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Technology Choice and its Performance: Toward a Sociology of Software Package Procurement

Abstract

Technology Acquisition is an important but neglected issue within the social science analysis of technology. The limited number of studies undertaken reproduce a schism between rationalist (e.g., economic) forms of analysis, where the assumption is that choice is the outcome of formal assessment, and cultural sociological approaches which see choice as driven by the micro-politics of the organisational setting, interests, prevalent rhetorics, fads, etc. While sympathetic to the latter critical view, we are dissatisfied with the relativist portrayal of technology selection: that decisions, beset with uncertainties and tensions, are divorced from formal decision making criteria. Influenced by Michel Callon's writing on the 'performativity' of economic concepts and tools, we argue that formal assessment has a stronger relationship to technology decisions than suggested by cultural sociologists. We focus on a procurement which is characterised by high levels of organisational tension and where there is deep uncertainty about each of the solutions on offer. We show how the procurement team are able to arrive at a decision through laboriously constructing a 'comparison'. That is, they attempt to drag the choice from the informal domain onto a more formal, accountable plane through the mobilisation and performance of a number of 'comparative measures' and criteria. These measures constituted a stabilised form of accountability, which we describe through the metaphor of a 'scaffolding', erected in the course of the procurement. Our argument is threefold: first, we argue that comparisons are possible but that they require much effort; second, that it is not the properties of the technology which determines choice but the way these properties were given form through the various comparative measures put in place; and finally whilst comparative measures might be imposed by one group upon others in a procurement team, these measures remain relatively malleable.

Keywords: Procurement; Performativity; Decision Making; Software Packages; Organisational Politics; Comparative measures

1. Introduction

As with many topics in the social sciences the debate surrounding the choice and purchase of technologies is polarised across a number of incommensurable positions. A major line of argument has been between, on the one hand, technocratic analyses advanced, for example, by economics, management and engineering accounts, where the assumption is that sufficient information is available about the properties of artefacts to

enable rational choice to be made, and, on the other, more sociological and critical approaches which emphasise the profound uncertainties surrounding procurement, the consequent contestability of claims about the properties of technology, and the 'negotiability' of the criteria used to assess objects. In this latter view, the choice of one technology over another is seen to reside not in the objective properties of the artefact as revealed by a formal technical or economic assessment but to be, of necessity, refracted through or, in some accounts, driven by the micro-politics of the organisation, the commitments of the various actors, prevalent rhetorics, fads, etc (Grint & Woolgar, 1997; Neyland & Woolgar, 2002).

While sympathetic with the critical account, we are dissatisfied with the relativist outcome and portrayal of technology selection as divorced from formal decision making criteria, particularly when it seems to us that procurement is subject to powerful, albeit complex, rationales. In contrast, we suggest that the formal assessment criteria adopted guide and transform the technology selection process. Our thinking is influenced by the work of those scholars who have become sensitive to the interrelationship between these two positions. In particular the work of Michel Callon (1998, 1999, Callon & Muniesa, 2005) and Donald MacKenzie (1992, 2004, 2005) which has examined the contrasting explanations that economists and sociologists offer for the functioning of economic and financial markets. They both suggest that the gulf that exists between these two viewpoints is unhelpful. MacKenzie (1992) raised the idea that these disciplines offer tools with different kinds of explanatory power. Economic tools he suggests are well-honed for assessing the aggregate outcomes of highly regularised behaviour; where there are more or less formal criteria in play. Sociological tools (and here he refers to contemporary actor-centred accounts) are best honed for exploring the particularities of behaviour in their more or less unique historical geographical and social setting. Callon too focuses on the efficacy of the tools that both disciplines bring to bear but he takes the discussion further by investigating why one set of explanatory mechanisms appears to be more successful than the other. His conclusions, which have sparked an intense debate in the field of economic sociology and beyond, are that certain theories and tools not only describe but help to create the settings in which they are applied. In other words, certain

theoretical constructs appear to more accurately describe their setting because they are performed in (and in so doing help constitute) that setting.

It is the notion of ‘performance’ (and ‘performativity’) which is crucial here. The term suggests that certain phenomena are, to a substantial degree, brought into existence and sustained through the actual ‘doing of them’ (MacKenzie, 2005, 9; Callon, 2004). Callon and MacKenzie have applied this concept in economic sociology to explain how markets may be brought into being. Callon suggests that if people are to trade and purchase goods in a ‘market’ (as opposed to any of the other ways the exchange of goods might occur) then the market has to be continually performed. The strength of his work lies in the conceptual framework he introduces to show this performance. For instance, he discusses and confirms the existence of ‘homo economicus’, suggesting that economic man does indeed exist but only because “he” is brought into being through a process of ‘disentanglement’ and ‘framing’¹. It is because of disentanglement/framing says Callon that actors can make decisions which appear ‘calculated’ and ‘rational’. Callon also introduces a third term, ‘overflowing’, to emphasise the constant need to reframe as new information relevant to the decision comes forward.

Petter Holm (2002) describes how in Callon’s approach actors and objects are so thoroughly entangled in ‘sticky cultural contexts’ that these processes of framing and disentanglement are crucial if market actors are to evaluate and calculate the likely results of their decisions: buyer and seller must be constructed as ‘autonomous agencies’ and the object to be sold must be constructed as stable and commodity-like. Importantly, the mechanism that enable this decontextualisation are not part of ‘human nature’ but have to be actively constructed (ibid). To put it more in the terms we want to develop in this article, various assessment and comparative measures must be defined, constructed and put in place if framing and disentanglement are to take place. Paraphrasing Holm, the more taken for granted, embedded, and ‘thing-like’ these measures become, the more effective they will be in untangling objects from their social, cultural and technological contexts, and thus enabling actors to make the calculated decision they desire (ibid).

¹ The concept of framing, building on Ervin Goffman’s sense of the term, describes the drawing of boundaries around the information and things actors should take into account during economic transactions. Disentanglement, drawn from the work of Nicholas Thomas (1991), emphasizes the relations that have to be detached if transactions are to occur (as in the transforming of a ‘gift’ into a ‘good’).

These are important ideas, which, if they can be applied to the study of decision making during economic transactions, can also be useful for understanding the choice of one technology over another.

2. Research Aim

This paper argues that technology choice and purchase should not be reduced to one single dimension (either the outcome of rational decision making or the result of discursive struggles). Rather it is the interaction and tension between these two positions that is interesting and that should be explored. We point to how scholars investigating technology selection within the Information Systems and Technology Studies traditions have struggled to deal adequately with what might be thought of as a ‘twilight’ or ‘grey’ space (Tierney & Williams, 1990). One side of the debate fails to take into account the variety of measures – particularly non-quantitative measures – that are used to inform and stabilise a decision (Lucas et al, 1988; Heiskanen et al, 2000; Kunda & Brooks, 2000). The other downplays the possibility that formal assessment occurs at all (Neyland & Woolgar, 2002). If some kind of formal process does occur this is portrayed as mere ‘ritual’ or ‘ceremony’ (Tingling & Parent, 2005). We argue for and develop an alternative approach to technology selection in such grey spaces. Although an uncomfortable place to operate within, we argue that these are the spaces with which Information Systems research should be concerned. Our own response to the schism is that, rather than reduce technology choice to one or other position, we wish to keep the tension between them open. We do this in two ways: firstly, through showing how assessment and comparative measures are performed; and secondly through showing how these measures can come in different forms (i.e., they are not simply quantitative measures – see Callon & Muniesa (2005) and Callon & Law (2005)).

Our interest is in how a Procurement Team (hereafter ‘the Team’) attempts to put the various properties of the systems on a common plane – to disentangle and frame them - so that a selection can be made. They attempt to come to a decision through constructing a ‘like for like’ comparison of the different software packages. Comparison does not occur easily (or spontaneously) but instead requires much effort in disentangling the systems from their existing contexts and framing the decision so that only certain information is taken into account. This work of disentangling/framing revolves around

the establishment of a 'system of comparison' or a number of 'comparative measures'. These measures come in many forms: some pre-exist the procurement ('value for money', the 'fit' of the systems etc.) and others are established during the process (the 'provenance' and 'status' of the technology, the 'competence' and 'standing' of the suppliers, being able to 'see' a working system, and so on). In describing these measures we see no reason why we should limit ourselves to those things that are conventionally seen as assessment criteria ('fit' and 'price' say) and include much broader issues (e.g. regarding the future behaviour and the survival of vendors) around which knowledge and criteria are more amorphous and difficult to determine. The important thing is to understand what are the measures which help detach the properties of the various systems from their contexts and allow the choice to be framed. The actual status of these measures (on which side of the schism they belong) appears to us as relatively unimportant (Callon & Law, 2005).

In describing this grey space we are not limiting ourselves to an easy case. The acquisition described here exemplifies all the organisational exigencies that one might expect around an information system procurement (and if anything is more complex as the procurement was part of a failed attempt at a joint venture partnership). There is also much uncertainty about the nature of the software packages being procured (many of the systems being offered were only 'partially' built). Our argument is threefold. First, we suggest that comparison is possible but that the construction of these measures requires much effort. To reflect this effort, we describe these comparative measures as a kind of decision-making 'scaffolding' that is erected as the Team move towards the procurement decision: it is through building up this comparative scaffolding that the Team attempt to disentangle the various software packages and map out their shape and boundaries. Second, it is through the establishment of this scaffolding that the properties of the objects within their intended context of application as well as the comparative relationship they have to each other are actually framed. Finally, what makes our case particularly interesting was no one actor was able to completely frame the process. Whilst certain members of the Team sought to propose (sometimes 'impose') comparative measures on others, these measures (these parts of the scaffolding) were subject to considerable uncertainty and tension (disentanglement and framing may break down).

What this suggested was that these kinds of assessments are to a significant extent locally produced and that the local context is important (and there is considerable discretion with regard to which comparative measures are enacted and how). The framework also allowed us to distinguish different contexts in terms of the level of local discretion and changes in the external context (e.g. in our case European competition law) which impinged upon this.

