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

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TECHNOLOGY CHOICE AND ITS PERFORMANCE: TOWARD A SOCIOLOGY OF SOFTWARE PACKAGE PROCUREMENT

Epistemological and Philosophical Issues in Information Systems

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Abstract

Procurement is an important but neglected issue within the social science analysis of technology. Where studies have been conducted, they are typically marked by 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 organizational 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 that is characterized by high levels of organizational tension and where there is deep uncertainty about each of the solutions on offer. We show how the procurement team is 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 mobilization and performance of a number of 'comparative measures' and criteria. These measures constituted a stabilized form of accountability, which we describe through the metaphor of a 'scaffolding', erected in the course of the procurement. Our argument is twofold: first, we argue that comparisons are possible but that they require much effort, and second, that it is not the properties of the technology that determines choice but the way these properties were given form through the various comparative measures put in place.

Keywords: Procurement, performativy, decision making, software packages, organizational politics, comparative measures

Introduction

As with many topics in the social sciences, the debate surrounding the choice and purchase of technologies is polarized 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 artifacts to enable rational choice to be made, and, on the other, more sociological and critical approaches that emphasize 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 artifact as revealed by a formal technical or economic assessment

but to be inherently refracted through or, in some accounts, driven by the micro-politics of the organization, 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 Callon (1998, 1999), Callon and Muniesa (2005), and 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 regularized behavior, where there are more or less formal criteria in play. Sociological tools (and here he refers to contemporary, actor-centered accounts) are best honed for exploring the particularities of behavior 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 are not simply describing 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') that 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). In this sense, 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 'framing' and 'disentanglement'.[1] It is because of framing/disentanglement, says Callon, that actors can make decisions which appear 'calculated' and 'rational'. Callon also introduces a third term, 'overflowing', to emphasize the constant need to reframe as new information relevant to the decision comes forward.

In his review of Callon's work, Petter Holm (2002) describes how 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 do not "…lie in waiting, ready to spring forth from universal human nature, but need to be constructed, often with tremendous amounts of hard work (ibid: 15-16). To put it more in the terms we want to develop in this paper, various assessment and comparative measures must be defined, constructed and put in place if framing and disentanglement are to take place. To cite Holm once more, the "…more institutionalized, naturalized, technological, material and thing-like" (ibid: 16) these measures become, the "…better they will work in dis-embedding agents and objects from their social, cultural and technological contexts" (ibid: 16) enabling them to make the calculated decision they desire. These are important ideas, which, if they can be applied to the study of decision making during economic transactions, can be useful for understanding the choice of one technology over another.

Software systems acquisition typically occurs within the context of significant change, not only in information systems but also in organizational strategy or policy and as a result is fraught with, and managed in, a context of, considerable tension. The acquisition described here exemplifies these organizational exigencies (and, if anything, is more complex). Added to this, there is often uncertainty about what particular 'software packages' can do, with adopters struggling to find concrete evidence of the capacities of these technologies. It is said that their functionality can only fully be understood through installing them (an impossible option, of course, as the implementation of an

1 The concept of framing, building on Irvine 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, emphasizes the relations that have to be detached if transactions are to occur.

information system is an expensive and arduous task in itself), and thus adopters are forced to rely upon various other actors and proxies to understand these capabilities.

Whilst software system procurement has received relatively attention in the social study of technology, those studies that have been conducted (that fall on one side or the other of the analytical schism) either fail to recognize the variety of measures – particularly non-quantitative measures – that might inform a decision (Heiskanen et al., 2000) or downplay altogether the possibility that a measured 'comparison' can occur at all (Neyland & Woolgar, 2002). In contrast, we show how a Procurement Team (hereafter 'the Team') attempts to come to a decision through constructing a comparison, albeit one that is based on numerous and difficult-to-quantify judgments (Callon & Law, 2005). Comparison does not occur easily (or naturally) but instead requires much effort, the bulk of which revolves around the establishment of a number of 'comparative measures' and attempts to put the various properties of the systems on a common plane. Some of these measures pre-exist the procurement (like 'value for money' and 'fit') and others are established during the process (the 'provenance' and 'status' of the technology, the 'competence' and 'standing' of the suppliers). Our argument is twofold: first, we suggest that comparison is possible but that the construction of these measures requires much effort; second, it is through the establishment of these measures that the properties of the objects within their intended context of application are actually stabilized or, better still, produced.

