

Negotiating the Inter-organizational Information Systems Space

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Introduction

Organizational boundaries have become increasingly porous: outsourcing, insourcing and a variety of hybrid arrangements mean that previously distinct dividing lines between one organisation and another have become blurred. As competition intensifies and shifts rapidly, businesses are more inclined to question their enterprise and asset boundaries (Brant, 2005). Attempts to understand this state of flux and its implications for sharing information and knowledge across emerging and uncertain inter-organizational relationships are of interest to scholars and management practitioners alike (McKenzie, 2005).

Technology has often been advocated as a solution for the effective capture, storage and retrieval of organisational knowledge. Despite doubts about the extent to which technology can be used to effectively transfer 'information' (Boland, 1987) or 'knowledge' (Hislop, 2002) between individuals and organisations, its development continues to be a prime concern to management practitioners. For example, responses from a recent survey of 122 executives in large European companies showed that whilst they were unable to exploit much of their existing corporate data, so called 'Knowledge Management Solutions' were ranked as the single most important priority for future strategic technological investment (Economist Intelligence Unit, 2005). Following close on the heels of this rush towards intra-organizational knowledge integration, comes increasing interest in extending the implementation and

use of information & communication technologies (ICT) beyond the boundaries of the firm (Davenport & Brooks, 2004). As innovations in software and infrastructure continue apace, sophisticated and affordable technological solutions are now more readily available than ever.

The role of technology in organizational knowing

There is a growing body of both theoretical and empirical literature which sounds a note of caution about attempting to share and/or transfer knowledge using IT (Currie & Kerrin, 2004; Hislop, 2002; Newell, Scarbrough, & Swan, 2001; Schultze & Boland, 2000). Even within organisations, the implementation of IT has produced results that are at best unpredictable and at worst, contrary to expectations (Newell et al., 2001). The dangers of overlooking social implications have been highlighted (Storey & Barnett, 2000; Storey & Quintas, 2001). There is a small body of empirical work that suggests outcomes may be even more dramatic and contradictory when ICT is deployed for inter-organizational use (Schultze & Orlikowski, 2004; Vaast & Walsham, 2005). Existing studies of inter-organizational ICT use within the knowledge management domain have researched the political appropriation of technology during its development (Hislop, Newell, Scarbrough & Swan, 2000).

But there is little research that explores the inter-organisational use of ICT for everyday activities such as placing purchase orders, agreeing forward schedules and managing collaborative plans. These mundane activities increasingly rely on the inclusion and use of ICT-based 'information systems', defined by Suchman, (et al, 1999 p. 399) as,

'an array of partial, heterogeneous devices brought together into coherent assemblages on particular occasions of work. To be made useful, these devices needed to be read in relation to each other and to an unfolding situation. Technologies in this view are constituted through and inseparable from the specifically situated practices of their use'.

Suchman and others have employed the metaphor of technology as 'text' that can be 'read' (Joerges & Czarniawska, 1998; Poster, 1990; Woolgar, 1991). These authors argue that in 'reading' the position of the reader is altered; subjectivity is inscribed. Using, or indeed choosing to ignore ICT-based technologies affects network

durability (Joerges & Czarniawska, 1998; Latour, 1993). The changes in organisational performances are particularly significant where ICT-based artifacts are involved, not only because of their capability to enact local reconfigurations of space and time (Suchman et al., 1999) but also because of their potential to ‘alter significantly the network of social relations ... restructure those relations and the subjects they constitute’ (Poster, 1990 p.8). As Mutch (2002 p.490) elaborates,

‘The construction of networks that are durable involves the inscription into material form of the assumptions that underpin the interests of particular actors in the network... inscriptions that subsequently make other forms of action difficult. The degree of difficulty depends on the irreversibility of such inscriptions, of unravelling the enrolments that happened to construct such inscriptions.’

These analyses suggest that, whilst often not anticipated, technology-in-use can have durable, material effects. Accordingly, in this paper we explore how the concept of an ‘*inter-organizational routine*’ may be used as an analytical device in the study of relationships conducted with ICT-based artifacts. Theorising such relations as ‘performative’ (i.e. created in practice) we suggest, following Latour, (2005) and Feldman (2003), that the use of ‘mediating’ technological assemblages needs to be considered as part of the *generative process* and that analysis of variations between technology-in-use across particular sites provides insight into the negotiation of inter-organisational power.