Our case material is based on an ethnographic study that one of the authors conducted at a large UK public institution (which we call 'Melchester Council') over the period of a year. The system they were attempting to procure is a 'Customer Relationship Management' (CRM) system. We begin the paper by contrasting how technology choice has been depicted within the Economics, Software Engineering, Information System and Technology Studies literatures. Then, before moving onto our empirical material, we describe some of the more practitioner-based views of software selection as well as some of the research issues relevant to the study of software package procurement. Finally, we focus on how the software choice is produced in four different ways: the collection of 'testimonies' from existing users; visiting reference sites; soliciting expert advice, and witnessing the software in action.

3. Theories of Technology Choice

3.1. Formal Comparison

In economics and management, procurement is typically portrayed as a process of selection between different products. The emphasis on 'selection' is telling, as it suggests the existence of two or more possibilities which will be compared to understand differences and similarities. Underpinning this view is the notion that the specific capacities of the objects can not only be identified but that they are intrinsic to the technologies and are a determining factor in choice. In other words, properties are amenable to objective assessment, even in cases where the complexity of the product makes such assessment difficult (Lucas et al, 1988; Kunda & Brooks, 2000). The role of adopters is thus to collect ever more information about those properties, such that artefacts can be compared to explain how they differ or resemble one another. Once the characteristics of the systems have been laid out for all to see, then the presumption is

that they can be ranked, as in cost benefit analysis, for instance, where technologies are compared through placing their costs and benefits on a common economic plane (Heiskanen et al, 2000). In a perfect market, 'price' is often seen to be the means by which such comparisons can be conducted, such that the price alone will give the necessary information for purchasers to make a decision (Williamson, 1991). This would seem to apply to software which is becoming commodified and sufficiently standardised that the term 'software package' is often used (Brady et al. 1992).

At the same time, there has been extensive discussion of software as an 'informational product' and the difficulties in ranking a commodity whose characteristics are not readily ascertained (Williamson, 1985). Close to the economic and management view, though differing in some important respects is the position found within computer science and software engineering. Here, the major focus revolves around not how each of the systems compare with each other, but how they compare with the needs of the adopting organisation. How, in other words, they might 'fit' organisational requirements. The term attempts to categorise the commensurability between organisational requirements and the properties of the software packages on offer; i.e. the software which is most commensurable with organisational needs is said to have the best fit (Finkelstein et al, 1996).

3.2. Indeterminacy of Properties and Measures

Whereas the more quantitative approaches have portrayed procurement as organised around a narrow set of criteria, this view has been the subject of criticism. Technology studies, organisational studies, and information systems research, by contrast, have shown how technology choices are the result of a more complicated social and political process. Various accounts describe how there are often multiple, competing and contradictory assessments of the character and capacities of technologies – perhaps because they are new, complex or controversial. In much of this work the choice of one technology over another is seen not to reside in the properties of the artefact as revealed by a formal technical or economic assessment but necessarily refracted through, or, in some accounts, driven by the micro-politics of the organisation, the commitments of the various actors, prevalent supplier rhetorics, managerial fads, etc (Pettigrew, 1973; Swan

& Clark, 1992; Knights & Murray, 1994; Koch, 2000, 2001; Tingling & Parent, 2004; Howcroft & Light, 2006). Many from a discourse theoretic position end up following a position close to Steve Woolgar (Grint & Woolgar, 1997) in his insistence that the material properties of artefacts are essentially unknowable and thus that the role of analysis is to reveal the discursive practices through which one interpretation wins out over another (Bloomfield & Danieli, 1995; Joerges & Czarniawska, 1998; Rappert, 2003).

Similarly just as technology choice is not dictated by the properties of an artefact, nor, in this position, is there seen to be a determinate relationship between formal assessment criteria and the purchase decision. Neyland and Woolgar, discuss the rationale behind the decision to purchase a database within a university, and argue that formal criteria like 'value for money' figured as a "...background relevancy throughout...[but] only informed participants activities in a highly indeterminate sense" (Neyland & Woolgar, 2002, 271). Having a much greater bearing was the ability of the procurement team to 'persuade' their colleagues that they had taken all such measures into account:

...the 'value' in our value for money story was constructed in the process of convincing those connected to particular circuit flows and receiving verification from those connectors that we had accounted correctly, that we had judged value correctly and that the university should spend this money (272).

The form of analysis advanced by Woolgar and co-workers suggests that we should question and unpack unexplicated assumptions about technologies as well as the measures used to assess them. However in doing so it reduces the particularities of the decision making setting to a political or rhetorical struggle. The decision criteria are seen as marginal to the decision, and, if not entirely removed from the equation altogether, are seen as indeterminate.² Whilst reading Woolgar's previous work we learn that assessment measures should be seen as the outcome and not simply the cause of the procurement (Grint & Woolgar, 1997). We agree. However we need to go further than this. In our view it would be difficult to fully understand the procurement decision - how comparison

² This reductionist form of analysis is deeply unsatisfactory. Woolgar's position has been the subject of a sharp debate with the late Rob Kling (the 'guns and roses debate' reviewed in Grint & Woolgar (1997) and McLoughlin (1999)). Our critique here is more particular: that it reduces complex obdurate decision processes to an epiphenomenon of the underlying political processes, and portrays the actors as duped by this process. There may, of course, be cases where technology was acquired on the strength of compelling supplier promises, divorced from artefactual affordances, or through the efforts of influential managerial elites. Moreover, the simplifying lens of cultural sociology removes our ability to distinguish between different instances of procurement and see how decision processes could be configured and played out differently in different settings.

across the different technologies was achieved - if we did not give some role to assessment criteria. How could properties be produced if it were not for these measures? The fact that numerous measures can be established to help produce and compare the characteristics of technologies and the lengths certain actors go to establish these measures is more interesting and important than Woolgar suggests.

Underpinning our own analysis is the view that analysis should not reduce phenomena to a rhetorical struggle. Rather we see technology choice as the 'co-production' of both assessment measures and the decision. That is, these measures bridge the decision-makers and the objects of decision (i.e. artefacts and their vendors). This co-production view moves us away from the Woolgarian idea that any assessment is possible or that assessment might become uncoupled from the organisational reality. In this respect we need tools that are honed to identify the particularities of decision making in what we call this 'twilight' or 'grey' spaces (Tierney & Williams, 1990). The strength of a such an approach rests on its ability to produce analyses of assessment and decision-making that go beyond the gulf between technocratic, 'rationale decision making' models and the emphasis on 'discursive practices' or 'rituals' advanced by more critical approaches. Our view shares elements of, but at the same time differentiates itself from, the analytical outcomes of relativist sociology.

While we have highlighted those studies of technology selection on either side of the schism, there is in fact existing work which has looked to bridge these dimensions. Tingling & Parent (2005), for instance, describe a procurement decision that is the outcome of a 'judgement' and which is only later justified through more formal mechanisms. Since the decision appears divorced from the formal process they describe these in terms of 'ritual' and 'ceremony'. Their argument, which we in principle support, is that 'rationality and ceremony' need not be in 'conflict' but could in fact be 'complementary' (349). The weakness in their paper is that rather than continue to develop this line of thinking they eventually conclude in fairly conventional way, reducing the discussion down to one side of the schism, stating: "Decision processes and, therefore, the decisions themselves, may be socially constructed" (349).

3.3. The Social Life of Software Packages

Interestingly, recent practitioner based literatures, arising from specialist bodies providing expert advice to adopters, have presented a more sophisticated view of software procurement than either the economic or sociological ones - capturing something of the 'grey space' that is being described here. They point to how criteria over and above price and product features are important when making procurement decisions. Not only is there an increasing number of (non-price as well as price) variables to consider but there is often uncertainty about which are the important ones (Stefanou, 2001; Herschel & Collins, 2005). This literature – as well as some writing within the Information Systems tradition (Oliver & Romm, 2000) - undermines the notion that technical characteristics and fit can be ascertained through observation of the product or even 'testing', pointing out that a software package can only really be tested through actually buying the package and installing it (Bansler & Havn, 1996). A common way of emulating the latter is for potential adopters to visit 'reference sites' where the software is being used. However this can bring its own set of problems. There may be few if any reference sites in the adopter's specific domain. Even where reference sites exist there may be uncertainties about how similar the demonstrator organisation is to the potential adopter. Likewise, given difficulties in assessing such a complex, non-material product as software, as well as its malleability (the scope to adapt and customise software), there are questions as to whether the system being demonstrated is the same or sufficiently similar to the one being procured? These issues raise points relevant to the discussion of our case.

Software packages are often conceptualised as a product or commodity and discussions of their commodification tend to focus on their stabilisation and standardisation (Brady et al., 1992; Quintas, 1994). We however seek to conceptualise them in more fluid terms – rather than simple 'snap shots' we should study the life-cycle of software packages and their longer-term evolution across multiple cycles of development and implementation, their 'biography' and 'career' (Pollock et al, 2003). As an example of this approach, we see that many of the organisational software systems constructed nowadays are 'generic' software rather than systems tied to a specific locale. These generic packages are constantly being 'recycled' for use in different industrial sectors and are thus explicitly

designed with the idea that they will be applied beyond the place(s) for which they were originally designed. Many CRM systems, for instance, are of this kind - described by one set of practitioners as 'retooled version[s] of generic functionality' (Herschel & Collins, 2005, p2). The upshot is that when choosing between systems, adopters may be assessing software that exists in a domain very different to their own. And in this case, the object being procured is not simply the software but also crucially the supplier's future intention and ability to modify the system to meet the specific requirements of intended adopter. There are also longer term questions as to whether the supplier is committed to the new sector, whether they will continue to develop software for this industry (or whether they are simply entering the market opportunistically (Herschel & Collins, 2005)).³ In these cases what might the adopters assess - the reputation of the software supplier (as indirect evidence of their competence and future behaviour) – or something else altogether?

