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On the interpretative flexibility of hosted ERP systems

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Abstract

This paper explores the interpretative flexibility of ERP systems through the study of a project to implement a hosted system for the Central Accounting Department of a large multinational. The paper presents intensive case study data around the decision to implement the system and analyses it in terms of the interpretative flexibility of the system. The paper questions the extent to which technological features of the new system influence the perceived flexibility of the system.

1. Introduction

For more than 40 years, technology-based organisational transitions have captivated academic researchers who have used examples of innovations to look beyond the particular effects of specific new technologies on organisational structures and business processes to theorise the technological artefact. Through the studies of numerous systems and their implementations, researchers have developed an increasingly sophisticated understanding of the role that technology plays in relation to organisations and society more generally.

Every new technology provides an opportunity to highlight nuances about the technological artefact and to ask further questions about the relationship between technology and society. Within this research programme, this paper studies enterprise resource planning (ERP) systems. The large scale of the ERP systems, coupled with

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their claims to provide 'best practice' support for organisations raises many new areas of interest. For example, it is common to speak of ERP systems as being 'configured' rather than 'programmed' and for any implementation problems to be seen as organisational rather than technological failings. As a result, ERP systems are very different to early centralised office data processing systems or the later desk top computing and end-user computing and will highlight different aspects of the technology–society relationship.

There is a significant body of research that has been devoted to the implementation of enterprise resource planning systems (e.g. Howcroft and Truex, 2001/2002; Newell et al., 2003) as companies have increasingly opted for this generic packaged software in favour of custom-developed systems (Lucas et al., 1988, p. 537). The prospect of replacing 'home grown' legacy systems with the integrated business solution offered by ERP systems like SAP/r3, PeopleSoft and Oracle, has proved to be irresistible (Caldwell and Stein, 1998). The momentum that surrounded these 'off-the-shelf' software packages in the 1990s is captured by what Ross (1998) terms 'The Enterprise Resource Planning Revolution'.

The majority of adopting organisations that have joined the 'ERP bandwagon' (Kremers and Dissel, 2000) have presumed that with relative ease they can benefit from the alleged 'best-of-suite solutions' that are embedded within the business processes of these generic packages (Robey and Boudreau, 1999b, p. 291). The latest innovation enables global companies to host generic or customised SAP systems through networked servers across multiple sites.

Much of the published research on ERP has been about the specific benefits of the technology or particular features of their implementation in individual organisations (Francalanci, 2001; Murphy and Simon, 2002; Ragowksy and Somers, 2002). However, Lee (2000) argues for the information systems research community to try to develop a cumulative and current body of research findings 'despite the never-ending onslaught of newly emerging technologies' (Lee, 2000, p. viii) by using the experiences with particular instantiations of the information technologies themselves to produce 'contributions to theory' that emerge in the interactive system effects between the technological and the organizational.

> The aim of this paper is therefore to contribute to this tradition of conceptualising the IT artefact through the study of ERP systems.
>
> This paper presents an interpretive, impressionistic study of the implementation of hosted ERP systems in a division of a large multinational.

When conceptualising ERP systems as a form of technological artefact (Orlikowski and Iacono, 2001), a variety of approaches have been adopted in the literature. One common form, given the large scale nature of the systems, has been adopted by Ciborra and associates (2000) who consider the technology as an information infrastructure and emphasise its large, interconnected nature and installed base (Star and Ruhleder, 1996). Viewing the system as an infrastructure highlights many similarities with institutions (Avgerou, 2002; Scott, 2001; Zucker, 1977) and this notion is explored critically Section 2.

2. Literature review

2.1. Technology as institution

Until recently, the predominant logic employed in IS theory was deterministic (Robey and Boudreau, 1999a, p. 168) with the assumption of an objective physical and social world which places technology in the role of an external agent that can exert 'unidirectional, causal influences over humans and organisations' (Orlikowski, 1992, p. 400). The technological determinist view is a positivistic, technology-led theory of social change in which technology in general is seen as the fundamental premise underlying patterns of social organisation (Heilbroner, 1994).

Deterministic theories adopted a narrow and objective lens in an attempt to identify a common relationship between technology and organisation—a perspective that was clearly incomplete (Scott, 1987, p. 507). Institutional theorists have attempted to address this shortcoming by directing 'attention to the importance of symbolic aspects of organisations and their environments' (Scott, 1987, p. 507). They reflect and advance the stance that perceives no organisation as a mere technical system, but as a social system that exists in an institutional environment that 'delimits social reality' (Scott, 1987, p. 507).

Organisations become less expendable as they are infused with value and so participants actively seek to preserve them, promoting the persistence of structure over time (Scott, 1987, p. 493). The definition of institutionalisation is extended by Zucker (1977, p. 728) to describe the point in the process when the meaning of an act or a technology is a 'taken-for-granted' part of social reality. Thus, institutionalisation is viewed as a social process by which participants come to accept an 'objective and exterior' (p. 728) definition of social reality whose validity is seen to be 'independent of the actor's own views or actions' (Scott, 1987, p. 496).

Meyer and Rowan (1977) place great emphasis on the growth of 'rational myths' or shared belief systems that give rise to the existence and elaboration of organisational forms. However, Meyer and Rowan recognise that organisations do not necessarily conform to a set of institutionalised beliefs purely because they 'constitute reality' or are 'taken-for-granted'. A variety of processes may cause an organisation to alter its structure in ways that make it conform to an institutional pattern (Scott, 1987, p. 498), including the reward of increased legitimacy. According to Suchman (1995, p. 574), legitimacy enhances both the stability and the comprehensibility of organisational activities and is intimately related to the process of institutionalisation. Scott (2001) introduces three pillars of institutions—the Regulative Pillar, the Normative Pillar and the Cultural-Cognitive Pillar—and he indicates that each of them provides a different basis for legitimacy and, hence, social conformance.

These pillars should be applicable not only to organisational structures, but to any institutional entity. Recent theory has indicated that information technology itself can assume the properties of an institution or a formative context as it takes shape in relation to other institutions of modern society (Avgerou, 2002; Ciborra, 1993, p. 31). According to this view, the legitimacy surrounding an information infrastructure, for example, is also a reflection of its embeddedness within a system of institutionalised beliefs and social scripts (Suchman, 1995, p. 574).

Information infrastructures can be regarded as institutions or formative contexts (Ciborra, 1993) on the basis that they 'constitute the background condition for action, enforcing constraints, giving direction and meaning, and setting the range of opportunities for undertaking action' (Ciborra and Hanseth, 1998, p. 315). The implication is that as they are 'infused with value' they become more taken for granted and less expendable.

Institutional theorists have emphasised that the many dynamics of an organisational environment stem not from technological or material imperatives, but rather from cultural norms, symbols, beliefs and rituals (Suchman, 1995, p. 571). Nevertheless, there is an apparent neglect for the capacity of humans to intervene or resist the 'over-determined' (D'Andrade, 1984, p. 98) structural and technological 'constraints' on action. A determinist scenario is therefore, implied within institutional theory that places technology and/or structure as the main protagonists, leaving a marginalised role for individual actors in the flow of events.