Our study investigated the use of ICT in inter-organizational routines in the context of two buyer-supplier relationships – both were in the UK retail sector. In each case ICT-artifacts were designed to facilitate electronic data-sharing between a retailer and the supplier. Drawing upon the concept of an ‘organisational routine’, this paper addresses the following question: where similar ICT-based artifacts are used to manage ordering and delivery plans between organisations, how can the variation and instability in emergent organisational practice be explained?

In the following section we develop the theoretical framework briefly outlined thus far, then our methodology and case study methods. In the ensuing sections, illustrations from the case studies are described and discussed. We conclude that the concept of an ‘organisational routine’ can be used as a unit of analysis in the study of

inter-organisational technology-in-use and that this concept can help to identify and explain observed variation in inter-organizational practice.

Theoretical framework

Through the adoption of a constructivist perspective focusing on individual meaning-making (Tsoukas, 1996; Tsoukas & Mylonopoulos, 2004), we explore how ICT-based artifacts are constructed and used in the mundane processes of ordering and delivery planning. Following Mutch (2002), we draw upon aspects of Actor-Network Theory (Latour, 1993, 2005) to inform a social realism that holds structure and agency analytically separate. Drawing upon the principle of human/ non human symmetry (in a methodological rather than epistemological sense (Preda, 2000)), we investigate technological artifacts-in-use as either (or neither) ‘structures’ or ‘agents’, without a priori determination. This theoretical framework permits explication of apparent inconsistencies in contemporary forms of organizing that implicate both the ‘social’ and the ‘technical’ (Hanseth, Aanestad, & Berg, 2004; Vaast & Walsham, 2005; Walsham, 1997).

Relatively stable work practices such as ‘inventory management’ and ‘pricing’, may be conceptualised as organizational routines (Becker, Lazaric, Nelson, & Winter, 2005). Whilst there have been definitional problems with this concept, recent attempts have been made to clarify the term more precisely (Becker, 2004, 2005). In Becker’s view, it is the action patterns of observable behaviours that are best conceptualised as routines. Further, he suggests that it may be most useful to think of these routines as ‘recurrent inter-action patterns’ (Becker, 2005 p.256-257): patterns since they are formed through repetition (either across time or space) and interactions, since they are collective and organisational, rather than an individual. These recurrent patterns are ‘emergent’ (Becker, 2004; Feldman, 2000). Becker, who develops his argument from a critical realist position, suggests that the concept of a routine can be related to the emergence of organisational patterns at the ‘actual’ or ‘action’ level. Analytical separation of an emergent ‘actual’ and observed ‘empirical’ level enables a distinction to be drawn between arbitrary and context sensitive ‘actions’, (mediated by agency) and observable ‘behaviours’ or cognitive rules.

Two, parallel classifications of organisational routine may be discerned in the literature: concrete, performative and phenotypic or abstract, ostensive and genotypic (Becker et al., 2005). The former set emphasises the pragmatic, local and temporary, whilst the later is more closely aligned with conceptions of theoretical, general and abstract ‘rules’. Our conception of a routine is most closely aligned to the first of these classifications, that which Feldman (Feldman, 2000) describes as the performative aspect, created through practice. However, we differ from Feldman, in that we also consider how (non-human) technological artifacts may be involved in the generative process. Organizational routines are often recognised to be the result of ‘intertwined’ social and technical aspects (Becker et al., 2005) and to contain the traces of organizational knowing (Becker, 2004). Or, to put this another way, the concept of an organizational routine may be used as a *metaphor* for depicting the organisational know how necessary to get things get done (Dosi, Nelson, & Winter, 2000). Others have argued that routines may extend beyond the confines of an individual organisation, where two firms have a history of cooperative interactions (Zollo, Reuer, & Singh, 2002).

