer these questions. Our initial research question framed this issue by asking how an organisation can negotiate with technology to create a matter of fact that binds disparate groups together for better or worse. This study's analysis showed the process of negotiation and also the implications of choosing with whom those in power would negotiate. The quotation in the beginning of part II of this dissertation introduced the squashing of organizational silos as a result of dramatic accounting change. The narrator implies that conflict is a natural part of implementing a new system. From his perspective the agenda for actors is to *be included* in these negotiations – to have a story that is plausible and focused on moving forward. We remind the reader of part of the technical leader's story:

> "You don't like it? You are out of the consensus picture. If you are more inclined to accept the changes and deal with them then you are in the narrow universe of people we will work to have consensus with."

This is a provocative and insightful excerpt of Ivy's phase-one implementation strategy. However we would nuance this perspective and argue that one can be included in negotiations without wholly subscribing to the dominant vision of the future.

As Star (2002) reminded us in chapter six, knowledge disciplines such as universities are not premised on consensus. Rather actors can coordinate without always having to share the same epistemological position. It is in these debates that the basis of the university is formed. These

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negotiations sum up to the grand narrative that will constitute university life and all it stands for. Therefore, actors whose narratives are speak only of the past are trying to combat the irreversible arrow of time (Adam, 1995) which pushes us forward. As such these actors do not provide a plausible narrative that can inform the future. In this way these stories do not work and therefore cannot be considered equal to others. The effect is that these stories become silenced because of their irrelevance to the negotiations occurring within the change initiative. We were able to access some of these stories but we found that their interests were not connected to the network alliances who were shaping Ivy's future. As such their presence within the University was recognized, but their stories could not be interpreted as equal to those involved in moving forward.

Instead what is at risk is that plausible futures for the University informed by traditions different from those underpinned by the ERP will be forgotten. The design of the phase-one ERP inscribes powerful stories informed by 'for-profit' business concepts which outweighed time-honoured, locally-based traditions. The Project X initiative represented a time during which faculty values and agendas were silenced from Ivy's plotline and replaced at will, in part because faculty themselves did not care to have a voice at that time. However, the introduction of the phase-one system into the University community twists the narrative plot and faculty find they are no longer the main protagonists in Ivy's grand story, but instead are secondary to the storyline which has been overtaken by issues of administrative integration and professionalisation.

Alvarez (2002) conducts an interpretive case study within a large US university and argues that its organisational values were centred around the integration of work practices prior to choosing to embark on an ERP project. Her interpretation of these organisational values derives from

communication with university management and senior leadership who de-legitimised the previous 'template' of work practice. Their powerful perspective was able to generate a 'myth of integration' that was supported by ERP technology. In turn, the ERP is constructed by university members as an integrated solution thereby aligning the technology with ideal organisational values.

However, we question the author's interpretation of 'university values' being equivalent to the powerful narratives of senior executives. Certainly values of integration are less important to faculty than the consideration of academic freedom and scientific separateness. Nevertheless, her study highlights ERP as a technology synonymous with integration – a characteristic historically at odds with university collegium culture. We argue that over time Western society's grand narrative of ERP has begun to disintegrate as organisations implement the technology and find it problematic. This thesis directly questioned the notion of integration as synonymous with standardisation of work practices and considered what stories of ERP were brought forward from the phase-one design only to be later overwritten by customisation efforts. One area for future research would be to consider the extent to which a backlash will come to the ERP trend as a result of its best business practice design.

For example the Ivy-Oracle ERP package is currently being sold as inscribing the best business practices for global University contexts. As people try to apply these practices to their local situations we argue that they will have to evaluate the extent to which their local work practices are of greater value than those mandated by the ERP. Such a choice was adopted by Ivy but not without a price. It would be interesting to consider the extent to which the best business practice

model is storing up trouble for ERP software companies and the perceived value of outsourcing strategies and application service provisions (ASP) agreements.

In a recent book published on ERP, Oliver and Romm's (2002) chapter lists integration as a motivating factor when it comes to adopting ERP software within the university context. The authors summarise their findings as follows:

> "Usability, flexibility, more effective maintenance, business process reengineering and the modernization of systems…now dominate issues of performance improvement. Integration of systems and data is confirmed as a powerful motive for ERP investment. Risk avoidance is also a motive for renewing legacy applications with more modern ERP systems, which are assumed to present fewer maintenance problems."