This logic would appear to collapse in the face of studies that demonstrate inconsistent effects from the same technology within a single organisation (see Buchanan and Boddy, 1983; Burkhardt and Brass, 1990; Orlikowski and Gash, 1994). In addition, many studies of groupware technologies have demonstrated the ways in which identical technologies are appropriated differently by different groups, thereby producing inconsistent effects (DeSanctis and Poole, 1994). Such contradictory outcomes emphasise the role of human agency and challenge the uniform effects that might have been expected with a deterministic logic.

Although the thrust of institutional theory has been to account for continuity and constraint in social structure, this need not exclude the ability of individual actors to create, maintain and transform institutions (Scott, 2001, p. 75). That is to say, structure and agency need not be separated and, indeed, an attempt is made to incorporate both elements in Giddens' Structuration Theory and Actor Network Theory.

2.2. Technology as structure

Structuration Theory is advanced as an integrative meta-theory that incorporates both subjective and objective dimensions of social reality. Giddens (1979) introduces structuration as a social process that involves a reciprocal relationship between human actors and the structural properties of organisations. Although structure is believed to be both constraining and enabling, the theory of structuration rejects the terms in which structure appears as something 'outside' or 'external' to human action and, instead, structure is understood at a temporal level of analysis, in the 'memory traces' (Giddens, 1984, p. 25) of social actors. As such, structure and action are analytically related through the 'duality of structure' to represent how the daily activity of social actors 'draws upon and reproduces structural features of wider social systems' (Giddens, 1984, p. 24).

The related concept of agency refers to an actor's 'transformative capacity' (Giddens, 1984, p. 15), the ability to have some effect on the social world by altering the rules or the distribution of resources. There is a recognition that actors are both knowledgeable and reflexive and are thus able to monitor and account for their actions, even if unintended consequences result. This presence of agency 'presumes a non-determinant, voluntaristic

theory of action' (Scott, 2001, p. 76) that empowers actors 'to 'act otherwise' … to intervene in the world, or to refrain from such intervention' (Giddens, 1984, p. 14). An element of choice is implicit in action, even where only one feasible option exists, because 'awareness of such limitation, in conjunction with wants, supplies the reason for the agent's conduct' (Giddens, 1984, p. 309).

Structuration theory is therefore, wholly in support of a more proactive role for individual and organisational actors, as well as a more reciprocal view of institutional processes (Scott, 2001, p. 76). There is a rejection of the notion that institutions can exert unidirectional forces that can constrain actors in their daily lives, leaving them no option but to comply. Rather, the rules and resources that make up the structural properties of social systems are mediated and reaffirmed by human actors in their ongoing interaction with the world. Institutionalised properties have no objective existence, but are reinforced by the regular action of knowledgeable and reflexive actors (Orlikowski, 1992, p. 404).

Structuration theory rejects the perspective that technology is an institution or a formative context in its own right. Instead, there is believed to be a reciprocal relationship through which users shape the technology structure that shapes their use. Thus, rather than structures being inscribed into technology and hence considered as external or independent of human agency, they emerge from the repeated and situated interaction with particular technologies (Orlikowski, 2000, p. 407).

In the Structurational Model of Technology, Orlikowski (1992) proposes that:

> technology should be considered as one kind of structural property of organisations developing and/or using technology. That is, technology embodies and hence is an instantiation of some of the rules and resources constituting the structure of an organisation (Orlikowski, 1992, p. 405).

Orlikowski therefore, equates technology with structure, and as such, she attributes a virtual existence to technology which can only be 'made real' through its instantiation during use mode (Dobson, 2001, p. 73; Orlikowski, 2000). That is to say, it is only through the appropriation of humans that technology can exert any influence.

Structuration theory is undoubtedly useful in defining the role and effects of agency, however, in recent years it has been argued that its subjectivist ontology can make it difficult to account for technology as a material artefact that exists independently of social practices (Archer, 1995; Dobson, 2001; Monteiro and Hanseth, 1996). Structuration theory is premised on the fact that humans and machines are not equivalent and, thus, the enduring materiality of machines and their consequent capacity to affect future outcomes are unacknowledged. In effect, technological artefacts become relegated to the status of tools in the hands of knowledgeable human agents.

Pickering (1995, p. 169) argues that 'technological innovations can indeed have an impact on the social', but he denies the 'autonomy and causal privilege that technological determinism grants to machines'. These two statements seemingly contradict each other because, as Kallinikos (2002, p. 287) argues, any effort to describe technology in a way that is 'amenable to local reshaping' is frequently deemed deterministic in an indiscriminate manner (Winner, 1993).

Kallinikos (2002) maintains that there is a great diversity across technological artefacts and that whereas some

> technologies are embedded in complex and technological and institutional dependencies that limit their contextual adaptability … others operate in relatively isolated settings, under conditions of considerable manipulability (Kallinikos, 2002)

This statement invites us to explore in more detail the distinctive status of particular technologies in addition to the unique character of situated factors.

An alternative reading of technology and structure is given by actor-network theory (Latour, 1996; Law and Hassard, 1998; Hanseth et al., 2004; Callon, 1991). Methodologically actor-network theory does not differentiate between human actors and non-human actants (such as ERP systems) and presents a performative view of society, where any outcome (such as an institution or system) is a contingent result, produced by the creation of temporary alliances and networks of heterogeneous actors. It therefore makes the researcher sensitive to the many different forms of work needed to create and maintain the net-work that we call a successful system (Wagner, 2002).

Actor-network theory has origins in science studies and semiotics (Latour, 1999), and so shares many similarities with social shaping theories such as the social construction of technology (MacKenzie and Wajcman, 1999). It also, however, has important differences with theories like structuration (Latour, 2004), particularly because of the relative position given to human agency in Giddens' work and the differing views of modernity the two authors have (Latour, 1993). In light of these incompatibilities this paper will take a structurational rather than ANT perspective on the topic.

2.3. Technology and interpretive flexibility

A significant number of commentators have suggested that the malleability of technological artefacts tends to decrease as the degree of interconnectivity and interdependency increases (Davenport, 1998; Hughes, 1994; Orlikowski, 2000, p. 409; Pozzebon and Pinsonneault, 2001, p. 336). However, this decreased malleability is attributed to more than just the material constraints of the technology—the 'perceived autonomy' (Rose and Truex, 2000) that humans attribute to complex infrastructures, that is, the extent to which humans behave 'as if' these infrastructures have autonomy or intentionality, may in itself influence social practice.

The likelihood of technological change therefore becomes increasingly delimited by an agent's ability to understand the potential of a given technology (Orlikowski, 1992), that is, an agent's interpretive flexibility. Social constructionists argue that a given technology has interpretive flexibility (Brey, 1997), which allows for different interpretations of its functional and social–cultural properties (Avgerou, 2002). Technology is hence socially constructed such that perceptions of its properties are largely if not exclusively determined by the interpretive frameworks and negotiations of relevant social groups. 'Stabilisation' is said to have occurred when different social groups arrive at a similar interpretation of a technology (Pinch and Bijker, 1987). The rhetorical process of agreement on the true nature of a technology results in 'closure' when the contents of a stabilised technology are 'black-boxed' and then taken-for-granted (Brey, 1997).