To summarise this discussion, understanding inter-organizational relationships has become an increasingly important research topic. Despite both theoretical and empirical problems, practitioners remain interested in the role technologies may play in inter-organisational information and knowledge sharing. Attempts to implement technological solutions appear likely to proliferate. Research is required to understand the effects of such ‘technologies-in-use’. Approaches are needed that avoid the pitfalls of determinism and provide ‘new conceptual and empirical insights into the dynamics of multiple socio-technical ensembles’ (McLoughlin & Badham, 2005 p.839). In this paper we explore the extent to which the concept of an inter-organisational routine may be used to address these requirements.

Methodology

Case Selection

The retail sector was chosen for this study, since retailers, as well as being early adopters and enthusiastic advocates of inter-organizational ICT, have also been in the forefront of initiatives that imply new forms of inter-organizational relationships with

their suppliers (predominant amongst these have been Efficient Consumer Response (ECR) and Collaborative Planning Forecasting and Replenishment (CPFR)). Two inter-organisational dyads were selected. One set of relationships studied was between a timber supplier and their Merchant customer (referred to as the Timber case). The other was in clothing retail (referred to as the Fashion case), between a Retailer and one of its main clothing suppliers. While the timespan during which each pairing had been using the specific ICT-based artifacts investigated was similar (4 and 5 years, respectively), the retailer in the Fashion case had long been at the forefront of ICT use whilst for the timber supplier and their Merchant customer, this was a relatively new innovation. In this paper, we draw on ‘across space’ examples from each of these two cases to explore inter-organizational technologies-in-use.

Data collection and analysis

Data was collected using participant and non-participant observation methods (see Table 1). The two studies, each conducted over a four-month period, concentrate on the routine inter-organisational work activities that the particular ICT-based artefacts were designed to support. In the Timber case, this resulted in attention to customer ordering and delivery practices. For Fashion, collaborative planning and despatch to customer call off were the focal points of analysis. Data was collected using a combination of methods. Firstly, participants were asked to demonstrate and describe how they accomplished tasks using the ICT-based artifacts in each case; (user training was also experienced in the Timber case). Secondly, we observed, and where possible recorded, a series of recurrent ‘across space’ (Becker et al., 2005) inter-organisational interactions. These activities were selected based on their relevance to the inter-organizational routine under scrutiny, judged by researchers and participants. In the case of Timber, this non-participant observation took the form of shadowing Timber Sales Managers during their regular sales calls: on-site visits to Customers’ retail branches. In the Fashion case, we observed weekly and bi-weekly work meetings, held between Suppliers, their Sourcing agents and Retail Merchandisers at both supplier and retailer head offices. Examples of artifacts, particularly system-generated reports, used within these interactions were collected. In both cases, subsequent data-collection was orientated towards understanding these events as ‘partial’ ethnographies (Alvesson & Deetz, 2000). To facilitate this, semi-structured interviews were conducted with participants from both supplying and

retailing organizations. As well as covering the history of system development, participants were asked to comment on specific instances observed and documents collected. This approach to interviewing draws on protocol analysis (Easterby-Smith, Thorpe, & Lowe, 2001) and the concept of ‘drilling’, where ‘the researcher in the research process learns more and more about the case study object and that this learning may facilitate the transcendence of norms and scripts that otherwise may guide interview statements’ (Alvesson & Deetz, 2000 p. 197). Finally, other artifacts that provided details of organizational design and development were sourced, included role specifications, technical specifications and organisation charts.

Case Study		Timber	Fashion
Methods			
Participant Observation	ICT-based investigation	Video recorded participant-demonstrations (5) user training	Video recorded participant-demonstrations (4)
	Informal interviews	Semi-structured interviews, face-to-face (22) and telephone (13)	Semi-structured interviews, face-to-face (12)
Non Participant Observation	Shadowing	Accompanying field sales managers to Merchant branches (8)	Merchandiser work meetings held at Retailers’ and Suppliers’ head offices (10)
	Documentation	ICT-technical specification System-generated reports-in-use Other technical artifacts	

Table 1: Participant and non-participant data collection methods

Research participants included those interacting directly with ICT-based systems and reports, their senior managers, those directly involved in the development and implement of the technological artifacts (e.g. business analysts) or in orchestrating its use. This produced a wide cross-section of organizational employees. Sales managers, administrators and support staff (e.g. HR, finance, IT) as well as commercial and other directors were included. (The higher number of interviews in the Timber case was a result of interviews with participants engaged in similar roles and responsibilities in multiple regional offices).