4. Methodology

4.1. Arriving After the Event

There are surprisingly few systematic studies of software package procurement within Information Systems research or Technology Studies (though see for instance Koch, 2001; Tingling & Parent, 2004; Howcroft & Light, 2006). This oversight is somewhat paradoxical given the latter's concern to subject to critical scrutiny the claims and capabilities of technology supply. In most cases procurement is briefly introduced prior to the 'implementation story' (McLaughlin, 1999; Fleck, 1993). The process by which a potential customer engages with technologies, selects between them, and then commits to a particular supplier would seem to be of particular importance. One, perhaps prosaic, reason for this lack of attention is related to its timing and the consequent methodological difficulties in capturing procurement. Information system procurement is conducted infrequently; the earliest stages may be conducted over short periods of time and in a fairly 'ad hoc' manner, with decision-making restricted to senior managerial and technical elites. By the time a technology selection process is identified and access negotiated by social science researchers, many of the key decisions will already have

³ There are also questions about whether the supplier will survive in the sector. Software is an area in which scale economies and network externalities underpin the tendency for dominant suppliers to displace others - leaving 'angry orphans', users who bought software that did not become the de-facto standard and is no longer supported (Swann, 1990) – a factor which may motivate alignment with market leaders; as instanced in the adage "nobody ever got sacked for buying IBM".

been made. As some researchers have noted, the large body of ‘technology implementation’ studies have typically been carried out retrospectively at some remove from the initial procurement decision, the completion of which underpins the identification and selection of the case. Thomas (1994) argues that many researchers take the formal procurement decision as the starting point for beginning their study, even though many of the issues, relationships and alliances that shape later phases will already have been formed during the procurement process itself (the same point is made by Tingling & Parent, 2005). The consequence, as McLaughlin et al. (1999) observe, is that choice is described by informants as having occurred in a ‘carefully managed’ and ‘rational’ manner with researchers thus left to rely upon these ‘managerial accounts’ (1999: 104). While we agree with these authors about the need for more research into procurement, their view perhaps exemplifies the dominant sociological view of formal procurement as merely rationalising decisions made by powerful players elsewhere.

4.2. Research Design

The development of this study procurement was fortuitous. One of the authors, along with a group of management and computer scientists, was investigating the changing nature of information systems within the public sector. The research team had negotiated access to Melchester Council with the goal of observing a ‘joint venture’ partnership the Council was attempting to set up with a large IT company (see below). At the same time, the Council were also hoping to purchase a Customer Relationship Management (CRM) system; a form of system that allows organisations to capture and manipulate greater amounts of information about their customers; as well as ‘integrating’ that information across the enterprise. The procurement was seen by many members of the Council as the first ‘real test’ of how and whether the partnership would work. Whatever the outcome it represented an exceptional opportunity for studying software package procurement, particularly in terms of early and extensive access.

4.3. Data Collection and Analysis

One of the authors conducted a participant observation at the Council during the period of the selection (for almost a year). During this time he sat in on and observed meetings of the Procurement Team. There were approximately a dozen of these, during which he

would sit quietly taking notes. Sometimes he would be asked for his opinion of what he thought of the various solutions on offer and he would respond appropriately. He also attended several vendor presentations conducted on the Council premises. On one occasion he travelled with the Procurement Team by train when they visited another Council in the South of England ('Bingham') to view a demonstration of their CRM system. Along with the Team he also watched a demo of the Bingham software and participated in a visit to their call centre where the software was actually being used. Whilst at the call centre, he sat with an operator and watched the taking of calls and use of the system. Various written materials that were passed between the Team members were also collected, including testimonials from existing users of the potential systems, printed out email correspondence between Melchester and the industry analysts Gartner, and the typed up notes of telephone conversations with these analysts.

More formal interviews were also conducted with members of the Team at different stages throughout the procurement. These usually lasted an hour or so and were tape recorded. Discussions tended to begin by the researcher asking the interviewee to bring him up to date on the unfolding procurement story. Subsequent questions were aimed at understanding which of the solutions were preferred by the interviewee. Usually the interviewer would ask for reasons for particular preferences. Some of the Team members were re-interviewed at a later stage in the process, and during these sessions questions tended to focus on whether preferences had changed. We were able to interview one of the suppliers, the Sales Director of the firm that eventually won the contract (but only some time after the initial procurement process). During this meeting he was asked to reflect on the process and why he thought his company had been successful. We were unable to talk to the other vendors. Despite requests for meetings, many pointed to logistical difficulties (in their work they would be travelling to the Council from different parts of the country to deliver presentations, meet with key personnel, and then leave quickly the same day, with potential customers to visit in other parts of the country).

As we began to make sense of and analyse the rich and voluminous amounts of data that we had collected, rather than be guided by prior theoretical knowledge, we paid particular attention to the terms and concepts used at our sites. This is perhaps one of the most appealing features of ethnography: that it promises access to the issues, concepts and

categories that are deemed relevant by those in the field, not those imposed a priori by the researcher. The ‘new sociology of technology’ has further applied the ‘symmetry principle’ of sociology of science to the analysis of technology. This regards the need to suspend belief about ‘truth’ and ‘falsity’ in scientific disputes, claims about the success of a technology, or its ‘social’ and ‘technical’ dimensions of a technology, if the nature of these phenomena are still being negotiated by those under study (Callon, 1986). We employed similar sorts of criteria when thinking about assessment measures.

5. The Case Study

5.1. The Public Procurement Process and How it Shaped the Procurement Context

The procurement process had a number of distinctive features rooted in the governance of public procurement (the requirement for transparency; the emphasis on price) and the trans-organisational character of the system being acquired. Typically public agencies have well established and highly regulated processes for procuring new computer systems and other infrastructural technologies. Normally, the process would start through the issuing of what is called an ‘OJEC’; meaning that a ‘note’ is placed in the Official Journal of the European Communities describing the organisation’s requirements and inviting interested suppliers to submit comprehensive tender documents. This is a complicated administrative and legal framework which seeks to eradicate discriminatory purchasing through opening up purchases to broader international competition (Martin et al, 1999). One outcome of the OJEC is that there is a general requirement to maintain a certain level of transparency during procurement. This was particularly important as past decisions were often subject to internal and external audits. A further feature shaping public sector procurements was ‘price’: the Council was obliged, like other public organisations, to achieve ‘best value’ when making purchases. Finally, the composition of the Procurement Team was noteworthy as it was made up of representatives from across the organisation and not simply technologists. The major groupings were the Customer Services staff, who would be the primary end users of the system, and the IT personnel. There were also a project manager, a Chairperson, and two from other parts of the Council (the Housing Benefits Section and the Environmental Department).

5.2. Stage One: Bringing Options to the Table

5.2.1. Offering One

Melchester Council were, as noted, in the process of establishing a joint venture partnership with an organisation we call 'JV Partner'. JV Partner's first task was to advise Melchester on the most appropriate CRM solution, which they did, putting forward a large US owned software supplier which we will call 'BigVendor'. JV Partner described in its documents how it had something of a 'unique relationship' with BigVendor and therefore had no hesitation in recommending them and their systems to Melchester. Also, as one of the world leaders in the provision of this kind of packaged application software, Big Vendor had recently announced they had set their sights on becoming the leader in providing CRM to local government. Everything appeared to suggest a good future working relationship. BigVendor began to visit the Council to carry out initial scoping work and interview staff about their requirements. However, shortly after these initial visits, JV Partner announced that it was no longer recommending BigVendor but a Latvian/American software house that we are calling 'MiddleVendor'.

5.2.2. Offering Two

MiddleVendor, which up till then was unknown to the Council, visited Melchester and conducted a two week 'discovery session'. After this they made a full-day presentation to Council staff, including giving a software demonstration (described below). However, during the question and answer session following the presentation, some questions arose regarding the exact cost of MiddleVendor's system and in particular what part of that fee would be passed to JV Partner. Despite attempts by MiddleVendor to clarify the issue, various members of the Procurement Team left the room highly suspicious about whether the Council was getting value for their money. These suspicions were not resolved, only heightened, in a later meeting and it was thus decided to invite a number of other suppliers to come to the Council so that MiddleVendor's prices could be compared.

5.2.3. Offering Three (and Offering One Again)

A small software house from Northern Ireland, which we call 'SmallVendor', had also tendered for the project and they too were now invited to visit the Council offices. This company was also unknown to the Council, having previously developed software for the

Telecommunications sector, but had recently implemented its system in one of the largest UK local authorities. Also in the same week, and to everyone's surprise, BigVendor contacted the Council to ask if they could have a second chance to present their offering. Despite much scepticism (and even some bewilderment) they were invited in once more. In summary, then, there were now three possible options on the table between which the Team had to decide.

5.3. Dividing Possibilities

From the beginning of the procurement process it was clear that each of the options was attracting supporters. For instance, one issue the Team spent time discussing was the 'type' of system they should procure and its implications for organisational change. The choice was between what was described as a 'highly prescriptive' mature solution (BigVendor) and the newer, more flexible software packages (MiddleVendor & SmallVendor). It was widely understood that BigVendor's solution would mean applying the system's 'standard templates' to the council's business processes and this would involve re-engineering much of the organisation. For Barry, who was Chairing the Procurement Team, this was seen as a good opportunity for the Council to update its processes. In one meeting he describes how "...there is the pressure to adopt new and better practices"; BigVendor's system templates were presumed to embody best (or at least better) practice. And BigVendor's system "...will provide us with a focus for organisational change". A similar set of points was made by the manager of the Housing Benefits section as she too listed the advantages BigVendor's solution might bring.

Customer Services staff were less impressed by the BigVendor solution. They particularly problematised the generic nature of the package. In stark contrast, however, they were openly describing the MiddleVendor solution as 'brilliant'. The reason for this enthusiasm was because, unlike BigVendor's 'out of the box' solution, MiddleVendor would be building a software package specifically for Melchester. MiddleVendor did not yet have a local government CRM system (their system was being used within the Financial Services sector only) and they were thus proposing to use Melchester as the 'pilot site' for this re-development. This was seen in a positive light by the Customer Services staff:

From a Customer Service point of view it is brilliant. What they are going to offer us is everything that we could possibly want because they are going to build it around our existing systems (Interview with Kerry, Customer Services).

From a Customer Service point of view, we strongly believe that MiddleVendor could deliver what we want (Interview with Christine, Customer Services).

However, the IT staff within the Procurement Team appeared to favour the third option, SmallVendor. From their initial presentation it was said to be the 'cheapest' option.

When pressed to give further reasons they stated how they liked the fact that SmallVendor had already developed a version of the CRM system they were promising to deliver to Melchester at another council in the UK ('Bingham Council'). And this was seen to give the solution, to use their term, 'added credibility'. One of the IT managers describes how:

My personal view is that SmallVendor is: the least expensive and delivers what we are looking for; comprehensive in looking to the future; and has credibility of working with the largest council in the UK (Procurement Team meeting).