This quotation highlights risk reduction as an expected benefit of ERP systems. Interestingly, the IS literature is almost non-existent with regard to the core financial module of ERP suites which we argue is central to issues of risk management within organisations. The financial module provides the backbone upon which all other module are connected and, according to a recent study, is adopted by organisations more than twice as often as any other module (Themistocleous, Irani, O'Keefe & Paul, 2001). Yet limited articles were found within the IS literature that explicitly focus on the financial module. One study does so by considering the changing role of management accountants as a result of an ERP implementation (Caglio & Newman, 1999). Another study is in progress and was presented as a short conference paper (Chang & Gable, 2000) on the major issues involved in the lifecycle of the 'SAP Financials' module. Neither of these studies addresses the accounting context in depth to consider the implications of shifting computer-mediated financial management practices within organisations.

Drawing on accounting scholarship as a reference discipline points to the early emergence of ERP related studies. Quattrone and Hopper (2001) use the context of ERP project initiatives to conduct a theoretical analysis of the nature of change. They publish this study in a refereed accounting journal, but it is directly relevant to the IS community as the authors argue for a reconceptualisation of how change occurs within local contexts so that we can better understand the ways in which new information systems shift the nature of work life. Briers and Chua (2001) allude to ERP technology in their study of an attempt within an organisation to shift the accounting information system from one of standard costing to activity-based costing (ABC). The authors argue that ABC and ERP are 'new managerial technologies' that have implications for the financial management of organisations as well as the general nature of work tasks and business processes. In the final section of their paper they call for further accounting scholarship focused on ERP technology and its ability to connect disparate parts of an organisation.

Shifts to calculative practices such as accounting and the work of classification are key aspects of ERP implementation projects and offer opportunities to inscribe a preferred worldview within system artefacts and in turn, define the post-implementation activities of the organisation. We argued in this dissertation that what may have appeared at the surface to be a semantic argument over vocabulary/accounting jargon, can be reinterpreted as powerful political acts, the outcome of which will indicate who/what is valued within the organisation (Miller 1998).

The systemic impact of ERP within North American Universities has implications for teaching and research missions. The ERP legitimises administrative and managerial identity within the University. Further business students are becoming inducted into this software through their core

management course where academic topics are being taught through ERP software. This creates a self-reinforcing cycle both in terms of students and faculty. As the technology proliferates, students feel compelled to learn this technology in order to have an advantageous position within the job market and faculty are conscripted into the role of software trainer in order to keep their classes filled to capacity. Winner (1978, 1997) makes the argument that technological systems are the nexus between academia and the business environment where education becomes the training ground for corporations seeking cookie-cutter employees. This demand is shaping the ways in which the contemporary university can define itself because some stories may no longer be plausible.

Enter most universities today and you will hear the language and narratives of corporate America. Certainly, at Ivy, notions of integration and standardisation, outsourcing, best business practices were prevalent. However, we side with Winner who argues that there are also voices that call for the 'pulling forward' of valued academic norms. It is only through the voices of action that we can be hopeful for a contemporary university that is both industry facing and academically informed. As we saw in this dissertation the story of the university does not have to be one of commercialisation, but we must actively negotiate with multiple perspectives in order to determine what we value enough to bring with us into the future.

Despite feelings of leadership betrayal on the part of faculty and their staff, many of the stories we gathered during the first year of system use were of those actors who wanted to move forward and perpetuate Ivy's history – its legend. The vast majority of actors shed blood, sweat, and tears for the love of Ivy in order to try and create a working information system that would perpetuate the

institution. Ironically, the process of 'making the ERP work' was defined in different ways. The project team became enrolled in a global narrative of business practice which modified the grand narrative of Ivy changing how the University could define itself in the future. It was through the team's dedication during Project X that this cherished story of Ivy was modified – damaged or improved depending on one's perspective.

Classifications are inscriptions of compromise that result from negotiations between multiple communities of practice (Star, 2002). For information infrastructures such as ERP to be useful they must be based upon flexible classifications that gain acceptance and use within multiple social worlds. Where the Central Budget Office attempted to force a new centre of calculation within Ivy, their strategy failed to account for a certain amount of difference within the University, we argue that if a 'pure' ERP system is to be naturalized within Ivy the core group will have to reconsider its strategy for gaining control, accountability and auditability. Until a hybrid temporality is created that meets the needs of Ivy's diverse community, the ERP will fail to become 'part of the furniture: a local resident' (Silva & Backhouse, 1997). In this way the ERP will remain a stranger: an actor who comes and stays a while – that both belongs and doesn't belong (Bowker & Star, 1999).