Data was prepared for analysis by typing up substantive field notes, reviewing and indexing collated company documentation, audio and video recordings. Data analysis and theory development were conducted as an iterative process. Notes and transcripts were reviewed and research journals used to record analytical notes and theoretical concepts as each case study progressed. As our conception of emergent inter-organisational routines crystallised, indexed interviews and other documents were reviewed and selected extracts transcribed. Data from these various sources were pieced together to form the account you find here. What we found particularly interesting about these cases was that, despite the implementation of notionally 'identical' ICT-based artifacts within each particular case, our findings suggested emergent 'across-space' variation in inter-organizational routines.

In the Fashion case, our research focussed on the inter-organisational merchandising activities between a large high street fashion retailer and UK head office of one of their global garment suppliers. Sub-divided into three discrete, product-orientated business teams, this UK-based agency supplied a mix of own-produced and third-party sourced product into various Adult and Childrenswear categories. The retailer operated two distinctly different logistical supply models. In the first, title of goods was exchanged at the point goods were despatched from the agent's UK warehouse. In the second model, title was exchanged at port of origin, referred to as 'FOB' or, colloquially, the point at which goods passed 'over the ships rail' (though air as well as sea freight transportation could be used). These different logistical models implied the adoption of equally distinct merchandising activities both on behalf of the supplier and retail merchandisers. The implications of ICT-based artifact use were explored in both settings.

Given that the majority of merchandise was sourced from origins outside the UK, the retailer had supplemented their existing merchandising systems with a collaborative planning, forecasting and replenishment tool that we refer to as 'Visplan'. The Visplan system contained detailed information on sales forecasts, current stock holdings and agreed future production. Envisaged as a stock management system, to ensure cover for future sales plans, this technological artifact shared regular actual and forecast sales information with product suppliers for the first time. Since

manufacturing and delivery lead times could be up to 24 weeks, this collaborative forward planning was deemed necessary if the in-store availability of staple products was to be guaranteed.

Our second case was in the timber sector. The supplier partner, a UK subsidiary of a multi-million euro parent, supplied timber and timber-related products into the UK retail sector. Customer-facing operations were organized into discrete business streams, one of which dealt mainly with Merchant customers. Whilst their customer portfolio ran into the hundreds, such customers differed widely, ranging from multi-branch, national operators, with hundreds of stores, to single retail units, independently owned and run. Although similar inter-organizational ordering routines were observed with other merchants, in this paper our case study focuses on ordering activities between one regional team and their single largest ICT user, a mid-size, multi-branch general trade merchant.

Merchant customers had, over the previous 4 years, been encouraged to place their orders using 'Weborder', an internet-based system. An innovation within the sector, the supplier envisaged that this ICT-supported, self-service order entry would provide their customers with not only a secure, round the clock ordering facility but also fingertip access to on-line stock availabilities, prices, delivery status and schedules. Reduced administration costs were an added benefit. A fully integrated, internet-enabled customer interface was designed and built. This 'Weborder' screen allowed customers' to browse a customised product catalogue and select available products for delivery according to a pre-determined schedule. On-line order processing, incorporating an automatic credit check; uploaded transaction details directly into the suppliers enterprise resource planning (ERP) system.

These two ICT-based artifacts were variously implicated in a number of distinct inter-organisational routines, the effects of which are described in the following section.

Findings

In the Fashion case, Visplan data representations of 'lead time', contractual 'commitment' and finished goods 'availability' became the site of significant inter-

organisational negotiation work. In line with the retailers' distinctive logistical supply models, two clear variants of delivery planning and ordering emerged, Visplan mediating within each: one that we describe as 'purchase order buying' and the other that we term 'collaborative planning'. Despite somewhat similar activities, tasks and responsibilities Visplan use differed in these two models with materially different implications.

In the Timber case, use of Weborder similarly effected task responsibilities. Order entry administration moved from one organisation to another. However, these alterations were subject to financial incentive and significant inter-organisational surveillance. These activities raised the profile of Weborder use at branch level and altered existing power relationships. At one branch, this resulted in a complete breakdown of the supplier relationship. In other locations, disruption to sales, planning and delivery routines were experienced.