It also meant that Melchester could form some kind of partnership with Bingham to develop the CRM system further. Partnerships were being heavily pushed by Government and this appeared to offer the possibility of "killing two birds with one stone" (comment by the Chair of the Team during a Procurement Team meeting).

In summary, after the first round of discussions, there was no clear choice emerging; to the contrary, various sections of the Team were becoming closely wedded to different solutions. Each had their own criteria for evaluating the packages. One group was attracted to the way their favoured system would 'fit' with existing processes, another thought a standardised system would help modernise and 'update' the Council's business processes, and another group saw a third system as attractive because of 'price' and the fact it had an existing local government customer. In what follows, we will show how the Team attempted to unlock this situation through disentangling the systems from their existing contexts as a precursor towards achieving the realignment needed to shift technology preferences. They did this through introducing new measures by which to compare the systems.

5.4. Narratives of Success

Evidence about the software packages was collected in the following ways: through observing supplier presentations and demos of their systems; the solicitation and reading of testimonials from existing customers (so called ‘reference sites’); and seeking advice from third party experts. In this section we will focus on the testimonies and return to the other elements later in the paper. The testimonies were made up mostly of written replies to questions sent out by the Team concerning the nature of the system and the level of service and support provided by the supplier. Telephone interviews were also conducted. Completed questionnaires and typed up summaries of telephone conversations were passed around members of the Team. These testimonies can be divided into different categories. First, many simply described the effective operation of the system without any qualification:

[Our internal people] rave about the savings in man-hours since we implemented workflow queues to our operational sections and they can query and print documents without having to dig through rolls of microfilm. We have also given query ability to the court judges and their staff. They were very pleased and complimentary – *US County District Clerk talking about MiddleVendor*

Agents can now perform much better. For example with “Case Management” agents can now report complicated customer complaints electronically through Frontline for resolution at the back-end – *SlowLink talking about SmallVendor*

BigVendor’s CRM solution has transformed the way the City Council thinks about IT. We are well on target for meeting the Government’s deadline for e-enabling all our services by 2005 – *Hill Council talking about BigVendor*

There were also those that focused on the role of the suppliers themselves. Like the systems descriptions these were usually unconditional in their support:

To date they have delivered what has been promised – *Island Telecom talking about SmallVendor*

As a Telecom we work with many vendors within our company, and the solutions we develop with MiddleVendor are more of a partnership than a client/vendor relationship. The expertise offered in development, the support provided in implementation, and the confidence we have in the resulting end production/solution, make working with MiddleVendor a pleasant and productive experience – *TelCo talking about MiddleVendor*

Intriguingly, when we were able to find discussions of failings, these were almost always addressed in a somewhat indirect manner. For instance, authors were careful to show how responsibility for problems was distributed among a range of actors:

We have experienced some complications that have resulted in the dissatisfaction of the staff at various periods, but again, I think the Department's administrators share some of this responsibility – *NewState Department of Insurance talking about MiddleVendor*

We did experience some downtime but the majority was our own internal issues, i.e., network problems, personnel turnover, and some of it could be directly attributed to problems with the custom application written by [a third party vendor] – *US County District Clerk talking about MiddleVendor*

...most service interruptions have been attributable to our own network and software change management – *TelCo talking about MiddleVendor*

We would describe the bulk of the documents and references received as 'narratives of success' (Fincham, 2002). There were very few negative comments made about the suppliers and their software systems.⁴ We can also interpret the insertion of these (negative) statements and the counter statements that qualify or explain them as 'modalities', in Latour and Woolgar's (1986) sense, that they are used to emphasise the problematic elements (and perhaps also to add a sense of realism and credibility to these testimonials).⁵ To sum up, this phase of procurement was organised around the collection and reading of testimonials. The interesting issue about these narratives is that they were uniformly positive and allowed the Team little scope for comparing the various suppliers. It appeared that the Team would have to find alternative measures if disentangling and framing were to occur.

5.5. The Provenance and Status of the Software Packages

One set of issues that began to dominate Team meetings concerned the nature of the system that MiddleVendor was promising regarding where it came from, and the kind of reference sites that they were offering. As we have said, many generic software packages are 'recycled' across different industrial sectors. The assumption is that because a system has been made to work in one class of organisation it can also be reconfigured for use in other settings (or the setting itself can be reshaped to more closely match the newly arrived technology, or as more usually occurs there is a combination of both). However, this recycling presents difficulties for procurement teams, for they may be assessing

⁴ Fincham (2002) argues that the users and adopters of IT systems construct these positive narratives because they do not wish to be associated with the 'stigma of failure'. Alternatively, they might also be seen as a rhetoric or device deployed by existing users to encourage potential customers to adopt the system, there being positive benefits to be gained from extending the community of users (see below).

⁵ Modalities is the term used by Latour & Woolgar (1986) to describe qualifications that appear within a text and have some bearing on how that text is read or believed. In their book *Laboratory Life* they deploy the notion to show how scientists insert doubt about a statement. However we can also use the term in the opposite way. In the case of software packages, these modalities appeared to have little effect on the acceptance of narratives.

software in settings that are drastically different to their own, as well as software that is not yet in the form that has been promised to them. One member of the Team describes this difficulty:

MiddleVendor haven't got any system anywhere in the world with the mix they are proposing to give to us. They have only one site which isn't yet live in the UK. All the sites they mentioned to us in the United States, people visited some of them and had lengthy discussions with them, all had bits and bobs of the stuff they were going to give to us but no one had much of it working together (Interview with Project Manager).

Reference sites are interesting in that they seemingly give prospective adopters the reassurance that the software does work in some places at least. However this reassurance is only as good as the intellectual comparisons that adopters are able to draw between the reference site and their own setting. To the extent that such parallels cannot be established – or a recognisable system cannot be demonstrated – the adopter is then required to 'imagine' what the finished system might look like and how it might operate in their environment. In other words, this requires disentangling these 'bits and bobs' from the specificity of the reference site, imagining them in a different format, and then projecting this image onto the Melchester setting. In this case, when presented with a number of MiddleVendor's reference sites it appears that the Team were unable or unwilling to make these necessary mental leaps, to envisage technologies that did not yet exist, and to disentangle the software from the sites in which it was presented (we return to this issue later in the paper).

Interestingly, Ken, who is an IT Manager, describes a similar set of concerns about MiddleVendor but also emphasises the danger of selecting a system that did not yet exist:

Problem with MiddleVendor is high cost, no track record in Europe, in UK. We spent time getting references. The people we talked to were very impressive, though their presentation was only on paper and there was nothing to see. They would be developing a bespoke product for Melchester. We would be guinea pigs (Customer Service Workstream meeting).

Here concerns were raised that MiddleVendor would be building a software package specifically for Melchester. Somewhat paradoxically this had initially been seen as a highly positive feature of MiddleVendor's proposal by the Customer Services staff but it was now re-cast or reframed as a significant weakness. The Melchester team were unable to disentangle the system from the supplier. Would (could?) MiddleVendor stick to its promise of adequately reconfiguring its systems so that it was useful in this new setting?

There appeared to be an easy way to resolve these questions – to get the suppliers to demonstrate their capability.

5.6. Credibility Contests: Providing Evidence of Competence⁶

Establishing credibility is said to be important for software suppliers, especially where they are attempting to build new systems or recycle existing systems to new settings.⁷ Indeed it was through using the language of credibility that members of the Team sought to reframe the procurement and in so doing problematise MiddleVendor: ‘there was nothing to see’; and everything they had was ‘only on paper’. In response, during MiddleVendor’s visit to the Council they spent time attempting to demonstrate their credibility. They did this most explicitly by undertaking a ‘Proof of Concept’ (POC) project which was presented as nothing out of the ordinary, as if the supplier was required to demonstrate its competence for every potential customer. The supplier’s documents describe how:

Many engagements involve a proof of concept. The proof of concept generally involves confirming that the solution will, in fact, solve the most pressing business problems. In such cases the back end systems are absolutely unchanged during the project scope. Capacity is typically strictly limited so that capacity engineering is not a risk... (p42).

Once the POC was established as a ‘normal’ part of the procurement process, there was an explicit attempt to signal that it was capable of standing-in for a whole range of things: the as yet un-established skill and competence of staff and the credibility of the supplier.⁸

The objective of the Proof of Concept is to demonstrate to the Melchester IT community that MiddleVendor can integrate to Melchester ICL mainframe applications and can navigate the Melchester Oracle databases (MiddleVendor Tender Document, p23).

POC system should demonstrate the ability of MiddleVendor the Integrator component to access existing Melchester data systems infrastructure (ibid, p23)

POC should show the capabilities of the MiddleVendor Portal component (ibid, p23)

⁶ The notion of a ‘credibility contest’ comes from Tom Gieryn (1999).

⁷ The management theorist Michael Cusumano has written about what he calls the ‘credibility gap’; whereby software companies cannot build credibility until they have a number of existing customers who can serve as ‘reference sites’; and they can not enrol these initial customers until they have some credibility. He suggests that new software companies do everything possible to get the first reference customer, even if means “giving the product or service away almost for free” (2004, 208). And as for larger software companies entering new domains, they can “...transfer credibility they have built up with customers in one market to help them enter new markets...” (ibid., 70). Obviously, we can question Cusumano’s discussion of credibility: for instance, the ‘thing like’ status of credibility which he appears to suggest that just like the technology can be transferred across boundaries. We know technology is not simply transferred and of course the same can be said of ‘credibility’.

⁸ Proof of Concept is being given a status closer to a demonstrator. In an earlier study we showed the reverse process whereby a publicly funded Research and Development project that had not met its original goals was rebranded as a successful Proof of Concept (Williams, Stewart and Slack, 2005).

Having flown in programmers from Latvia, it appeared that MiddleVendor sought to demonstrate its competence in a dramatic manner through attempting the hardest possible case:

Specifically, POC examines the operations required to establish a customer direct debit ('an arrangement') for council tax payments. The scenario that the POC is trying to cover has been discussed with Melchester users and was agreed would be a good test case of the technology due to the complexity and inconvenience of the procedure using the mainframe application (p23).