We might think of these measures as operating as a kind of 'scaffolding' erected as the Team moves toward the procurement decision: it is through building up the scaffolding that the Team attempts to map out the shape and boundaries of the software package (i.e., to whom it is connected and on what it depends). Also, what makes our case particularly interesting was no one actor was able to completely frame the process; some of the measures (parts of the scaffolding) were also the subject of considerable uncertainty and tension, and framing and disentanglement may break down. In other words, these kinds of assessments are to a significant extent locally produced (they remain relatively locally malleable); local context is important, and there is considerable discretion with regard to which comparative measures are enacted and how. Our aim, then, is to investigate how comparison is performed within one setting. We focus on how the software is stabilized in three different ways: collecting of 'testimonies' from existing users; visiting reference sites; soliciting expert advice, and witnessing the software in action. In endeavoring to do this, we are operating in what might be thought of as a 'twilight' or 'grey space' (Tierney & Williams, 1990) between rational accounts of technology procurement and cultural sociological accounts. Rather than reduce procurement to one or other position, we wish to keep the tension between them open. Although an uncomfortable place to operate within, we argue that these are the spaces with which Technology Studies should be concerned. Our case material is based on an ethnographic study that one of the authors conducted at a large U.K. public institution (whom 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, 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 procurement.

Technology Choice

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 that 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. The role of adopters is thus to collect ever more information about those properties, such that artifacts 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. This is particularly true with software, which is becoming commodified

and sufficiently standardized, and the term 'software package' is often used, such that the price alone will give the necessary information for purchasers to make a decision (Williamson, 1991; Brady et al.. 1992).

Indeterminacy of Properties and Measures

Whereas the more quantitative approaches have portrayed procurement as organized around a narrow set of criteria, this view has been the subject of criticism. Technology studies, organizational studies, and the sociology of information systems, by contrast, have shown how technology choices are the result of a more complicated social and political process. It has been widely described – either because they are new, complex, or controversial – how there are often multiple, competing, and contradictory assessments of the character and capacities of technologies. In much of this work, the choice of one technology over another is seen *not* to reside in the properties of the artifact as revealed by a formal technical or economic assessment but necessarily refracted through, or, in some accounts, driven by the micro-politics of the organization, the commitments of the various actors, prevalent supplier rhetorics, managerial fads, etc. (Pettigrew, 1973; Swan & Clark, 1992; Knights & Murray, 1994; Koch, 2000, 2001). 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 artifacts 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 artifact, nor, they argue, can we find a determinate relationship between formal assessment criteria and the purchase decision. Neyland and Woolgar (in one of the very few Technology Studies analyses explicitly concerned with procurement) discuss the rationale behind the decision to purchase a database within a university. They 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, doing so reduces the particularities of the decision making setting to a political or rhetorical struggle. The properties of the technologies and the decision criteria, which are seen as marginal to that decision, if not entirely removed from the equation altogether, are seen as indeterminate to that decision.[2] Whilst reading Woolgar's work, we learn that assessment measures should be seen as the outcome and not simply the cause of the procurement. We agree. However, we need to go further than this. In our view, it would be difficult to fully understand the procurement decision – how the properties of a technology were finally settled – if we did not give a more important 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 stabilize or produce the characteristics of technologies and the lengths certain actors go to establish these measures is more interesting and important than Woolgar suggests.

Underpinning this analysis is our view that analyses should not reduce phenomena to a rhetorical struggle but need tools that are honed to identify the particularities of decision making in what we might call the 'twilight' or 'grey' spaces (Tierney & Williams, 1990). The strength of a technology studies 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' advanced by more critical approaches. We draw upon work that addresses these forms of assessment that are primarily non-quantitative but still forms of calculation nonetheless (Callon & Muniesa, 2005). This view shares elements of, but at the same time differentiates from, the analytical outcomes of relativist sociology.

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2 This reductionist form of analysis is deeply unsatisfactory; 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. However the simplifying lens of cultural sociology removes our ability to distinguish between different instances of procurement and see how decision processes were configured and played out differently in different settings.