In the analyses which follow three key aspects of the negotiating inter-organisational information systems are explored with special attention to temporal aspects; spatial aspects; and 'factual' negotiation and renegotiation. These three are examined first with regard to the fashion case and then second with regard to the timber case.

Fashion: Using Visplan

Temporal effects: Playing with time

When engaged in 'Collaborative planning' routines in the Fashion case, suppliers were required to declare finished stock quantities held in their UK warehouses on a weekly basis. This information was uploaded into the retailers system and used by the Retail Merchandisers as a base figure against which to 'call off' required stocks for onward distribution to store. These system stock declarations were subject to two, explicitly articulated, rules. Firstly, predicted future warehouse receipts would not be included, even if they were to be available by the time goods were due for despatch (there could be a lag of up to a week between the declaration of stock and the physical despatch date) and secondly, all stock physically present in the UK warehouse should be declared. In reality, these rules were subservient to achieving the closest possible

demonstration of adherence to ICT-held representations of production. One supplier Merchandise Manager (MM) described his reasoning,

MM: two of their things that are like commandments, written in stone, one is thou shalt not forecast [stock in transit on it's way as in the warehouse] and number two now, is that you shall declare everything that is in your warehouse...Basically, their belief is that if sales are good, and you've actually got a bit more stock, I'll go for it, I'll take it. I'll sell it, I'll call it off you. The worrying thing is if you're over-producing, or you've got some deliveries that have got here early, I mean in our business, we warehouse on site for 3 of the businesses but we also subcontract warehouse for [another business]. So if someone's delivery, another business, goes down and there's a container that's available early, we'll bring it in. But you may not want [the customer] to see all that. The other thing is that if we bring it in early and it's in the warehouse, that's going to furnish next week's flow.

Visplan data representations were manipulated to smooth out manufacturing and delivery irregularities and tactical, operational alterations, minimising the appearance of apparent excesses or shortfalls. For these reasons, representations of declared stocks were routinely amended to remain as close as possible to predicted quantities. The manual administrative effort involved in checking, adjusting and re-entering this data was part of the supplier Merchandise Assistants' normal weekly routines, with an artifact (the 'CPF' document) dedicated to tracking the accumulated progress of these 'synthetic' figures against physical warehouse stocks. The following extract from field notes made during non-participant observation of Supplier Merchandiser activities describes how,

The CPF is 'the key to doing availabilities'. Produced weekly, by style and colour, the columns deserving attention are 'free stock' (in the warehouse, ready to declare) and 'cumulative production' (all stock received to date – stock already despatched).

These two figures are used to work out what to declare. There is a decision point here. If there is 'too much' stock in the warehouse, then stock is 'held'. If there is 'too little', anticipated deliveries into the warehouse e.g. those that will be delivered on Monday are bought forward.

Rather than representing real-time events, these deliberate re-arrangements of Supplier data used the time dimension within information systems space as an additional resource in inter-organisational negotiations. This was not only a tactic of supplier merchandisers. Retail merchandisers also deliberately circumscribed ICT-

based data. Verbal indications, delayed order entry and temporary, manual re-adjustments were all normal occurrences. In the following extract taken from a routine joint work meeting at the Retailers' head office at the start of a new buying season, the Supplier Merchandiser (SMM) checks the veracity of the information he has used to produce his forward plan. An Assistant Retail Merchandiser (ARM) admonishes him when he prompts for a more formal indication of the confirmed production volumes that she indicates verbally,

MM: I'm looking, I was looking, I've just took the figures off 'Visplan' and on those two styles and run it through over that period of time, it's you know (.). You're happy enough with that, yeah?

ARM: Yep and also those figures only run 'til the first week of July. Those products won't cut off at the end of July, we'll run them through

MM: What you got any indications of what]

ARM: [No! We're only just sorting the budget out. But, as I say, we should hope to catalogue in Autumn which will be in the next 2 weeks so then we will work on the figures. They're only a 12 week lead time. What are you panicking about?