Thus, for example, Pozzebon (2001), addresses prevailing discourses about the rhetorical closure of ERP packages (that is, the idea that a given artefact is not open to change because it is 'well-defined, ready to use and able to set out the problem it sets out to solve' (p. 330)). To do this, she proposes to use interpretive flexibility, which she develops from (Orlikowski, 1992) and is defined as 'the degree to which people perceive a given technology as changeable'. This, in turn, depends on '(1) the technology's physical properties, (2) the users' knowledge, skills, and perceptions about the technology, and (3) the context in which users and technology interact' (Pozzebon, 2001, p. 331).

> The first research issue, therefore, is to find evidence of the differing interpretations of the technology that exist in the organisational context.

The notion of interpretive flexibility has been widely used (Chae, 2001, p. 582; Davenport, 1998; Gow, 2003; Hughes, 1994; Orlikowski, 1992, p. 421; Rolland, 2000, p. 585) to suggest that large information infrastructures tend to be less flexible than information systems due to the fact that they reduce users' interpretive flexibility (Chae, 2001, p. 582).

This operationalisation of interpretive flexibility is drawn from Orlikowski (1992) who uses the term interpretive flexibility to 'refer to the degree to which users of a technology are engaged in its constitution … during development or use'. It is influenced by characteristics of the 'material artefact', of the 'human agents' and of the 'context' (Orlikowski, 1992, p. 409). In particular, Orlikowski argues that the interpretive flexibility of any given technology is not infinite (Orlikowski and Gash, 1994, p. 409).

An added complexity is the imminence of large-scale packaged software, such as SAP r/3, which has tended to increase the separation between technological development and use (see Fig. 1). According to Orlikowski (1992) the technology designers, influenced by the institutional properties of their organisation (arrow_1), construct a technology to meet their strategic goals (arrow_2). Since these designers are involved in the 'design mode' of the technology, they will tend to have a higher interpretive flexibility and will therefore be less likely to treat the technology as 'fixed'. In the 'use mode', technology will appear to influence users (arrow_3) as well as the institutional properties of the organisation (arrow_4).

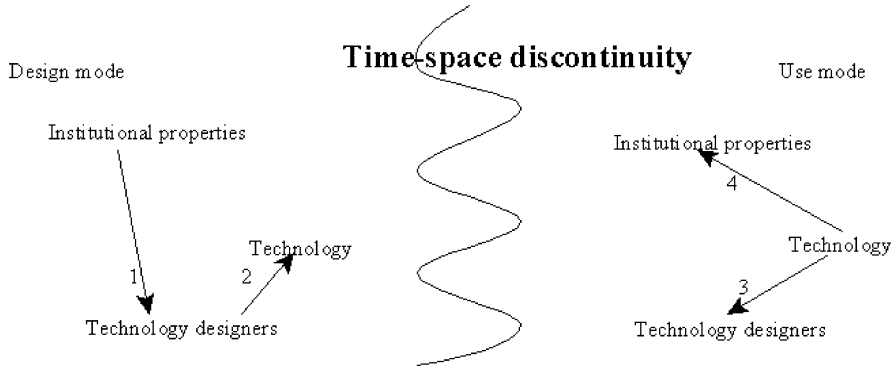

Fig. 1. The analytical separation of design and use for an inherited infrastructure (From Orlikowski, 1992).

The second research issue seeks to apply the time-space discontinuity to ERP systems and to explore the extent to which the hosted nature of the ERP system alters the perceived flexibility of such systems and to understand why a particular hosted implementation is 'taken for granted' or has a low interpretive flexibility.

Within the context of researchers drawing upon earlier work of others, Barrett and Walsham (2004) present counter-intuitive results. In their study of the use made of Star and Ruhleder's paper (Star and Ruhleder, 1996) they note that there was little use made by later texts of the central theories and concepts which, from the title and content of the paper were meant to be key contributions.

Bearing these lessons in mind, the next section revisits the original notion of interpretative flexibility, as proposed by Bijker et al. (1987). This is not done to argue for a true meaning of words (Wittgenstein, 1956), nor to suggest any deliberate particular slippage in usage ((Orlikowski, 1992) uses interpretive flexibility throughout the paper apart from one instance of interpretative flexibility (Orlikowski, 1992, p. 421)), but to introduce the third research issue of the paper.

2.4. Interpret*at*ive flexibility

Most uses of interpretive flexibility refer back to the collection of papers edited by Bijker et al. (1987) and particularly the paper by Pinch and Bijker (1987). This draws on work in the sociology of scientific knowledge and particularly the Empirical Programme of Relativism (EPOR) (Collins, 1981). The first stage of EPOR involves the demonstration of the interpretative flexibility of scientific statements, that is the way in which scientific findings are 'open to more than one interpretation' (Pinch and Bijker, 1987, p. 27). In particular, they argue, that this 'shifts the focus for the explanation of scientific developments from the natural world to the social world'. Where there is closure as to what the 'truth' is in any particular instance, this is the result of consensus and the second stage of the programme involves understanding the social mechanisms that limit interpretative flexibility.

Collins (1981) is even more explicit: the approach 'embraces an explicit relativism in which the natural world has a small or non-existent role in the construction of scientific knowledge' (p. 3).

The fine-grained analysis of ANT lends itself to the discussion as a means of providing a more specific language for describing the 'closure' of technical artefacts. According to ANT, closure results from the stabilisation (or rhetorical agreement on the meaning or status) of an artefact. Stability is continually negotiated as a social process of aligning a diverse collection of interests (Hanseth and Braa, 1998, p. 189) via translation (reinterpretation, representation) and inscription (patterns of use, design). Therefore, within a relevant social group, opinion is mobilised by various means and successful networks of aligned interests are created by enrolling a sufficient body of allies (Walsham, 1997). Using the tenets of ANT to enrich the stages of EPOR, we can state that interpretative flexibility is amenable to social shaping through the alignment of diverse interests into one coherent 'truth'.

Thus, the origins of interpretative flexibility do not relate to 'the technology's physical properties' or the characteristics of the 'material artefact'. Thus it is not appropriate to

claim, as Sahay et al. (1994) do that 'information technology is more interpretively flexible than production technology' (p. 250) as this would imply that information technology has some special (material) flexibility that is not found in production technology. Reframing the case from an EPOR perspective, it would be necessary to consider how institutional and network based closure mechanisms have limited the interpretative flexibility of production technology in relation to information technology.

> Thus the third research issue is to explore the extent to which what is being reported is interpretive flexibility (a materially constrained flexibility in the sense of Orlikowksi and Pozzebon) or interpretative flexibility (as originally described by Collins) and what the implications of these differing viewpoints are.

The three research issues are summarised in Fig. 2.

3. Research methodology

The research strategy was designed to emphasise the perceptions of key stakeholders (Pouloudi and Whitley, 1997) and so the researcher adopted an interpretive, qualitative mode of inquiry to capture sensitively the social phenomena under investigation (Cavaye, 1996, p. 232; Klein and Myers, 1999, p. 67; Stredwick 2001, p. 5). A positivist research approach was rejected on the grounds that it would ultimately reduce the case organization to set of static, uni-directional cause-effect relationships (Orlikowski and Baroudi, 1991, p. 9).