We say hard case because it requires MiddleVendor to achieve integration between several discrete systems. When the day of the POC arrived there was gathered in the room the Procurement Team, other members of the Council involved in setting up the wider joint venture, and several JV Partner staff. MiddleVendor staff introduced the event by announcing that because 'we are a new company' and because no-one had yet 'heard of us' that they wanted to 'demonstrate their expertise'. Then this is what they attempted to do. Apart from some initial problems in getting the system to run, the POC appeared to proceed as planned. Through a process they described as 'screen scraping' they were able to access a number of Melchester databases and run a simulation of how a council officer would deal with a typical customer enquiry. Afterwards there appeared to be unanimous opinion among those gathered that the MiddleVendor presentation, the POC demo, and the expertise of their staff were 'excellent'. This view of MiddleVendor was repeated throughout the Council. One member of the Team for instance stated:

I have to say that the level of expertise of these people who came in was absolutely superb. In fact some of the questions they came back and asked you wouldn't expect a council officer who had been there for several weeks to ask (Interview with Christine, Customer Services Manager).

Significantly, however, not all of the Team appeared as convinced. In a meeting between the Team and other Council staff one IT manager casts some doubt on whether the POC did in fact tackle a hard case:

There is proof that they can use tools [to access data] but other tools were already in place. I still can't comment on the robustness of their solution. We have followed up references such as the [US State Dept of Insurance]. But references are limited. I would like to see a site where integration has been done (Procurement Team Meeting).

In other words, this Manager was unwilling to allow the POC to stand in for a demonstration. He questioned the ability of this measure to really test the supplier. For

him ‘real proof’ would be to actually go to a site where the software package was already integrated with legacy systems. Another IT manager makes a similar point and also questions the long term viability of MiddleVendor:

I’m impressed with MiddleVendor but we have given them access to our processes which we didn’t give to the others. Brian’s [from JV Partner] suggestion that MiddleVendor is the best for us is ‘bollocks’. There is more comfort in going with BigVendor as we know they’ll [still] be there in several years (Procurement Team Meeting).

Despite the fact that MiddleVendor were able to visibly demonstrate their expertise, there still appear to be concerns about their competence and now, according to this latter comment, their viability to survive as an organisation. One way of resolving these concerns appeared to be to solicit the opinion of a ‘credible’ other.

5.7. Have the Experts Heard of Them?

During the procurement Melchester employed the IT analysts the Gartner Group. Analysts like Gartner present themselves as providing ‘impartial’ information about particular software systems and the technical and financial standing of suppliers. They are experts in the classification and positioning of vendors (see Pollock & Williams, forthcoming). Having sought their opinion in the past, Melchester thus turned to them once more in order to resolve the questions about MiddleVendor’s longer term viability. Several lengthy telephone calls were conducted and the results of each were typed up and circulated among the Team. In the first of these calls, Ron, an IT manager asks Gartner for their opinion of MiddleVendor and is somewhat surprised to be told by a Gartner consultant (‘Ed’) that:

[Gartner] has a list of some 500 vendors of CRM, many of which [Ed] meets on a regular basis to track the development of their products. MiddleVendor is not on the list; he had not heard of them (Ron’s circulated notes).

The consultant said he would cross check with a colleague based in America and call back. A week later Ron reports how:

[Ed] has been in touch with his colleague in the USA, but [that MiddleVendor] were unknown to him as well. Gartner can therefore not provide any research papers into the company or its products (Ron’s circulated notes).

What we see here is that through the introduction of these various modalities (they are not on Gartner’s list, Gartner had not heard of them, and there were no available research papers) that Gartner begins to cast doubt on MiddleVendor’s credibility. The episode

becomes more interesting still when Melchester report this to MiddleVendor and they in return seek to play down its significance suggesting that it is the result of a simple 'categorisation' difficulty:

Their comment when it was pointed out that they were unknown to Gartner was that in the two years the company has been in existence it has not spent any time or effort in making itself known to industry analysts. This is because at present these companies do not have a category for what they are offering (the integrated framework approach) (Ron's circulated notes).

Here, rather than simply accept Gartner's assessment, MiddleVendor responds by casting doubt upon Gartner itself and its methods of compiling briefing documents. In other words, MiddleVendor insert their own modality ('these companies do not have a category') in an attempt to diminish the significance of these judgements. The matter does not end there. Gartner, on being informed of these objections, attempts to clarify (defend?) its position by discussing the provenance of its own information:

Gartner gets 80-90% of its information directly from Gartner clients talking about their experiences and technologies and not from being briefed by technology vendors. Nonetheless Gartner hosted 150 CRM vendor briefings in Europe last year, of which 30 or so were instigated at Gartner's request due to client calls. No client has asked us to ask for a briefing from MiddleVendor. It does not mean that MiddleVendor is a bad solution – it just surprises us that we have not had a request (Gartner email circulated among the Team).

Now Gartner appear to backtrack somewhat on their initial statement by arguing for a lighter form of modality ('It does not mean that MiddleVendor is a bad solution').

Another Gartner consultant makes a similar point a week or two later during a conference call. The note on the conversation describes how:

She advised Melchester not to read too much into the fact that they were not known to Gartner. It was in MiddleVendor's interest not to be classified with other CRM vendors as they offer broader services. They did not want to be seen as simply a software vendor. They had perhaps failed to take a more pragmatic approach to this (Ron's circulated notes).

This exchange is interesting for at stake here was the issue of who was qualified to pass judgements on suppliers and their technologies. In this sense, Gartner are the knowledgeable specialists who analyse the biography and careers of objects: they know where the software originated, which other organisations are using it, and they build up extensive knowledge, through their contact with these user organisations, 'talking about their experiences' with the technology. The existence of firms like Gartner is a symptom

of the problems user organisations face in assessing claims about software packages (and of having to operate in the ‘twilight’ or ‘grey’ space between formal and informal knowledge about technologies). This begs two questions: What makes Gartner credible? And what does Gartner’s contribution add to the assessment of the MiddleVendor system? A credible witness is seen to be a source who could be believed – one who was ‘impartial’ and had no particular axe to grind (Steven Shapin, 1994), inspiring ‘a just confidence’ by applying genteel virtues of ‘integrity and disinterestedness’ (ibid:212). In this respect, Gartner do not make public assessments about particular suppliers but merely comment on the availability of third party information, presenting themselves as the neutral collector and collator of that information. In other words, Gartner do not so much produce technical claims but act as the carriers of ‘community knowledge’.

However, Gartner’s assessments do not close the outcome; there is space for discussion – for example about whether their methods may discriminate against MiddleVendor. Gartner makes its assessments accountable⁹. However, the ambiguity opens up space for doubt. One reading of this exchange is that Gartner are passing the ultimate judgement on the status of each supplier back to the Team. It is the Team who must now decide on how to interpret this information. It is they who have the ability to leave the issue open or to ‘say what is to be seen’ (Munro, 1995, p441). For the IT staff within the Team, however, there is little doubt about how to read this report. In one meeting, Neil describes how: “Gartner said that with MiddleVendor we would be taking a risk”. Similarly, Fred echoes this comment by asking: “Who would sign up to a company that no one has heard of?”¹⁰

It becomes clear that MiddleVendor will be removed from the table when its initial supporters, the Customer Services team, begin to articulate and repeat similar views. Kerry, who had previously articulated the benefits of MiddleVendor, now presents a somewhat different view:

⁹ In discussing why Gartner are so low key in advancing negative opinion – we have identified how they are desperate to make transparent the source of their assessments; they deny that they are acting, but merely carrying knowledge validated by others/elsewhere. There is a parallel with science – both are seeking to make their knowledge claims objective and accountable - though scientists tend to validate their claims in terms of objective nature, whilst Gartner refer to community knowledge. We discuss this issue in more detail in Pollock & Williams (forthcoming).

¹⁰ He also suggests that choosing MiddleVendor would have implications for them being able to meet the Government’s advice on partnerships: “I view MiddleVendor high cost, high risk. If you are expecting other local authorities to buy-in, then, there is a risk of credibility because no one has heard of MiddleVendor”.

...what we were always doing was chasing a concept. We hadn't yet seen, and we still haven't seen anything to prove they can do what they say they can. In my mind I have no doubt about their professional expertise and ability to deliver something but until we can see something physical and some kind of evidence. The Authority has put too much into this kind of project to be seen as a pilot for MiddleVendor really within local authorities and within the UK even. From what I can gather they have not delivered a CRM system in the world, never mind the UK, so we were always going to be guinea pigs. That was unsettling a lot of people (Interview with Kerry, Customer Services).

To sum up, we have seen how the procurement was initially framed and then reframed as various comparative measures were introduced and some were recast. While MiddleVendor were keen to demonstrate their capability at the outset of the process, Team members sought more concrete 'physical' evidence of this capacity. Having once enthused about the expertise of MiddleVendor, the Customer Services people now too sought more evidence. In the end, the result was that the Team came to the conclusion that MiddleVendor lacked both an actual software package, and, through Gartner's intervention, credibility.

5.8. Shifting Technology Preferences

Several months have passed by now and there is the realisation among the Team that they will have to simplify the process significantly if they are going to reach a decision. Barry, the senior officer chairing the meetings, attempts to get the group to explicitly identify their preferred option:

We need to make a decision on who we are to go with. The three suppliers, are they any good? What do you think of the three products offered so far? We need the technology and value for money.

Going around the table it is the IT experts who speak first and it immediately becomes clear that SmallVendor is their favoured option:

SmallVendor has all the technology required. It is the cheapest with 'transparent costs'. It is the best value for Melchester City Council (Ron, IT Manager).

SmallVendor looked an excellent solution (Ken, IT Manager).

This is followed by the remainder of the Team who, because of the strength of opinion of the IT staff, are now divided into three separate categories of individuals:

(1) Those who are convinced by the capabilities of the SmallVendor system and who will subscribe to it and support it:

Err on side of SmallVendor. MiddleVendor is US and Latvian. SmallVendor is closer to home (Kath, Customer Services).

(2) Those who will reject it outright because they favour another solution:

BigVendor are arrogant. MiddleVendor are people and service focused. SmallVendor is technology driven (Kerry, Customer Services Manager).

MiddleVendor would do job. I have issues with SmallVendor (Ed, EnviroCall Manager).