Research Issues

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) and the developing relationship between the two. At the same time, the Council were also hoping to purchase a Customer Relationship Management (CRM) system, a form of system that allows organizations 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. However, soon after the procurement began, it became evident that the joint venture relationship was unlikely to survive the selection process and, more importantly, in studying information system procurement, we had hit upon a rich vein of fieldwork.

Methodology

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 supplier presentations conducted on the Council premises. On one occasion, he traveled 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 among the Team members were also collected. These were testimonials from existing users of the potential systems, printed out email correspondence between Melchester and industry analysts, 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.

Case Description

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 organization's requirements and asking for interested suppliers to submit comprehensive tender documents. This is a complicated administrative and legal framework that 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 organizations, 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 organization 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).

Bringing Options to the Table

Offering One

As noted, the Melchester Council was in the process of establishing a joint venture partnership with an organization 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, U.S.-owned software supplier that 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'.

Offering Two

MiddleVendor, which up until 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 on from the presentation, some questions arose regarding the exact cost of MiddleVendor's system and in particular what part of that fee would be passing 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.

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 U.K. 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 skepticism (and even some bewilderment) they were invited once more. In summary, then, there were now three possible options on the table between which the Team had to decide.

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 organizational change. The choice was between what was described as a 'highly prescriptive' mature solution (BigVendor) and the newer, more flexible software packages (MiddleVendor and 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 organization. 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 organizational 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.

The 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 possible 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 favor 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 U.K. ('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 U.K. (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).

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. One group was attracted to the way their favored system would 'fit' with existing processes, another thought a standardized system would help modernize the Council, and another 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 by collecting more evidence about each of the solutions, as a precursor to achieving the realignment needed to shift technology preferences.

Narratives of Success

Evidence about the software packages was collected in the following ways: through observing supplier presentations and demos of their systems; soliciting and reading 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 running of the system, with no attempt to provide any form of qualification. There were also those that focused on the role of the suppliers themselves. Like the systems descriptions, these were usually unconditional in their support.

Intriguingly, when we were able to find discussions of failings, these were almost always addressed in a somewhat indirect manner. For instance, the authors were careful to show how responsibility for problems was distributed among a range of actors. 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.[3] 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 emphasize the problematic

3 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).

elements (and perhaps also to add a sense of realism and credibility to these testimonials).[4] To sum up, this phase of procurement was organized 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 ways to differentiate between systems.

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 organization 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 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 U.K.. All the sites they mentioned to us in the United States; people visited some of them and had lengthy discussions with them, and 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).

Interestingly, another member of the Team (Ken, IT Manager) describes a similar set of concerns about MiddleVendor but also emphasizes the danger of selecting a system that did not yet exist:

> The problem with MiddleVendor is high cost, no track record in Europe, in U.K.. 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 was initially seen as a highly positive feature of MiddleVendor's proposal by the Customer Services staff, but it was now re-cast 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*.

Credibility Contests: Providing Evidence of Competence[5]

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. Indeed, it was though using the language of credibility that members of the Team sought to problematise MiddleVendor: 'there was nothing to see'; and everything they had was 'only on paper'. Therefore, during MiddleVendor's visit to the Council, they spent time attempting to demonstrate their credibility'. They did this most explicitly during 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. 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-ye-unestablished skill and competence of staff and the credibility of the supplier. Third,, having flown in programmers from Latvia, MiddleVendor appeared reluctant to demonstrate their ability in a simple manner; rather they sought to demonstrate it in a dramatic manner through attempting the *hardest case*.

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4 Modalities is the term used by Latour and 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.

5 The notion of a 'credibility contest' comes from Tom Gieryn (1999).

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 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 it appeared to be unanimous 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 [U.S. State Department 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; 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, but 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 organization. One way of resolving these concerns appeared to be to solicit the opinion of a 'credible'.

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. 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), Gartner begins to cast doubt on MiddleVendor's credibility. The episode becomes more interesting still when Melchester reports this to

MiddleVendor, and they in return seek to play down its significance, suggesting that it is the result of a simple 'categorization' 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).