A qualitative approach was adopted to study phenomena in terms of the meanings people bring to them (Denzin and Lincoln, 2000, p. 3). Methods such as case study, ethnography and action research can be employed to the study of social and cultural contexts through the eyes of their inhabitants (Wagner, 2002, p. 57).

The case study method is considered to be particularly useful when a natural setting or a focus on contemporary events is needed (Benbasat et al., 1987, p. 373) and given the characteristics of the research site, a case research approach was chosen for this study.

A priori knowledge of the case was limited at the outset to a general idea that the accounting department being studied had recently initiated a project to introduce a hosted SAP system. Although this general information enabled the preparation of some initial open-ended questions, the boundaries of the phenomenon remained relatively unclear. That is, the researcher entered the field with a broad area of study but with no specific research question and so hoped to narrow the focus after conducting the initial interviews and observations. Such uncertainty is not uncommon before data collection has commenced (Strauss and Corbin, 1998, p. 38) and case analysis is a valuable means to develop and refine concepts for further study (Cavaye, 1996, p. 229).

- Is there evidence of differing interpretations of the technology?
- Are these differing interpretations driven by the time–space discontinuity or for other reasons?
- Is the evidence best understood as interpretive or interpretative flexibility?

Fig. 2. The research issues.

Table 1
Details of the interviews

User group	Position	No of interviews	Face-to-face	Telephone
Project team	Project manager	3	2	1
	SG team leader	2	1	1
	Inter-company manager	1	1	–
	Requirements intermediary	2	2	–
Systems group	Technical specialist	1	1	–
Reporting group	Accounts clerk	3	1	2
Processing group	Data-entry clerk	2	2	–
	Total interviews	14	10	4

3.1. Data collection

The first and second phases of data were collected between June and August 2003. Since then, email correspondence has been conducted with the study's interlocutors and follow-up telephone interviews were conducted in August 2003. Fourteen interviews were conducted in total, as illustrated in Table 1.

The first phase of research was open-ended and a set of emerging themes and concepts was produced from the data. The second phase of data collection was directed by concepts and themes that were developed during this first phase of analysis and hence, involved 'more strategic selection of informants and more structured interview protocols' (Orlikowski, 1993, p. 313). The follow-up phase was influenced by the emerging themes from the two previous phases.

3.2. Data analysis

Data analysis took place in three main phases: during the first phase, the iterative approach of data collection, coding and analysis tended to be open to various interpretations and more generative than the latter two phases, which were more focussed on developing the evolving categories, properties and relations.

Data analysis was guided by grounded theory (Strauss and Corbin, 1998), initially to narrow the area of study and develop a more focussed research question, and later with the aim of adding to a relevant body of theory from the findings of the case study. This approach has been effectively used in organisational research (Ancona, 1990; Orlikowski, 1993; Pettigrew, 1990) and is adopted here for three primary reasons;

First, there are few guidelines for analysing qualitative data (Miles, 1979, p. 590) and it has been argued that grounded theory approaches are particularly well suited to dealing with the type of qualitative data gathered from case studies (Charmaz, 2000; Martin and Turner, 1986, p. 143). Thus, it was felt that this research study would benefit from the systematic set of guidelines offered by a grounded theory approach.

Second, there is an attempt to correct the perceived imbalance between theory generation and verification in grounded theory (Bryant, 2002, p. 3) and, hence, during

the research process itself, theory evolves and is the product of a continuous interplay between data collection and data analysis (Goulding, 1999, p. 6). This would enable the researcher to develop an impressionist account (Mlcakova and Whitley, 2004), whilst simultaneously grounding the account in the observed data. This iterative process of interpretation seemed particularly useful here given that there was limited information available about the case study before the research commenced.

Finally, grounded theory facilitates 'the generation of theories of process, sequence and change pertaining to organizations, positions and social interaction' (Glaser and Strauss, 1967, p. 114). Thus, unlike traditional research, data is interrogated in the early stages of data collection to search for meaning and understanding (Glaser and Strauss, 1967; Goulding, 1999; Stern, 1994; Strauss and Corbin, 1998). The fact that this research approach could specifically include the elements of process and change that were anticipated during the course of the project was an added incentive to adopt grounded theory.

Notes and memos were written up soon after each interview as a means of documenting immediate impressions and directions for further inquiry (Strauss and Corbin, 1998, p. 110). Interview transcripts, observations and documentation were then analysed using 'open coding' (Strauss and Corbin, 1998).

The initial concepts guided the second phase of data collection, allowing the theoretical sampling of interview protocols, coding and analysis. At first data were grouped according to the categories that were generated during the first phase of analysis but this could only account for some of the findings that emerged from the second phase. This could be attributed to three main factors; the more focused approach to data collection, a greater understanding of the case study and finally, some important developments in the SAP project.

Concepts that had seemed less significant during the first phase of analysis were illuminated by the new developments, forcing a reconsideration of some of the initial observations. It was therefore necessary to re-sort and re-analyse the data collected in the first phase to take account of the 'richer concepts and more complex relations now constituting the framework' (Orlikowski, 1993, p. 315). The flexibility to sample on the basis of emerging concepts and to incorporate new insights during the course of study is regarded as one of the strengths of the grounded theory approach (Eisenhardt, 1989, p. 539). Contrary to claims that such flexibility is merely a disguise for 'poorly developed research ideas' (Bryant, 2002, p. 6), Eisenhardt perceives it as 'controlled opportunism', where researchers can 'take advantage of the uniqueness of a specific case and the emergence of new themes to improve resultant theory' (Eisenhardt, 1989, p. 539).

Due to the unfolding nature of the project, follow-up telephone interviews took place after the relevant theory in the literature review had been consulted. The follow-up data gave the researcher an opportunity to confirm and develop the concepts that had so far been observed and in turn, this enabled the researcher to verify if 'theoretical saturation' (Strauss and Corbin, 1998, p. 212) had been achieved. That is, whether the concepts gathered during earlier iterations of analysis were saturated or whether they could benefit from new data. In practice, saturation is elastic (Charmaz, 2000, p. 520) and given the developmental nature of the SAP project, the researcher was aware that an under-analysis

of the data could occur through the 'premature closure' of the case study (Goulding, 1999, p. 15; Skodel-Wilson and Amber-Hutchinson, 1996).

Further details of the analysis process are given in the appendices, alongside the results of the two stages of data analysis.

4. Background to the case

The case firm, Petrolco (name disguised), is one of the largest multinationals in the world. The case study is based on the central accounting department (CAD) of a UK branch, being the only Petrolco site that has a non-outsourced accounting function. CAD provides its accounting services to 200 companies across all business segments and this equates to a high level of specificity in their IS requirements. Within CAD there are three resource groups—the Processing Group (PG) handles all account 'inputs', the Reporting Group (RG) deals with the outputs of the accounting function and the Systems Group (SG) is responsible for managing the interfaces and data flows between the accounting packages and the rest of the business.