MiddleVendor (Dianne, Housing Benefits Manager)

(3) Those who are neither for nor against SmallVendor but who seemingly could be convinced of the merits of the system:

SmallVendor appeared committed and had enthusiasm, were new to market, and were pleasant. But from a service perspective they would need to demonstrate (Helen, Customer Services Director).

MiddleVendor provides more of what we want. SmallVendor, I didn't know enough about. They didn't refer to our priority areas at all. We would need to have more conversations with them... (Christine, Customer Services Manager).

SmallVendor haven't demonstrated that they could do it (Richard, Project Manager).

Barry attempts to move the meeting forward by focusing not on the criticisms raised by the middle group but the possibility of convincing the third group of the merits of the SmallVendor system. In so doing, he avoids the need for the whole Team to discuss the issues raised by those hostile to the choice. There is clearly as yet no consensus in the group as to which system is the better and they continue to evaluate the systems according to a wide variety of measures. Barry, rather than go on discussing each and every difference for several more hours, attempts a form of rhetorical closure on the process by suggesting that they select SmallVendor as the preferred solution. However, and he spends considerable time emphasising this point, only if it can be shown to be the best system:

Is that it: SmallVendor is what we need? [there are some nods of agreement from around the room]. Our proposition then is to go ahead subject to further checking. Our view is of 'caution'. All of this must stack up.

We describe below how SmallVendor is shown to be the best system, but first, we see how JV Partner further complicates the procurement through attempting to introduce other assessment measures.

5.9. We Are Duty Bound to Get to the Facts

It had been scheduled that JV Partner staff should join the above meeting, where they would be briefed on the progress of the procurement decision. Within the Team there was a fear of upsetting the development of the joint venture partnership and this was especially troubling since they were now proposing to reject JV Partner's proposal (of MiddleVendor as the best solution for Melchester). The JV Partner people enter the room and are asked to present their evaluation of each solution. They do so by pointing out how difficult it was to compare each of the packages: "It was a bit like comparing apples and pears" describes one member. Despite these difficulties they had managed to put together a matrix, choosing to rank the packages according to the 'risks' they posed to the Council. As expected, they identified MiddleVendor as the least risky solution, then BigVendor which was clearly not a 'good solution' for the Council, and then SmallVendor who they 'didn't really know much about' but despite this still considered posed the 'biggest risks' to the Council.

The majority of these risks were linked to the technical capacity and competence of the Supplier and also to an extent on JV Partner's analysis of the future of the CRM software package market. It was generally agreed that the SmallVendor system would require large amounts of 'back-end integration' before it could be made to interface with numerous other legacy systems within the Council. This work would be carried out by SmallVendor and Melchester staff and, as JV Partner saw it, this was a significant risk:

SmallVendor have no experience of mainframe integration; [in their presentation] they said they had 'two buddies' from ICL who can help them out. There will have to be bespoke work, and the risk shoots up if Melchester staff do it. We want to 'de-risk' it and move towards packaged solutions. I wouldn't be happy with Melchester staff doing the integration...Got to push risk back onto the Supplier... (Procurement Team Meeting).

Another member of JV Partner adds:

The SmallVendor proposal doesn't have 'middleware'. No enterprise is doing [back-end] integration these days. At Bingham City Council they are using [a company called] Cavendish to do the middleware (Procurement Team Meeting).

The extent to which SmallVendor was a risk was disputed by members of the Team and this led to further uncertainties concerning just what each of the vendors and their packages could do. For instance, in response to the comment about the use of middleware as opposed to carrying out back-end integration, one Melchester IT Manager (Ken)

describes how “this is what we are talking about doing [with SmallVendor]”, only to be told by JV Partner that: “No, you’re not suggesting corporate middleware. Only MiddleVendor has ‘integrator’ which is corporate middleware”. There was further uncertainty regarding how much of the work the Melchester IT personnel would be carrying out themselves. While JV Partner thought SmallVendor was risky because it would mean using the in-house staff: “we don’t want to rely on in-house staff, we have to use packages”, Ken describes how MiddleVendor actually were proposing to use “our COBOL skills anyway” and that “we [the in-house personnel] are involved in whichever solution we go for”.

These points highlight the various uncertainties and ambiguities regarding the capacities of the technologies and the capabilities and standing of suppliers, and the introduction of a further comparative measure (risk) has not lessened but only heightened this. There were also a number of tensions developing between the two groups, which Barry attempts to deflect by taking the discussion onto a topic where surely they could all find some agreement – that was the stated price of each package. Barry makes the following comment:

Superficially SmallVendor looks cheap. It is worthwhile having further dialogue. We had MiddleVendor here for 2 weeks who were credible but superficially expensive. Is it worthwhile having further discussion with SmallVendor? We are duty bound from a local authority point of view because of price... (Procurement Team meeting).

Yet JV Partner does not agree that SmallVendor are cheaper. They argue that the Team are not making a correct comparison:

You are not comparing like with like here. The cost of the integration is not added in with BigVendor or SmallVendor. Moreover, SmallVendor are new to it and back-end integration costs money.

It seems that the uncertainty around each of the packages continues to grow, and the possibility of comparison and putting the systems on a common plane more distant. To cool the conversation down, Barry argues for further research to be done: “Why don’t we find out what the position ‘is’ and not what we think...?” In contrast, Brian thinks further studies will only lengthen the process and that it will ‘go on for another 6 months’. Barry describes how:

We are duty bound to get to the facts...Need for further work, to do it properly with some accuracy...we have more time than we thought we had. If it happens, it will happen in the

context of the Joint Venture. We need CRM but we don't need to make that decision before we know we have the Joint Venture. Melchester will have to make that decision on its own, even if the Joint Venture doesn't come off. I have no choice but to do further evaluation. And it won't take 6 months...Have to show it's properly evaluated. That work needs to be done jointly...Need 'like for like' evaluation. No good squabbling. Should be doing further evaluation jointly. At the end of the day we have to decide, even if these tensions exist (Procurement Team meeting).

Through further research Barry imagines a process whereby the differences between each system could be clarified so that all the uncertainty could be reduced. Moreover, the downside to these delays was that the Team were finding it increasingly difficult to sift between the various technologies and their suppliers. While they had previously agreed (among themselves) that they would conduct further work on just one system (SmallVendor), JV Partner assume that are considering looking at two systems. On top of that, one IT manager within the Team (Fred) adds that if they continue to evaluate SmallVendor and MiddleVendor, then, for the sake of due process, they should also allow BigVendor back to the table. His argument is that they might "...cry foul on the grounds of not having had the same access". In other words, rather than remove suppliers from the table, they were forced to re-admit and review all three for a third time!

5.10. Seeing Is Believing

We have discussed how those within the Team were laboriously attempting to shift the boundary concerning which assessment criteria were relevant to the selection. For instance, we have shown how much time was spent collecting and interpreting testimonies from reference sites, deciphering the provenance and status of the various systems, and questioning the standing of the suppliers. However, these measures were not sufficient to assess suppliers like BigVendor who have packages working in several local government sites, and as one of the largest software suppliers in the world, have a substantial standing among users and industry analysts alike. Thus, given there were many reference sites available, the Team began to invest time in visiting these sites. Below, we show how attending and observing a successful demonstration became a further comparative measure.

5.10.1. What, Down Again!

BigVendor appeared to have a major advantage over the other suppliers as its systems were already installed and working within many UK local authorities. However, when

members of the Team travelled to see one of these systems in use they were told that ‘unfortunately the system was down today’. Strikingly, the same thing happened at a number of other BigVendor sites; and even when they made return trips they found the systems down once again! Christine, incredulous about the situation, describes this in one interview:

...I visited a number of BigVendor sites and I haven’t yet seen their CRM solution working anywhere [Question: Where were those sites?]. I visited [Rochester], and we have been to [Lichester], and then there was a party of colleagues from the Customer Service Centre who went back to [Lichester] a second time 8 weeks later and there was nothing working then! (Interview with Christine, Customer Services).

The difficulties were reported by the reference sites to be the result of rare (?) technical glitches, and despite providing re-assurances that they were indeed satisfied with the BigVendor solution, the Team were now beginning to express concerns. Ron, the IT manager, after one such visit describes how he thinks:

Technically, BigVendor can provide a solution, I am sure of that. I don’t think I can sit and say there is a technical problem with their solution, I don’t think there is. I think in terms of their track record, which worries people, we have been to two BigVendor sites and haven’t seen the application running properly yet. I think there is a feeling that, ‘yes’, they might become the leading suppliers, and ‘yes’ they are one of the companies that the Government is talking to about producing standard solutions for local government. But right at this moment in time there is a high chance of anything produced for Melchester not working first time (Interview with Ron, IT Manager).

To counter these rising concerns, BigVendor tries to persuade the Team to make another visit to one of its reference sites but, unsurprisingly, this was met with some reluctance. In a last ditch effort, BigVendor offer to run its demo via a broadband link but as there was no such link at Melchester the Team were invited to travel some 100 miles to one of BigVendor’s offices. Richard, the Project Manager, describes the Team’s reaction to this suggestion:

They wanted us to go their office in [Fine City] and we said frankly that ‘If we tried to tell people that idea they would just [inaudible]... We suggested that that wasn’t appropriate [he laughs]...

The story did not finish there. There was some further negotiations about how and with what technology the demo would take place before eventually it went ahead in Melchester’s own offices. As the Project Manager describes, this too did not end in the way BigVendor would have liked: “It was over a phone line, and it worked perfectly well over a phone line, [but] unfortunately they were showing us the wrong thing!” We never

actually learnt just which system the Team had been shown but whatever it was, or whatever had gone wrong, it was significantly embarrassing for the BigVendor to immediately withdraw from the procurement.