The ERP that exists at the time of writing could not have been planned for – the information system is a heterogeneous composition representing each group and negotiated outcome that preceded its acceptance into the local community. This will continue to be the case as the system and its functionality drifts to meet organisational agendas and vice versa. For this reason an analytical understanding of negotiating between socio-technical collectives should be a part of any

IT project management strategy. As Hammer said at the 2002 Strategy World Conference (Said Business School, 2002) "execution is strategy" in contemporary society. It is not merely the grand vision that creates organisational success but rather the ability to negotiate end-to-end operational processes that is key for maximising organisational potential.

We illustrated in this dissertation that fostering a strategic vision requires translating that story into purposeful action. For practitioners this suggests that whilst control of IT is illusory during project management, the cultivation of relationships between a grand strategic narrative and the small daily stories can foster empathy during times of uncertainty and change. Similarly, this suggests for IS research that making ERP work within organisations is neither about control or drift but purposeful and selective negotiation between strategic ideals and tactical activities. This dissertation presented a story of holding onto grand narratives in spite of complexity. These narratives are not comprised in the way we think of 'master' stories, and they are not of the topics we are used to seeing. They are comprised as collectives – sympathetic in spite of difference. Topics are about perseverance and making it work in a complex world. they are not about success and failure.

The fact that the Ivy community achieved compromise should not be interpreted as an endorsement of ERP as the most appropriate solution for the University or higher education administrations in general. Making their ERP work has been, and will continue to be costly, for Ivy in both monetary and human terms. The continued cost for Ivy as it leads software development on behalf of Oracle's Higher Education Special Interest Group (SIG); a network within an independent user group working to "increase members' knowledge and understanding of

Oracle Applications and to communicate issues and needs to Oracle Corporation (www.oaug.org/hiedoaug/).

Our analysis showed that unity is facilitated through an organisational 'grand narrative' that inspires the agenda of *making it work*. Seizing this story as a graspable truth – or organisational fact – helps guide complex change initiatives and creates a system that may not easily be classified as a success or failure but rather as a workable compromise. Making technology work is a story that is applicable beyond ERP implementation; it is a story that often exists in organisations but is rarely told. The organisational tales of blood, sweat, and tears are often suppressed in favour of a 'success story' and their complexity reduced to 'factors'.

We argue that in every case of success and failure there are stories of negotiation – of actors manoeuvring through change and order – it is in these details that we can learn how to integrate multiple perspectives whilst maintaining a degree of heterogeneity. Ivy provides us with a compelling story of integration telling us that organisational grand narratives exist but they are not credos about *how to live* or mandates from visionary leaders. Rather these unifying stories sum up the work of individuals whose sympathetic efforts result in a University both similar and different to its past.

Whilst we agree with Latour (1991) that "technology is society made durable" (p. 103) because it gives substance to community interests and alliances, any attempt to shift societal agendas through technological information systems may be in conflict with the grand narrative that represents

organisational ethos. As such developers and team members should be aware that the energy and commitment required to make a new system work derives not just from technological artifacts, institutional mandates, and regulatory compliance but also by designing systems that reflect the grand narrative to which actors subscribe. The difficulty in the ERP initiative at Ivy was that the project team didn't give sufficient rhetorical regard to Ivy's grand narrative when they designed the technology and its associated business processes. Instead they conceptualised the University as a rational structure that could be systematically reorganized to incorporate US corporate business practices. Ignoring the power of the grand narrative was perilous for Ivy during Project X because it was the extra-rational parts of the story that motivated employees to go above and beyond the call of duty during significant events and inspired loyalty and trust by suggesting to them that they are connected to a larger whole.

For example, academic administrators have for years been considered experts in their domain and as such they have contributed to sustaining the vision of the University as an elite institution through their dedication to Ivy – the actor. Faith in the University as a protector of their welfare and also as one to be protected meant that these users gave their all when the system went live despite their feelings of betrayal by leaders who had promised an improved administrative environment. These users worked through dramatic cases of stress-related health problems, lack of balance between multiple social times of family, friends and career, and fears of lost expertise as the desirable skill set shifted from one of Ivy-specific knowledge to sophisticated analytical and technological skills. This commitment sustained Ivy's grand narrative and suggests that making a system work involves acknowledging not just a multiplicity of stories that exist but the need to unify that heterogeneity in order to achieve a viable operating environment.