Early in 2003 CAD were informed that they would be replacing their dispersed accounting systems with a SAP platform. A project group was set up in April 2003 to have the new system ready by 1st January 2004. The current system (Sun Systems) has been in place for almost five years and CAD expected to upgrade to a new system within the next year. The initiative to introduce the packaged software was instigated by a senior management directive that is prompting business centres worldwide to adopt SAP as the new Petrolco standard. At the beginning of the project there were two options available to CAD:

> In-house hosting, This would involve hosting the SAP server on-site and managing the database administration (DBA) with the existing systems specialists (the server itself would be managed by an outsourced company).
>
> Off-site hosting, This would involve hosting the SAP server at a different Petrolco site that has already configured the software: there were two main options, one in the US, the other in Europe.

At the end of July 2003, when the researcher began her investigations at Petrolco, the project was just coming to the end of the first 'Scoping' phase. This functioned mainly as a business and systems requirements gathering phase. The decision to host the server in-house had already been ruled out by this stage and the main decision was therefore to choose between the two off-site locations. Each location offered a different configuration of SAP and neither location matched CAD's requirements perfectly. Part of the scoping exercise was therefore to compile a comparator document that would compare and contrast the features of each location in relation to CAD's business requirements. The comparator was to be presented at the meeting of the Board of Governors in early July when one of the models was to be selected. However, at the meeting the Board requested more information and, at the time of writing, the decision had yet to be made.

The European site is based at a downstream and petrochemicals company that was recently acquired by Petrolco, giving them access to five new refineries and the region's

largest fuels retailer. The EU-site was still undergoing a transition to SAP when the project at CAD commenced and they expected to go live with their new system in September 2003. The second location is based at a Petrolco site in the US, which is home to a huge server farm that hosts most of the SAP instances across the United States.

5. Evidence and discussion

This section presents selected excerpts from the interviews that address the research issues. The selection of interview data to present is guided by the research issues in conjunction with the concepts and categories generated from the data analysis.

5.1. Issue 1: is there evidence of differing interpretations?

The Central Accounting Department consisted of three different groups. Each of these groups had differing levels of involvement with the ERP decision and interviews with members of each group revealed different views of what the technology could and could not do.

The processing group (PG) had a marginalised role within the project and there was little direct input from the actual users. Instead, team leaders were expected to convey their business requirements in addition to carrying out the testing at a later stage of the project. In response to the question 'what have you heard about SAP', a user from PG remarked:

> only that it's going to be implemented … Somebody who is on the project to implement our system wouldn't dream of thinking about what the Processing people do … they never consider that sort of thing

The majority of the PG tended to see the SAP as an ominous, unchangeable entity:

> I'm not very positive about the new system, we're weren't happy when we got the current system (Sun) but we've had to work with it … it doesn't matter what we think, we just have to get on and use it (User from PG)

The reporting group (RG) also saw the system as unchangeable, but their outlook was 'to mimic the existing requirements with as minimal disruption as possible' (Accounting Clerk from RG). The majority of users from RG were unaware of the differences between the hosting options and on the whole, users were mainly concerned about changes to their individual work processes:

> Most people would just accept the way that we have to work as being beyond their control (Accounting Clerk from RG)

However, an accounting clerk from RG explained that the hosted implementation could constrain his existing way of working:

> We have certain controls over the (data warehouse) environment and it's driven by us-the problem is that if we go to something that's not in-house, we might not have the same control in terms of what we can get out.

5.2. Issue 2: how important is the time-space discontinuity?

Orlikowksi's operationalisation of the notion of interpretive flexibility emphasises the time-space discontinuty between the design and use of a system. Thus, the differing interpretations of PG and RG could be a result of the roles they play in the project team. The project team consisted of business and technical personnel from different departments of CAD in addition to the 7–8 SAP consultants, all of whom were highly involved throughout the design phase.

This tight-knit culture of the project team encouraged its members to form a shared perception of the new SAP implementation. They also had the power to withhold a certain amount of information from the rest of CAD, as illustrated by the following comment:

> The core project team are the ones making the decisions … it's hard to make decisions when you're trying to get everyone up to speed … it's just knowing what people to involve at what stage (Project Manager)

The comparator document, which was created during the scoping phase of the project, contributed to these shared meanings and perceptions. The comparator provided what was viewed to be an objective view of CAD's business requirements in relation to the functionality offered by the two potential systems (in the US or Europe).

Thus it would seem reasonable that those members of CAD not involved in the project team and with limited knowledge of what the system could do would have different interpretations of the technology from those who were more closely involved. It does not, however, help with the explanation of the differences between the responses of RG and PG. For them, the technology was the same (unknown) system, yet their responses were very different. This point will be returned to below.

Orlikowski's separation of design / use is further challenged when the focus of attention moved from the decision to go for a hosted ERP system to the choice of which hosting environment to use.

The site in the US was established in 1967 and houses a large data centre, with approximately 600 servers that network most of the Petrolco SAP systems across the USA. The US division are not new to hosting SAP implementations, as one member of SG described:

> In terms of running it (US-site) can do it with their hands tied because they run the whole of US accounting virtually

This considerable experience with hosting the US implementations was seen as a double-edged sword. There is a sense that since the systems in the US have 'been up and running in the US for so long ,…, it's very, very safe'. However, the longevity of the infrastructure has fuelled the perception that the US system will be less flexible:

> (US-site) is live but very old and … we may have to stick with what they're offering or not have them at all (Project Manager).

The site in the US has been established for so long that it has become increasingly difficult for them to make changes to their systems without reverberations for their other

clients. However, accepting their system as it is could have a huge impact on CAD's work processes and consequently, their own clients.

The SG representative on the project team confirmed this:

> They (US-site) have got clients set-up in a certain way and they require everyone to follow their standards and obviously that would give us less flexibility

The project manager disclosed during a telephone interview that if chosen, their system could constrain CAD in a number of ways—they lacked the functionality to handle CAD's billing requirements and they were reluctant to make changes because their own clients would be impacted by alterations to the system.

The European location has been developed very recently and the majority of development work has taken place in parallel with the project at CAD. The EU-site is itself a server farm and there is a project underway to network their SAP instance to a number of countries in Europe. They will host their SAP configuration across Petrolco divisions in Europe and they will provide the infrastructure and back-up support for all the sites that utilise their hosted implementation.

In a sense, they will perform a continental hosting role similar to the US-site, but had yet to 'go live' with their infrastructure.

They were due to be up and running by September 2003 and this presented a risk, particularly since CAD's own target was for January 2004. However, since the European site were still developing their system they had as yet no other clients and there has been a general perception that:

> The EU-site is open and new and we can model it slightly-they are going one way and so we may have to ask them to model it slightly towards us … they are still developing it, we feel that we can influence it more so that we can get our bits from it and they can get their bits from it (Project Manager)

> We don't know what we are inheriting; it's not proven—so how do we know it's a quality solution? No body knows yet, it hasn't gone live so it's a big worry and we're trying to rush this thing forward on an unproven system (SG team leader).