5.10.2. That is Better...

Given these difficulties much importance was now placed on actually seeing a system in operation. Thus, a few weeks later, when the Team were offered the opportunity to go and view the SmallVendor system that had recently been installed within Bingham Council they enthusiastically agreed to the trip. Also, whereas in previous visits only one or two people had actually made the journey, on this occasion the entire Team was travelling the 200 miles to visit Bingham Council. If the selection of a system depended so crucially on its capabilities being observed then any witnessing would have to be very much a 'collective endeavour'.¹¹

Upon arrival at Bingham there was a round-table session where Bingham staff talked about their experiences working with the supplier. This was followed by a demonstration of the software and time spent watching operators in a live situation within a Call Centre. Everyone broke-off into pairs and sat with an operator watching them take calls and enter and retrieve data. This demo and visit appeared to go extremely well and on the train back to Melchester the Team chatted excitedly about what they had seen. Some weeks later in an interview, Christine from Customer Services still spoke highly of the visit:

We also visited Bingham and saw their solution actually working, and it was very simple, the agents in the Call Centre were all delighted with it and it had made their lives a lot easier and it was really fast and responsive (Interview with Christine, Customer Services).

What was obvious on the train journey and then in subsequent meetings was that the attachments various groups had made to particular solutions, and the case for prioritising these, were now sufficiently loosened such that all other solutions could be sifted out. Of course, there was still the awkward job of notifying the JV Partner, but it was now clear that a decision had finally been taken and the procurement was all but over. This raises a final question in relation to the demo: Why had it taken on such importance, which was surely incommensurate to the amount of information it provided?

¹¹ Shapin & Schaffer (1989) in their book on 19th Century gentlemen scientists argue that 'multiplicity' was important during the witnessing of early experiments and had to be a 'collective act' so as to avoid reliance on any one radical individual.

As we have said, the comparative measures operated as a kind of scaffolding which was being erected around the systems in order to understand its shape and boundaries (i.e. to whom they were connected and on what they depended). What had been unclear at the outset but was now evident was that MiddleVendor did not yet have a finished version of what they were offering Melchester. Moreover, though they were able to provide reference sites, the Team were unwilling to imagine the software seen there (in rather different settings) working in their own setting. Melchester were unable to disentangle the technology from these sites; unable to envisage the whole solution, they recast MiddleVendor's proposal as containing only 'bits and bobs' of software. Similarly, whilst MiddleVendor had offered a 'Proof of Concept' in lieu of an actual demonstration of a finished system, this was not seen to be sufficient proof that they were capable of turning these bits and bobs into a package that might suit Melchester. As 'guinea pigs' Melchester would be entirely reliant on MiddleVendor's word.

Alternatively, BigVendor did have many local government reference sites in the UK (and parallels between Melchester and these could easily be drawn) but, surprisingly, was unable to demonstrate its software (or at least the correct software). As Shapin and Schaffer (1989) suggest there is much to be gained but also much to be lost during demonstrations. Demonstrations are rarely spontaneous events: adopters wish to observe the technology in everyday use, and will seemingly give much importance to these events, even though they know that the demonstration has been 'staged' specifically for their benefit. Their purpose among other things was to reveal some features – characteristics of the software - that up till then had been invisible to the Team, but in attempting to do this BigVendor ended up revealing some quite different characteristics (about themselves). To some extent, of course, demonstrations are not simply about evaluating systems but also evaluating suppliers. The question the Team might have asked themselves was: If the supplier cannot stage that which is expected to be staged, in the safe internal environment of their customers, then how might they deal with systems out there in the real world?).

This left SmallVendor which was only able to offer the one site but this was seemingly similar enough to provide sufficient parallels. What was specifically interesting about the demo at SmallVendor was not simply that the Team could see a software package in

action but it was also one of the few times the Team were able to establish an uncontested comparison between the different systems. We say ‘uncontested’ because every other measure up till then (price, risk, reputation, availability of a package, etc) was the basis of further disagreement and uncertainty. In the case of the demo, things appeared much less equivocal. The Team had successfully translated the assessment process into a specific requirement, indeed necessity, that the software be demonstrated and this demonstration be witnessed. In other words, to return to our earlier discussion of the performativity of procurement, they had finally established a place where the differences between systems/suppliers could be actualised. The demo became the means by which the systems were finally put on a common plane; the procurement was no longer simply an intellectual exercise but the entire Team could witness directly with their own eyes a ‘visual’ comparison between the systems.¹²

6. Discussion and Conclusions

From the point of view of economics, management and engineering accounts, the procurement of technologies is seen to be the result of a formal process in which information about the properties of objects is assessed against a narrow set of pre-specified decision criteria. By contrast, critical interpretations informed by constructivist and cultural sociology reject this view, portraying technology selection as the outcome of more informal social processes in which the micro-politics of the organisation overshadow the substance of the selection procedure. In particular many follow a ‘Woolgarian’ type view in which the technical properties of the different systems and the decision criteria, if not entirely removed from the equation altogether, are seen as ‘indeterminate’ to that decision. While constructivist tools are well honed for unpicking the political moves underlying technical discourse and seek to demonstrate how micro-politics are in command and decisions divorced from formal assessment, we argue that technology selection cannot be fully understood unless we more fully consider the role of assessment criteria.

In the case presented here, we have shown that the procurement decision was not a purely political device in the ways that radical constructivism might suggest (even though it had

¹² Particular, and perhaps disproportionate, weight was given to this, most direct form of evidence of system performance; even though it did not per se resolve uncertainties about system properties, it seemed to have particular impact in aligning opinion.

an important ritual and dramatic element). The decision occurred in a context characterised by high levels of uncertainty, where the properties of the different offerings and the decision criteria were negotiable and indeed openly and covertly contested. Added to this, the relationship between the council and its joint venture partner was teetering on the brink of failure. However, utilising Callon's concept of the performativity of economic concepts and tools, we have shown how the Procurement Team sought to push away arguments that came from outside the boundaries of the choice, to edge around controversies, and to drag the procurement from the informal domain onto a more formal, accountable plane. In other words, they attempted to 'disentangle' the vendors and their systems, and 'frame' the procurement so that organisational politics were, as far as possible, kept at bay from the decision. Their efforts involved the laborious construction of a 'like for like' comparison: that is, attempts to draw out and compare those properties which were deemed to be significant, and to lay them on a common plane. To this effect we saw how the Team wove into the process a 'system of comparison' or a number of 'comparative measures'.

These included elements set prior to and outside of the array of actors involved in the procurement, along with others put in place in the process of reaching a decision. Firstly, there were attempts to collect and interpret testimonies from reference sites, – though the evidence obtained was often uniformly positive and thus provided little opportunity to differentiate suppliers. Secondly, much time went into establishing the provenance and status of the software packages and there were discussions of what kinds of objects with what kind of biographies and careers the Council were willing to accept (a package built from scratch, one constructed for other industries, or a partially formed local government package). Thirdly, where the Team were unable (or simply unwilling) to 'imagine' a finished system from the 'bits and bobs' they were shown, or to make the necessary parallels between their setting and the references sites, there was a requirement for suppliers to show that they could also make their systems work within the Council. In other words they were being asked to provide evidence of technical competence. Fourthly, there were attempts to assess the standing of suppliers, as a measure of their current and future performance, by asking external experts to comment on and investigate

that standing. Finally, it became increasingly important for the suppliers to demonstrate their systems and that the Team could bear direct witness to these demonstrations.

We describe these comparative measures as stabilised forms of accountability - albeit a loosely-coupled form of accountability which left considerable discretion for actors. We suggested that these operate as a kind of 'scaffolding' erected during the move towards the procurement decision. These measures – this scaffolding – as they are put into place gradually give a shape to assessments of the various systems (i.e. their boundaries are mapped out, and it is shown on what they depend and who they are connected to). Our argument is that it was not so much the properties of the systems which were important for establishing differences and similarities between the various software packages but the enactment of these various assessment criteria which give a form to those properties.

When there were difficulties and uncertainties these have to be interpreted not as uncertainties about directly ascertained properties but, rather, as uncertainties surrounding the measures that calculate properties. Each of the different comparative measures had different explanatory power (and thus there was a constant need to shift between measures to stabilise the artefacts). We saw a shift from the notion of procurement as an exercise in imagination or even enchantment (i.e., where the Team were asked to 'imagine' how a system in a reference site would work within their own setting); to an exercise in trust based upon testimony (where the team were asked to assess testimonies and expert judgements); and finally to more concrete 'visual' exercise (where the Team could witness demonstrations). It was by shifting between measures that the technologies were eventually ranked and sifted; that they could be disentangled from the reference sites and the supplier, and that their differences could be shown. In other words, that the procurement could be framed.

What was also interesting about our case is that most members of the Team appeared to have a hand in the decision, to be satisfied with the process, to think their views had been included, and that the outcome (although it meant giving up their initial preference) was the correct one. This latter aspect (how the Team members shifted vendor preferences) is the most interesting. Callon & Muniesa (2004) have discussed how measures may be imposed by specialists groups. In our case the Team ended up evaluating the packages

(not through the measures that were initially touted – such as fit, price, the packages’ potential for updating processes etc) but through sets of measures that were proposed to them – maybe in some cases imposed on them – by their (more technical) colleagues. However, perhaps the notion ‘impose’ is too strong in our case. No one member of the Team were able to completely frame the process: new sites of tension were continuously opening up; the new measures were subject to continuous ‘overflowing’. This was most evident in instances where assessment criteria were recast: these included MiddleVendor attempting to sidestep their lack of a demonstrator by offering a ‘Proof of Concept’; MiddleVendor’s benign proposal that Melchester be a ‘pilot site’, which was subsequently reinterpreted by hostile local actors that they were actually being used as a ‘guinea pig’; and JV Partner’s ultimately unsuccessful attempt to introduce the notion of ‘risk’ as a further assessment criteria. The scaffolding metaphor addresses, on the one hand, the continued spaces for negotiation and discretion about what new criteria and methods should be introduced and how they should be applied – and as we saw, these reconfigurations could give rise to ‘surprising’ outcomes.¹³ On the other, the outcomes were not wholly open but were structured, subject to various kinds of local and broader accountability. For instance, we saw how the assessment process became increasingly constrained as different planks of the scaffold were put into place and the parties moved towards a decision. Procurement of course takes place in a range of contexts, with more or less well-established evaluation criteria and subject to different levels and types of accountability. And as we saw in this case, accountability may change. The actors’ awareness of formal requirements such as the fair trading legislation changed the parameters of this discretion - enacting a tighter form of accountability. In other words, the transparency that was required within the OJEC had a determinate effect on the conduct of decisions.