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?"[6]

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:

> …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 U.K. even. From what I can gather, they have not delivered a CRM system in the world, never mind the U.K., 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 the various comparative measures 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.

Shifting Technology Preferences

Several months later, there was a realization among the Team that they would have to further simplify the process. Barry, the senior officer chairing the meetings, attempts to get the group to explicitly identify their preferred option. Going around the table, it is the IT experts who speak first, and it immediately becomes clear that SmallVendor is their favored option. 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. First, those who are convinced by the capabilities of the SmallVendor system and who will subscribe to it and support it. Second, those who will reject it outright because they favor another solution. Finally, those who are neither for nor against SmallVendor but who seemingly could be convinced of the merits of the system. Barry attempts to move the meeting forward by focusing not on the criticisms raised by the middle group but on 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 his suggestion, rather than go on discussing each and every difference for several more hours, is to attempt a form of rhetorical closure on the process by selecting SmallVendor as the preferred solution. However, and he spends considerable time emphasizing this point, *only if it can be shown to be the best system*. 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.

6 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".

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 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 suppliers 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; 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 –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 two 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 is 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'. In contrast, 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 was 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 assumes 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!

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 were 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 that 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.

What, Down Again!

BigVendor appeared to have a major advantage over the other suppliers as its systems were already installed and working within many U.K. 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'. 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 reassurances that they were indeed satisfied with the BigVendor solution, the Team were now beginning to express concerns.

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 was 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 traveling 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 endeavor'.[7]

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.

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 prioritizing these, were now sufficiently loosened such that all other solutions could be sifted. 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? As we have said, the comparative measures operated as a kind of scaffolding that 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

7 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.

they were able to provide reference sites, the Team was unwilling to imagine the software seen there (in rather different settings) working in their own setting. Melchester wase 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 U.K. (and parallels between Melchester and these could easily be drawn) but, surprisingly, BigVendor 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 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 was able to establish an uncontested comparison between the different systems. We say 'uncontested', because every other measure up until 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/decision-making 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 betweens systems/suppliers could be actualized. 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.[8]

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 organization 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 procurement cannot be properly 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 an important ritual and dramatic element). The decision occurred in a context characterized by high levels of uncertainty, where the system properties 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, utilizing 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. Their efforts involved the laborious

8 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.

construction of a 'like for like' comparison: that is, attempts to draw out and compare those properties that 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 various assessment 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. First, 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. Second, 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). Third, 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*. Fourth, 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 stabilized forms of accountability, albeit a loosely coupled form of accountability that left considerable discretion for actors. We suggested that these operate as a kind of 'scaffolding' erected during the move toward the procurement decision. These measures – this scaffolding – 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 that were important for establishing differences and similarities between the systems but the enactment of these various assessment criteria that give a form to those properties. Moreover, what was interesting about these comparative measures was that each had different explanatory power (and thus there was a constant need to shift between measures to stabilize the artifacts). 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 judgments); and finally to more concrete 'visual' exercise (where the Team could witness demonstrations). It was by shifting through 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.

What was also interesting about our case is that members of the Team were not able to completely frame the process but rather it was subject to continuous overflowing. We saw various attempts to recast the assessment criteria and their application in particular cases: these included MiddleVendor attempting to sidestep their lack of a demonstrator by offering a 'Proof of Concept'; MiddleVendor's benign portrayal that Melchester be a 'pilot site' reinterpreted over time 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.[9] 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 toward 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. What our story highlights is that though laborious, comparison is possible. In this respect, we need to understand in greater detail these non-quantifiable calculations (Callon & Muniesa, 2005), which we describe as the 'grey spaces' that exist between rationalistic accounts of technology and cultural

9 Here we echo Jørgensen and Sørensen's (1999) concept of 'surprises' in discussing radical reconfigurations of inter-organizational development arenas.

sociological accounts. Theorizing these grey spaces as well as the actors who inhabit and are able to speak in them is crucial for analyzing technical change. In terms of the former, there is a need to accept that the comparative measures identified here constitute a form of assessment (and is 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 these experts and their organizations need to be studied. In other words, the challenge for technology studies is to develop tools honed for understanding the space established between techno-economic accounts and more cultural sociological approaches.

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