5.3. Issue 3: on the role of materiality and interpretative flexibility

The distinction between interpretive and interpretative flexibility can be restated as a discussion of whether the materiality of the technology plays any role. Orlikowski (1992) and Pozzebon (2001) have argued explicitly that material features of the technology do play a role. MacKenzie (1987) in contrast presents four responses to claims that the interpretative flexibility is more limited for technology. First, he argues that many disagreements take place during the design phase, whereas the criterion of working is an ex post-facto one; second even what counts as working is problematic (Collins and Pinch, 1998); third, the range of factors that will typically be required for a technology to work (social, economic and technological) is so large that it may not be obvious what the cause of failure is; and finally that a working technology does not necessarily confirm the rightness of every decision taken in its design (MacKenzie, 1987, pp. 213–214).

Thus the representatives from CAD who were not involved in the project gave differing interpretations of what the technology could and could not do, despite receiving the same minimal information about the functionalities and capabilities of the technology. Thus, to paraphrase Collins the technology has a 'small or non-existent role' in the construction of the interpretations of the ERP system.

Through the development of the comparator document, the project team had access to far more resources about the systems than the rest of CAD and were able to make decisions based on these resources. Project members worked closely with the SAP consultants as well as the Systems representatives and therefore they had more exposure to the technological aspects of the hosted implementations. Nevertheless the limited explanatory role played by the technology is also clearly visible in the discussion of the various hosting options. In the US case, the experience with hosting previous SAP systems is seen as evidence that they are less likely to be able to allow CAD to modify the system to meet its own needs whilst the lack of experience with hosting SAP systems in Europe is seen as making them more likely to be flexible. If the materiality of the technology did play an explanatory role then an equally plausible argument would be that those who were familiar with the technology would be more likely to know what it was capable of achieving.

According to Orlikowski (1992), the key factor influencing interpretive flexibility is the relationship with the design of the system. Pozzebon and Pinsonneault (2001) suggest that interpretive flexibility is 'the degree to which people perceive a given technology as changeable' and argue that those involved in the design stages of a system (especially before the system is finalised) are more likely to view a system as changeable than those only exposed to the end product. In the case company the project team perceive the system in the USA to be *less* flexible than the European system and this finding is confusing for two reasons: (1) the project team have been equally separated from the configuration of both systems, and (2) both systems 'meet the majority of (CAD's) requirements' (SG team leader). If the decision between these two systems was so close, how has this discrepancy in perception occurred?

The logic presented by the project team is that the US instance of SAP was designed over seven years ago and since then numerous clients have been networked to its 'existing set-up'. If CAD selected this model for their main accounting system, they too would be required to 'fit in with that set-up' (SG team leader). Since the US-site is well established, it has become part of a highly interdependent and complex network of players. The increased intricacy and internetworking which has accompanied the growth of the infrastructure has 'narrowed the range of alternative uses that may be crafted' with it (Orlikowski, 2000, p. 409). Moreover, as the community using this model grows, stakeholders at the US-site realise that any alterations to their system will cause huge co-ordination problems for their own clients (Hanseth, 2000, p. 67).

However, the problem is not solely confined to the technical aspects of their infrastructure, as one project member explains: 'it's not that they cannot change, they've just got a lot of clients all following the same methods'. By standardising the use of their technology the US stakeholders hope to retain their own and their clients' existing way of doing things, with no discernable changes in work practices or the system itself. This type of enactment is characterised in terms of inertia and has resulted in the reinforcement and preservation of the structural status quo (Orlikowski, 2000, p. 421). Through these

self-reinforcing mechanisms, the system has become a taken for granted fixture of the US organisation and has become institutionalised (Selznick, 1957; Zucker, 1977).

Stakeholders at the US-site therefore perceive their own system to be less malleable. Through a process of negotiation these stakeholders have influenced how the project team have come to view the system: 'we don't have any flexibility with (US-site)' (SG team leader).

The distinguishing feature of the European instance of SAP is that it is part of an infrastructure that is still early in its development. The system itself will not 'go live' until September 2003 and therefore, adaptations that are made on behalf of CAD will not impact any clients, as illustrated by the following comment:

> we will have our own unique piece of this machine which is very configurable and we can then do what we like with just that piece. It will not impact or be impacted by other people on that machine (SG Team Leader).

In addition, the European location has yet to be networked with clients in Europe and it is therefore, situated in an environmental context that is subject to relatively fewer institutional dependencies than the US model. The fact that the European system is still undergoing development also suggests that SAP consultants continue to work with the technical specialists at the EU-site, which may have lifted their overall sense of the flexibility of the installation.

To a large extent, this high level of interpretative flexibility explains why stakeholders at the EU-site are more willing to accommodate CAD's requirements. Through an ongoing process of negotiation, these designers have influenced how the project team have come to view the European system: 'we have been led to believe that we will have virtually complete control of the machine' (SG team leader).

6. Conclusion

The interplay between agency, structure and technology has shifted in emphasis throughout the decades as new theories have emerged. A summary of these changes is depicted in Fig. 3. The early technological determinist theories placed an undue emphasis on the influence of technology with minimal appreciation for the role of structure or agency. In an attempt to correct this imbalance institutional theorists have stressed relativity and situation-dependence and have re-focussed our attention on the structural influences on society. Yet with the role of interpretation and perception downplayed, humans are rendered passive to the structural forces at work.

Structuration theory is advanced as a compelling and original attempt to incorporate both structure and agency within an interdependent duality. However, its application to technology has instigated a vigorous and sustained debate within the IS field because it has been argued that in describing the structural properties of technology, one diverges from Giddens' (1979) temporal vision of social structure (Archer, 1995; Dobson, 2001; Walsham and Han, 1991). This debate has been fuelled by recent claims that large and complex information infrastructures can restrict the malleability of users

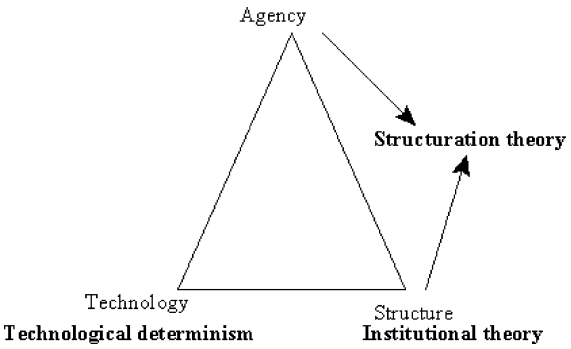

Fig. 3. The changing emphasis of agency, technology and structure.

(Ciborra and associates, 2000; Dobson, 2001; Orlikowski, 2000; Pozzebon and Pinsonneault, 2001; Star and Ruhleder, 1996; Volkoff, 1999).

This study has attempted to consolidate Giddens' (1984) conception of the knowledgeable and reflexive human actor and the literature devoted to information infrastructures by emphasising the role of human perception. Interpretative flexibility represents an agent's knowledge and reflexivity in relation to technology and hence the conditions that limit the interpretative flexibility of an agent can simultaneously reduce an agent's scope for action.