To conclude, technology choice and purchase should not be reduced to one single dimension (either the outcome of rational decision making or the result of discursive struggles). Rather, it is the tension between these two positions that is interesting and should be explored – this cycle of disentangling, framing and overflowing. What our story highlights is that though laborious, comparison is possible. In this respect, we need

¹³ Here we echo Jørgensen and Sørensen’s (1999) concept of ‘surprises’ in discussing radical reconfigurations of inter-organisational development arenas.

to understand in greater detail this 'grey space' that exist between rationalistic accounts of technology and cultural sociological accounts. Theorising these grey spaces as well as the actors who inhabit and are able to speak in them is crucial for analysing technical change. In terms of the former, there is a need to accept that the comparative measures identified here constitute a form of assessment (they are not simply a 'rhetorical ploy'). In terms of the latter, we point to the emergence of new kinds of experts who accept and work with this more amorphous kind of knowledge (see particularly Herschel & Collins, 2005) and argue that these experts and their organisations need to be studied. In other words, the challenge for researchers addressing technology choice, within Information Systems research or Technology Studies, is to develop tools honed for understanding the space established between techno-economic accounts and more cultural sociological approaches.

References

- Bansler, J., & Havn, E. (1996). Industrialised Information Systems Development, CTI Working Paper No. 22. Technical University of Denmark.
- Bloomfield, B.P., & Danieli, A. (1995). The role of management consultants in the development of information technology: the indissoluble nature of socio-political and technical skills, *Journal of Management Studies*, 32, 1, 23–46.
- Brady, T., Tierney, M., and Williams, R. (1992). The commodification of industry-application software'. *Industrial and Corporate Change*, 1, 3, 489-514.
- Callon, M. (1986). Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay. In J. Law (Ed.), *Power, Action and Belief: A New Sociology of Knowledge*, London: Routledge.
- Callon, M. (1998). An Essay on Framing and Overflowing. In M. Callon (Ed.), *The Laws of the Markets* (pp.244-269), Oxford: Blackwell.
- Callon, M. (1999). Actor-network-theory – the Market Test. In J. Law & J. Hassard (Eds.), *Actor Network Theory and After* (pp.181-195), Oxford: Blackwell.
- Callon, M., Meadel, C., & Rabeharisoa, V. (2002). The Economy of Qualites, *Economy & Society*, 32, 194-217.
- Callon, M., & Muniesa, F. (2005). Economic Markets as Calculative Collective Devices, *Organisation Studies*, 26, 8, 1229-1250.
- Callon, M., & Law, J. (2005). On Qualculation, Agency, and Otherness, *Environment and Planning D: Society and Space*, 23, 717-733.

- Cusumano, M. (2004). *The Business of Software: What Every Manager, Programmer, and Entrepreneur Must Know to Thrive and Survive in Good Times and Bad*, New York: Free Press.
- Finkelstein, A., Spanoudakis, G, & Ryan, M. (1996). Software Package Requirements & Procurement in Proceedings of the 8th International Workshop on Software Specification and Design, Schloss Velen, Germany, pp 141-146. IEEE Computer Society Press.
- Fincham, R. (2002). Narratives of Success and Failure in Systems Development, *British Journal of Management*, 13, 1-14.
- Fleck, J. (1993). Configurations: Crystallizing Contingency, *International Journal on Human Factors in Manufacturing*, 3, 15-37.
- Friedman, A. (1989). *Computer Systems Development: History, Organisation and Implementation*, Chichester: John Wiley.
- Gieryn, T. (1999). *Cultural Boundaries of Science: Credibility on the Line*, Chicago: University of Chicago Press.
- Grint, K., & Woolgar, S. (1997). *The Machine at Work*, Polity, Cambridge: Polity.
- Knorr-Cetina, K. (1999). *Epistemic Cultures: How the Sciences Make Knowledge*, Cambridge, MA: Harvard University Press.
- Heiskanen A., Newman, M, & Simila, J. (2000). The Social Dynamics of Software Development, *Accounting, Management & Information Technology*, 10, 1-32.
- Herschel, A., & Collins, C. (2005). How to Assess a Vendor's CRM Expertise in Your Industry, Gartner Report No G00127222, p2.
- Holm, P. (2002). Which Way is Up on Callon? A Review of a Review: Daniel Miller's "Turning Callon the Right Way Up".
http://www.nfh.uit.no/dok/which_way_is_up0.pdf, (Downloaded 15 Jan 2006).
- Howcroft, D., & Light, B. (2006) Reflections on Issues of Power in Packaged Software Selection, *Information Systems Journal*, 16, 215-235.
- Joerges, B., & Czarniawska, B. (1998). The Question of Technology, or How Organizations Inscribe the World, *Organization Studies*, 19, 3, 363-385
- Jørgensen, U., & Sørensen, O. (1999). Arenas of Development: A Space Populated by Actor-worlds, Artefacts, and Surprises, *Technology Analysis & Strategic Management*, 11, 3, 409-429.
- Koch, C. (2000). The Ventriloquist's Dummy? The Role of Technology in Political Process, *Technology Analysis & Strategic Management*, 12, 1, 119-138.
- Koch, C. (2001). Enterprise Resource Planning: Information Technology as a Steamroller for Management Politics?, *Journal of Organizational Change Management*, 14, 1, 64-78.
- Kunda, D. & Brooks, L. (2000). Identifying and Classifying Processes (Traditional and Soft Factors) That Support COTS Component Selection: A Case Study, *European Journal of Information Systems*, 9, 226-234.

- Knights, D. & Murray, F. (1994). *Managers Divided*, New York: Wiley.
- Latour B., & Woolgar, S. (1986). *Laboratory Life: The Construction of Scientific Facts*, Princeton: Princeton University Press.
- Lucas, H., Walton, E. & Ginzberg, M. (1988). Implementing Packaged Software, *MIS Quarterly*, 12, 537-549.
- McLaughlin, J., Rosen, P., Skinner, D., & Webster, A. (1999). *Valuing Technology: Organisations, Culture and Change*, London: Routledge.
- McLoughlin, I. (1999). *Creative Technological Change: the Shaping of Technology and Organisations*, London: Routledge.
- MacKenzie, D. (1992). Economic and Sociological Explanations of Technical Change. In R. Coombs, P. Saviotti & V. Walsh (Eds.) *Technological Change and Company Strategies: Economic and Sociological Perspectives*, London: Academic Press, 25-48.
- MacKenzie, D. (2005). Is Economics Performative? Option Theory and the Construction of Derivatives Markets, Paper Presented at the Annual Meeting of the History of Economic Society, Tacoma, WA, 25th June.
- Martin, S., Hartley, K., & Cox, A. (1999) Public Procurement Directives in the European Union: A Study of Local Authority Purchasing, *Public Administration*, 77, 2, 387-406.
- Munro, R. (1995). Managing By Ambiguity: An Archaeology of the Social in the Absence of Management Accounting, *Critical Perspectives on Accounting*, 6, 433-482.
- Neyland, D., & Woolgar, S. (2002). Accountability in Action?: The Case of a Database Purchasing Decision, *British Journal of Sociology*, 53, 2: 259-274.
- Oliver, D. & Romm, C. (2000). ERP Systems: The Route to Adoption". In Chung, H. M. (Ed.) *Proceedings of the 6th Americas Conference on Information Systems Association for Information Systems*, Long Beach, USA, 1039-1044.
- Pettigrew, A. (1973). *The Politics of Organizational Decision making*, Tavistock: London
- Pinch, T. & Bijker, W. (1984). The Social Construction of Facts and Artefacts: Or, How the Sociology of Science and the Sociology of Technology Might Benefit Each Other, *Social Studies of Science*, 14, 399-441.
- Pollock, N. & Williams, R. (forthcoming). The Magic in the Magic Quadrant: Industry Analysts and their Tools.
- Pollock, N., Williams, R., & Procter, R. (2003). Fitting Standard Software Packages to Non-Standard Organizations: The Biography of an Enterprise-wide System, *Technology Analysis & Strategic Management*, 15, 3, 317-332.
- Pollock, N., Williams, R., & D'Adderio, L. (in press). Global Software and its Provenance: Generification Work in the Production of Organisational Software Packages, *Social Studies of Science*.

- Quintas, P. (1994). The Commodification of Software, *Information Technology & People* 7, 4, 1–22.
- Rappert, B. (2003). Technologies, Texts and Possibilities: A Reply to Hutchby, *Sociology*, 37, 3: 565-560.
- Shapin, S. (1994). *A Social History of Truth: Civility and Science in Seventeenth-Century England*, Chicago: University of Chicago Press.
- Shapin, S., & Schaffer, S. (1989). *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*, Princeton: Princeton University Press.
- Stefanou, C. (2001). A Framework for the Ex-ante Evaluation of ERP Software, *European Journal of Information Systems*, 10, 204-215.
- Swan, J., & Clark, P. (1992). Organizational Decision-making in the Appropriation of Technological Innovation: Cognitive and Political Dimensions, *European Work and Organizational Psychologist*, 2, 2, 103-127.
- Swann, P. (1990). Standards and the Growth of a Software Network. In J. L. Berg & H. Schumny (Eds.), *An Analysis of the Information Technology Standardization Process* (pp.383-93), Amsterdam: Elsevier Science/North-Holland.
- Tierney, M., & Williams, R. (1990). Issues in the Black-boxing of Technologies: What Happens When the Black Box Meets 40 Shades of Grey? Edinburgh PICT Working Paper No. 22. Edinburgh University, Edinburgh.
- Thomas, N. (1991). *Entangled Objects: Exchange, Material Culture and Colonialism*: Cambridge, MA, Harvard University Press.
- Thomas, R. (1954). *What Machines Can't Do: Politics and Technology in the Industrial Enterprise*: Berkeley, University of California Press.
- Tingling, P., & Parent, M. (2004). An Exploration of Enterprise Technology Selection and Evaluation, *Journal of Strategic Information Systems*, 13, 329-354.
- Williamson, O. (1985). *The Economic Institutions of Capitalism*, New York: The Free Press.
- Williamson, O. (1991). Comparative Economic Organization: The Analysis of Discrete Structural Alternatives, *Administrative Science Quarterly*, 36, 269-296.
- Williams, R., Stewart, J., & Slack, R. (2005). *Experimenting with Information and Communication Technologies: Social Learning in Technological Innovation*, Chichester: Edward Elgar.