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Appendices

Journals A-K	Journals J-Z
Administrative Science Quarterly	JIT
AMIT	Journal of Higher Education (JSTOR)
AOM Review	Journal of Management Information Systems
Communication of ACM	Journal of Management Studies
EJIS	JSIS
HBR	Management Science
Higher Education (Kluwer)	Organisation
Higher Education Management (Igenta)	Organisation Science
Information and Management	Organisation Studies
Information Society	Research in H.E.
Information, Communication and Society	Sloan Management Review
Innovative Higher Education	Sociology of Education (JSTOR)
International Journal of Information Management	
IS Frontiers	**Conference Proceedings**
ISJ	ICIS
ISR	ECIS
IT and Management	IFIP
IT and management	AMCIS
IT and People	

Table 2.1 List of journals and conferences surveyed for ERP articles

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	Organisational type	Summer 99	Winter 99	Spring 00	Summer 00
1	End user - administrator - YSM Business Centre	✓	✓	✓✓	✓
2	End user - Non-academic department			✓	✓
3	End user - Non-academic department			✓	
4	End user - Non-academic department			✓	
5	End user - Non-academic department			✓	
6	End user - Science Hill		✓	✓	
7	End user YSM			✓	
8	End user YSM			✓	✓
9	End user YSM			✓	✓
10	End user YSM			✓	✓
11	End user YSM		✓	✓	
12	End-user in S.Science department with Grants				
13	Ex-Project X team member - Technical	✓	✓	✓	
14	Faculty in School of Management			✓	
15	Information librarian - in charge of intranet resources		✓	✓	
16	Institutional leader +project champion	✓		✓✓	
17	Institutional End user	✓		✓	✓
18	Institutional End user - GA Team		✓		
19	Institutional End user - GA Team	✓	✓		
20	Institutional End user - YSM Business Centre	✓	✓	✓	✓
21	Institutional Leader	✓			
22	Institutional Leader - Project X advisory role	✓	✓	✓	✓①
23	Institutional Leader - YSM	✓		✓	✓①
24	Institutional leader + represents users and provost		✓	✓	
25	Liasion between end-users and system		✓		
26	Part-time Project X team member - Functional + End user	✓		✓	
27	Part-time Project X team member - Functional +YSM change driver	✓	✓	✓	✓
28	Project X - change management and training		✓	✓	✓
29	Project X - integration testing	✓	✓		
30	Project X - software representation	✓		✓	✓
31	Project X at Institutional level	✓		✓✓	
32	Project X functional leader - Institutional leader	✓✓	✓✓	✓✓✓	✓✓✓
33	Project X team member - Functional	✓	✓	✓✓✓	✓✓
34	Project X team member - Functional	✓	✓	✓	
35	Project X team member - Functional	✓		✓	
36	Project X team member - Functional	✓	✓	✓	
37	Project X team member - Functional	✓	✓	✓✓	
38	Project X team member - Functional + Change management	✓			
39	Project X team member - Functional + Institutional Leader	✓			✓
40	Project X team member - Functional + Institutional leader	✓	✓	✓✓	✓
41	Project X team member - Functional + Institutional leader	✓		✓	✓
42	Project X team member - Functional +YSM training	✓	✓		✓
43	Project X team member - Functional/OGM	✓		✓	
44	Project X team member - Mix	✓			✓
45	Project X team member - Technical	✓	✓		✓
46	Project X team member - Technical	✓	✓		✓①
47	Project X team member - Technical	✓	✓	✓✓	

8	Project X team member - Technical	✓					
9	Project X team member - Technical	✓	✓				
0	Project X team member - Technical leader	✓			✓		
1	Project X team member + Payroll director post implementation				✓		
2	Senior Institutional Leader			✓✓	✓		
3	User representative for changes to system		✓	✓	✓		
		34	27	40	28	1	
	Storyboard -PI Report		✓	✓			
	BOP Meeting			✓✓✓✓			
	Problems in Large Units			✓			
	Input group meeting - large admin departments			✓			
	Physical Sciences Luncheon			✓			
	Science hill			✓			
	Serminar with Peter Block				✓		
	Tottal Meetings	0	1	9	1		
	Grand Total						1

✓① = Meeting included Dr. Susan Scott

.3: Interviews conducted at Ivy University