This research has shown some consistency with existing studies in the field. In particular, it has shown that users of the system who do not have detailed knowledge of the new technology are likely to have different interpretations of it from those who are involved in design decisions. The results also show some divergence with the literature, particularly with regard to the hosted nature of the ERP systems. Here, analytical distinctions between design and use are no longer as convenient or informative as they once were (Orlikowski, 1992, p. 408).

By providing an alternative explanation of the reasons for these differing perceptions, the paper argues that information systems researchers will benefit from returning to the original understanding of interpretative flexibility that specifically does not include any consideration of material features of the technology rather than relying on the adapted notion of interpretive flexibility that somehow claims a significant role for the specifics of the technology.

The findings of this research indicate that as an information infrastructure grows larger and more interconnected its malleability is perceived to decrease. In addition, the time-space discontinuity between the design and use of hosted implementations can encourage client organisations to adopt a similar perception to the technology as the host. That is to say, the host's interpretive flexibility, influenced by the size, complexity and interconnectivity of their information infrastructure, can influence client perceptions via processes of negotiation. Information infrastructures do not impose a deterministic force upon agents and their organisations. Rather, constraint is perceived and propagated in the minds of those in contact with the technology, influencing the eventual interaction with material agency.

It is recognised that due to the context-specificity of technological artefacts 'there is no single, one-size-fits-all conceptualisation … that will work for all studies'. It is therefore accepted that the findings from this case study are phenomena in their own right and may not necessarily be applicable in a generalized sense (Gadamer, 1975; Lee and Baskerville, 2003; Mol and Law, 2002). Further, the findings of this case study represent a single period of time during the early phase of the project at Petrolco. The research would have been enriched if the case study had been followed through until implementation and perhaps beyond, to analyse changes in the perception of agents.

There is scope for further research to develop the cultural and contextual influences on interpretative flexibility and how this can affect infrastructural development, particularly in light of the trend towards hosted implementations. Indeed, it would be interesting to explore whether the implementation of hosted systems will encourage adopting clients to mimic the organisational structure of the host. The field could also benefit from further empirical work to ascertain the subtle difference in perception towards more general information infrastructures and the newer, hosted breeds.

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Appendix A. Methodological appendix

The data collection and data analysis activities followed conventional qualitative methods. This appendix gives more detail on the processes.

A.1. Data collection

The first, semi-structured interview was held with the Project Manager, to obtain a greater understanding of the on-going project, recent developments and generally to become more familiar with the case study. Since minimal information was available about the project at the outset, it would have been unrealistic to force a pre-conceived theoretical framework onto the case study at such an early stage. Hence, the questions were open-ended and 'sensitising' (Strauss and Corbin, 1998, p. 77) to obtain an understanding about the events taking place. In the first phase of data collection, an 'open sampling' (Strauss and Corbin, 1998, p. 206) approach was taken, that is, open to all possibilities during an interview to take full advantage of different angles that emerged. Follow-up interviews with other members of the project team were audio-taped the following week. All interviews were fully transcribed so that their contents could be coded and analysed in an iterative manner during data analysis.

Documents from the intranet were also examined and some internal project documentation was viewed on the understanding that they would not be published. A number of informal conversations took place in addition to the recorded interviews and supplemented the project documentation.

Whilst the primary unit of analysis was in this case the project team, it is encouraged by the grounded theory approach to collect inter-related data at different levels of analysis (Orlikowski, 1993, Pettigrew, 1990 and Yin, 1990). Hence, the perspectives of people that were (a) outside the project and (b) at different hierarchical levels were investigated to 'understand the interacting factors' (Leonard-Barton, 1990, p. 249) at multiple levels of the organisation. In this case, a technical specialist from the Systems Group, an employee from the Reporting Group and an employee from the Processing Group were interviewed on a number of occasions (see Table 1).

In addition to obtaining an alternative set of viewpoints, these interviews were conducted in an effort to counter some of the bias that may have been introduced from the lack of anonymity within the project group. Even with the use of pseudonyms, the researcher became aware of an element of self-protection in responses from certain interviewees within the project group. This can be attributed to the fact that a draft of the findings would be presented to the Project Manager. To reduce this bias, the researcher endeavoured to be sensitive to the reactions of interviewees and, on two occasions, decided that a more open discussion should ensue without the use of the tape recorder.

A.2. Data analysis

The grounded approach to analysis involves segmenting the data into distinct units of meaning. After an initial read-through, each line of text was analysed in an attempt to generate initial keywords or concepts to label the phenomenon under investigation.

Following open coding, the concepts were grouped by recurring theme to reduce the number of units. These themes evolved into a stable set of categories that denoted more abstract explanatory terms, such as 'uncertainty' and 'top down pressure'. The properties (characteristics) and dimensions (range) of each category were identified to unite certain influences beneath a single conceptual heading (Goulding, 1999, p. 9).

To attach greater explanatory power to concepts, categories were further broken down into subcategories to answer such questions as when, where, why, how and with what consequences in relation to a particular phenomenon. The process of relating categories to their subcategories, known as axial coding (Strauss and Corbin, 1998), is a more sophisticated coding technique to appreciate the theoretical significance of concepts. The interview data were then re-examined and re-coded according to this scheme in order to create a set of categories and concepts that represented as much of the data as possible. The result of this iterative analysis was a set of broad categories and related concepts that 'described the salient conditions, events, experiences, and consequences' (Orlikowski, 1993, p. 314) associated with the ongoing SAP project at CAD. The categories and concepts developed after the first phase of data collection are depicted in Appendix B and their refined version is given in Appendix C.

Appendix B

Categories	Concepts	Data from CAD
Environmental context	Client impacts	CAD provides it accounting services to 60 Petrolco business units, which equates to about 200 companies in total A large number of interfaces link CAD to these business units to allow the input and output of data and hence Changes to CAD's main accounting system will impact clients, some more than others and this should be minimised
	Inherited companies	A number of companies that Petrolco have recently inherited through mergers and acquisitions have SAP already installed
	Reporting structure	Data feeds from Petrolco business units around the world into the Global Reporting Structure (GRS) for Quarterly reporting Compliance GRS will eventually become a global requirement for Petrolco
Organisational context	Corporate strategy	Decrease costs and streamline business High-level directive to use SAP as a global accounting standard The number of SAP implementations is to be minimised—business units should strive to accommodate similar instances of SAP that are already hosted Leverage technical and managerial skills on project team Implement technology with a focus on the long-term cohesion of systems
	Future model	Hierarchical operating structure with small teams operating at a local level Open communication and innovative culture reinforced by progressive career paths and 'lifetime employment'
	Structure and culture of CAD	Three main divisions: Systems Group (SG), Reporting Group (RG) and Processing Group (PG)
	Time as a constraint	The project assembled in April 2003, with a target provided by senior management to 'go live' with the system on the 1st January 2004 The bulk of the implementation is aimed to be completed by October; 6–8month project Insufficient time to adapt the majority of work processes; mostly mimicking existing processes The different models cannot be tested in advance; rather, they hope to choose the model most likely to fit with CAD The future accounting standard for Petrolco Enables standardisation and the seamless flow of data for reporting
IS context	Role of IS in CAD	Local IS division providing flexible support Stand-alone applications ('CAD Apps') commissioned/ funded by business unit
	IS practices	Standardised firm methodology exists on the Intranet, but each team adapts their approach