Here, without any formal indication of the volumes required, the risk of either starting speculative manufacture or incurring delays, and missed sales lay squarely with the supplier and go some way to explain the apparently relaxed attitude of the Assistance Retail Merchandiser. Speculative plans, once entered into Visplan, were subject to comparison against 'actual' deliveries and achieved sales. Once represented on the system, these data 'promises', either of contracted goods or available production, gained particular commercial significance. Any discrepancies in production could be used by the retailer to justify contractual changes. Part or full contracts risked cancellation, particularly on slow moving styles, as a more senior Retail Merchandiser (RM) spells out in the following extract,

RM: So at any given level, we can look through the whole department, we can look through at range, ranges, or we can look at a particular supplier to say, this is what you said you'd make, have you made it? Yes or No. If you haven't, why not.

R: Um

RM: Because [the retail organisation] is within its right that if you don't make it when you said you would, we can cancel the product... It will come down to personalities and departmental performance and various other issues that you may have in your department in terms of total commitment. Are you over committed, you've given me an opportunity to get rid of some of my commitment, and its slow merchandise, thanks very much.

Here, the ICT-based artifact was used as a tool for mutual surveillance. Despite the notion of 'collaboration', this extract brings into sharp focus the different organizational agendas of retailer and supplier. Supplier merchandisers worked to maximise sales for their business. Whilst clearly this involved slowing production of poorly selling products and switching into good sellers, there was also a clear imperative to sell through existing stocks. For retailer employees, on the other hand, for the retail organization, effectively managing their cash commitment meant getting out of slow moving stocks whenever an opportunity presented itself, thereby freeing them up to capitalise on faster moving styles, from whomsoever they were sourced.

Spatial effects: reflecting constraint

In a 'purchase order buying' (POB) situation however, the effects of Visplan use were somewhat different. The next extract, again taken from a work meeting early in a new season, is an extract from an interaction between merchandisers' using the POB model. At several points, the Assistant Retail Merchandiser had referred to problems she had 'buying blind'. As in an earlier illustration, budgets and contracts for the new season had not yet been finalised, so Visplan was not displaying forward sales estimates for the new season. However, in this setting, the failure to represent forward time causes problems for the Retail Merchandiser, rather than the Supplier Merchandiser, since in POB, each PO stipulated a *particular* delivery or drop date. This meant that any delay in contractual commitment threatened to push out the delivery date, as the Supplier Merchandiser (SM) explained during the meeting,

'the factories will get all signed up with a date, that if you don't confirm by such and such a date then you're going to loose that capacity and your POB date's going to move out to another week'

Within POB routines, the effect of constructing Visplan information system space *as if* no forward estimates of sales existed beyond those currently contracted

superimposed the same difficulties experienced by the Supplier Merchandiser in the collaborative model 'into' the retailer, despite the existence of this information elsewhere. The Retail Merchandiser couldn't use Visplan to plan ahead for her busiest time of year. She could neither use the artifact to calculate new season delivery dates (since the forward sales patterns weren't shown) nor log PO's (since this was prevented until contracts were entered). In addition, as end of season sales slowed, her 'mansum' (the 'management summary', a system-generated artifact that provided an overview of bought merchandise) showed her as currently over-committed and she was obliged to delay placing further purchase orders. Collaborative planning routines relied on suppliers' manufacturing and holding speculative stock. This however was not an option in POB, given the upfront negotiation of delivery dates. The following extract from a discussion during a POB work meeting underscores these points,

ARM: there's no sales estimate in there at the moment, because it hasn't been set up in contracts. And until it's set up in contracts, I can't put it into my sales estimate screen, which means it then can't feed into here.

Researcher: So is this what you say when you're buying blind

ARM: Yes... Really, it's not really true, because I do know how much I sold last season, last year for example. I've got an indication of what I want

Researcher: OK

ARM: But it doesn't actually spread it out for me. So where OK, I've said I'll take a snap at 20,000 singles, I may only need 15,000 and that second 5 I may not need 'til a bit later on. But I'm putting all my colourings upfront.