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Categories	Concepts	Data from CAD
Project team	Representation	Diverse set of people and skill-sets, representing the SG, RG and PG Most Petrolco members on the team have a SAP Consultant counterpart
	Project centricity	Decisions and related information have been confined to the project team, particularly in the early stages of the project This lack of communication with the wider department has aroused concern from non-project people within CAD Uncertainty stemming from the absence of information dissemination beyond the project team is exacerbated by expectations for open communication All project documentation is available on the intranet
	Comparator	Comparative document drawn up during Scoping to objectively map detailed business requirements against 2 possible SAP instances
	Delays	Time extended for scoping exercise delayed blueprint phase
	User involvement	PG will be the primary users of SAP, but will be excluded from the project until the later stages; team leader from PG is likely to view screen-layouts and help with testing RG have been consulted to establish client requirements SG will only use SAP directly from a trouble-shooting point of view
Time as a constraint	Time-limit	The timeline is 'ambitious' The project assembled in mid-April 2003, with a target provided by senior management to 'go live' with the system on the 1st January 2004 Progressive stages of project include: project preparation, scoping, blueprint, implementation, data migration, training, testing, go-live preparation, post-go-live support The bulk of the implementation is aimed to be completed by October; 6–8 month project
	Constraining change	Insufficient time to adapt all work processes; mostly mimicking existing processes The different models cannot be tested in advance; rather, they hope to choose the model most likely to fit with CAD
Perceptions of SAP	'Proven product'	Project team, SG and RG place confidence in the reputation and functionality of SAP; accepted as superior to existing system PG are ambivalent and slightly negative about the new system
	Blank system	SAP in itself is viewed as blank, objective and very configurable
	Main concerns	Project team, SG and RG view configuration and requirements mapping to be of most importance PG are concerned about introducing another system that does not meet their needs
Conditions for Adopting SAP at CAD	Obsolete current system	Current system is widely viewed as inadequate and lacking the flexibility and functionality to meet business requirements

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Categories	Concepts	Data from CAD
		Outside sources of information have been sought for reporting and add-ons have been created to compensate
	Complex requirements	Business requirements are wide and complex due the number of clients (60) and the mixture of streams involved Criticality of systems required a stable and reliable system that could match the stringent authorisation demands of the Sabres-Oxley Act (2002)
	Client requirements	RG have recently have recently spent 3 months attempting to map the requirements of an important client to the functionality of the existing system - it has neither the functionality or the flexibility to meet those needs
	Standardisation	Replacing the dispersed, decentralised systems with a central accounting system to promote traceability, reduce complexity, maintenance and cost
	Reporting information transfer	Conform to the requirements of Project Unity to facilitate information transfer into GRS
Likely organisational impacts of adopting SAP: 1. Hosted in US-site	SG impacts	Database administration, infrastructure support and back-ups will be controlled by US-Site instead of CAD; less flexibility System change requests may have a lag-time Possible job loss
	RG impacts	Less control over data warehouse environment for reporting—e.g. adding clients to the database will require going through US-Site first Time delay will exacerbate this
	PG impacts	The US-Site site has the capability to take over the processing aspects because they perform a similar function—PG could therefore be outsourced to IBM
	Accounting structure	Profit Centre Accounting (PCA)—the preferred choice for CAD
	SAP instance	Set up since 1994 and SAP itself and IBM at US-Site have run SAP since the 1960 s Four enhancements were required, three of which were critical to CAD- Chart of Accounts (not critical), Billing, Global Currency, and VAT adjustments
	Client impacts	If system is taken as it is, client impacts for CAD will be huge
Likely organisational impacts of adopting SAP: 2. Hosted in European-Site	SG impacts	Database administration, infrastructure support and back-ups will be controlled by European-Site instead of CAD; less flexibility System change requests may have a lag-time Language barrier SG may require re-training in Unix and Oracle Possible job loss

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Categories	Concepts	Data from CAD
	RG impacts	Less control over data warehouse environment for reporting—e.g. adding clients to the database will require going through European-Site first
		Time delay and language barrier will exacerbate this
	PG impacts	Minimal impacts since European-Site is not an accounting centre and would not take over processing
	Accounting structure	PCA—the preferred choice for CAD
	SAP instance	European-Site system is still under construction and will not go live until September 2003
		Insufficient time to test European-Site system and pass on improvements to CAD before 1st January
		Insufficient staff available at European-Site to help with CAD project
		Latest release of SAP so CAD will not have to upgrade in 2004
		Since model 'X' has not gone live yet, there is more chance of being able to modify the system slightly to CAD's requirements
	Client impacts	Their flexibility implies that there will be minimal client impacts for CAD

Appendix C

Categories	Concepts	Data from CAD
Involvement during design phase at CAD	Project team	Decisions and related information have been confined to the project team, particularly in the early stages of the project
		This lack of communication with the wider department has aroused concern from non-project people within CAD
		Uncertainty stemming from the absence of information dissemination beyond the project team is exacerbated by expectations for open communication
		Comparative document drawn up during Scoping to objectively map detailed business requirements against 3 possible SAP instances
		All project documentation is available on the intranet
	Reporting group	RG have been consulted to establish client requirements; this input is considered important
	Processing group	PG will be the primary users of SAP, but will excluded from the project until the later stages; team leader from PG is likely to view screen-layouts and help with testing

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Categories	Concepts	Data from CAD
	Systems group	SG will only use SAP directly from a trouble-shooting point of view Largely excluded from the project decision-making until later in the project when they will be required to integrate CAD's infrastructure to the new system
Perceptions of American System	Project group	Mature system Large number of clients Existing set-up that will be imposed upon CAD Loss of control over system System viewed as inflexible
	Reporting group	Insufficient time to adapt the majority of work processes; mostly mimicking existing processes Expected loss of control over database environment for reporting—adding clients to the database will require going through the host; system viewed as a constraint
	Processing group	PG are concerned about introducing another system that does not meet their needs Little known about the new system; system viewed as a constraint
Perceptions of European System	Project group	New development—more flexibility Has not 'gone live' yet—implies more flexibility, but more risk Few personnel can support CAD due to their own deadline
	Reporting group	No clear idea about the distinguishing features of this model
	Processing group	No clear idea about the distinguishing features of the model They are only aware that they will be getting a new system in the near future
American System	Mature infrastructure	SAP instance is embedded within an older, more complex infrastructure development—less flexibility
	Client impacts	Large number of clients receive the SAP instance; large network of dependent users Huge impacts to clients if the system is customised for CAD
	Willingness to adapt	Restrictions on the changes that can be made They would prefer CAD to adapt their processes to meet their existing set-up
European System	New Infrastructure	SAP infrastructure is embedded within a less interconnected infrastructure
	Client impacts	No clients will be impacted by changes because they have yet to 'go live' with their system
	Willingness to adapt	They have expressed a willingness to provide a lot of flexibility to CAD

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