Researcher: Yes, yes

ARM: Because in a way it's going to be there for our busiest time in this department is the back to school period. Those 3 months. They're our Christmas. If we miss sales then, we don't pick it up. It's huge, absolutely huge. The volume we turn over is amazing. Umm. So that's why it's quite important for us to have plenty of stocks and not be short at that time. Um, but also I have to manage my stock commitments because I have to report bottom line Mansum, which I'm doing here at the moment. At the moment, I'm overcommitted with stock, so I really ought to be slowing down PO's but that's not so easy to do now because my suppliers don't have a holding facility so before we went POB, we had this area where you could say, you're going to have 20,000 singles coming through to you next week, but we'll sit on them for a couple of weeks til I bring it forward, but you suppliers don't have that holding facility, and I certainly don't have that holding facility so we're not

quite sure how it's going to work ... I can't necessarily cancel, because I've booked it, but I've got to slow it down and somehow work it through.

To alleviate these effects, routine re-negotiation work was needed, Visplan data representations were 're-presented' as time unfolded, although the two routines produced different sets of options, described in the following section.

Factual effects: different strokes for different folks

Not only were the range of options considered by supplier and retail merchandisers different due to their distinctive organisational agendas but the use of Visplan in collaborative or POB settings led to negotiations based on a different set of possible actions and, potentially, different decision-making sequences. For example, 'fixed' delivery dates could be reviewed and re-negotiated either by part-shipping orders or expediting deliveries at the discretion of the supplier. Here goodwill was vital. Visplan gave (only) Supplier Merchandisers' access to lay out these scenarios in an alternative 'modelling' view. In very different tone to that of her colleague in the collaborative planning exchange, the Assistant Retail Merchandiser summarised her position to the Supplier Merchandiser at the end of their POB meeting,

I am sitting on PO's at the moment because I should be slowing them down because sales aren't picking up but I can't slow them down at the moment. Again, I think that's a case of just for me to feel happier if something could be brought forward, or part shipped again, but we've said that for everything.

Whilst the Retail Merchandiser 'knew' she needed to place definitive orders on Visplan to secure timely supply, she relied on verbal discussions and goodwill to ease these anticipated re-negotiations. In this setting, Visplan effectively prevented the retail merchandiser representing verbal agreements, threatening her plans for future sales.

Entering and agreeing PO's didn't guarantee problem-free supply. Visplan use forewarned of future supply problems, giving Merchandisers time to act. Since in the POB model, retail merchandisers were responsible not only for sales plans, but also inbound logistics, they have a broader range of options to consider than their collaborative planning colleagues when problems appeared on the horizon. The following illustration details a discussion following a review of Visplan that revealed

future stocks deficiencies. Following an unsuccessful attempt to re-negotiate existing PO dates with the supplier, the Assistant Retail Merchandiser (ARM) first discusses how much time can be 'saved' by expediting using airfreight, before altering store plans.

ARM: Ah, but you've got them coming in there, we need them pulling forward. That's your 15 there, isn't it, 5, 5 and 5

SM: That's the best they can do with them now. Where are you going deficient? The end of April?

ARM: A month beforehand

SM: gasps. That's the best they can do on those now

ARM: OK, well what about flying? (...) If that one flies in

SM: Right

ARM: 1,2,3,4 saves?

SM: well, 1,2,3,4,5 really it is

ARM: it would take 5 weeks would it?

SM: well, that's what we've been allowing because. Wait a minute, I'll tell you when it goes FOB. On the 6th of April.

ARM: so it'd get to me a week later

SM: if it was airfreight, yep. You've a PO a week before that on the 30 March

ARM: OK, so the 30 March PO is that one.

SM: It's already raised, you haven't got a PO raised for the second 5,000 yet.

ARM: So if that flew in, it would be received there. Then I go deficient, well that just takes that week out. Then I have another 5 (...) Bugger, bugger, bugger. What have I got in addition to the old, because that's based on full catalogue. Right, we'll do a split catalogue between the two of those (tapping pencil). That's going to full catalogue straight away. OK. I don't need to make a decision yet. I may end up flying this through.

Reserving her option to airfreight, the retail merchandiser opts first to re-catalogue and then 'wait and see'. In POB the decision whether or not to expedite is transferred

from the supplier to the retail merchandiser – as are the associated risks (i.e. potential lost sales versus increased transportation costs).

We suggest that these examples demonstrate variation in temporal, spatial and factual effects of Visplan-in-use between the two inter-organisational ordering and delivery planning routines emerging from the fashion case (collaborative planning and purchase-order buying). We now turn to our second case, to examine the use of Weborder for ordering Timber.

Timber: Using Weborder

Spatial effects: the partial re-distribution of work

The introduction of Weborder was a supplier-led initiative. Despite being presented a long list of potential benefits, the Merchant initially displayed some scepticism. A financial sweetener, in the form of a price rebate on all internet orders was negotiated. Whilst this proved successful in persuading the Merchant's buyer to endorse system use, it raised further questions. Whilst internet-based ordering was introduced throughout the branch network, the system was cast as a mechanism for transferring order entry work from supplier to branches, as the following extract from an interview with the Merchant's Commercial Director (CD) shows,

CD: There was a suggestion that we ought, we really ought to start looking at web-based ordering. Why? said we. Well, it's more efficient, less chance of mistakes. Oh, and also a percentage difference in purchasing price. So there was a purchasing incentive. To which we obviously said, right, so you're outsourcing data keying to us.

Researcher: So its contribution towards your costs.

CD: In essence that's what it was. In practice it caused a bit more work than we first anticipated.

The merchant buyer saw the introduction of Weborder as a simple transposition of order keying from the supplier to his branches. Branch managers had their own information systems for purchase order management and now, rather than simply printing and faxing a copy of their own-system generated purchase orders, branch

managers or their nominated representatives, were apparently required to duplicate the entry of this order information into the Weborder screen,

“We still had to raise the purchase order on our own system, so that when stock came in it had to be booked in to keep our stock records right. So having raised a purchase order on the system, that would be printed off in the normal way and we then go and re-key it. So we key it once, we key it twice. Hit the send button, down to [Regional Sales Office location], order processed. Material comes in, the faxed order is called up and the goods are booked in. So our people were pretty unhappy about having to key timber twice.”

Weborder use had apparently shifted all the work of order entry to the Merchant branch. Orders were now entered remotely and seamlessly transmitted straight into the suppliers' ERP system. Supplier sales office personnel were no longer involved in the routine. But something had been lost in this process, as the emergent delivery disruptions starkly reveal.

Temporal effects: disrupted deliveries

Despite complete integration with the suppliers' own internal systems, when orders were entered by customers' using Weborder, the synchronisation of orders and production schedules sometimes went awry. Weborders' daily 'Yes/ No' logics blinded the system to potentially risky order confirmations, given the potentially tight timing between and actual daily production times and required despatch slots. Failure to identify these in advance sometimes led to missing confirmed deliveries. Customers were swift to express their dissatisfaction, as one of the suppliers' regional Key Account Manager's (KAM) describes in the following interview extract,

KAM: The product planning department don't use the system to plan what they're running and when they're running it. So because internet is all worked on planning tables, you can input an order today and say you want it on Wednesday. And we're maybe manufacturing that product on Wednesday will accept that order and say that's OK, because that customer wants that product on Wednesday and we're running it on Wednesday. But that product may not be running in [production site location] until the nightshift, or something like that (.)

Researcher: after the deliveries' gone.

KAM: Yes and another instance, it may be running on a Tuesday, but the lorries are all loaded on a mid afternoon, so the chances are the customer's not going to get that. Then Transport e-mail me or the sales staff and say,

that's a nil stock, it didn't go. So by the time you phone the customer, it's actually Wednesday and he's expecting it that day (.)

Researcher:: and you're ringing him up saying sorry, it's not going to be on the van(.)

KAM: And he's saying, but I placed an order on your internet site and it said it could do it no problem. Well, actually it was only running Tuesday and he can't understand why it was running Tuesday and he can't get it on Wednesday and he's now not going to get it until Friday.

For customers using telephone-based ordering, such close shaves were identified and dealt with by Sales Administrators when taking the order. Internal liaison between sales and production planning personnel enabled customers' needs to be accommodated, or, at worst, the speedy identification and reporting of problems at the time of order entry. Translating this process into Merchant data entry had removed the opportunity for this sense-checking work to take place.

Factual effects: inter-organisational surveillance

The Timber Merchant soon found that the supplier was willing to work with them to monitor individual branch usage. An internet sales manager was appointed for the express purpose of promoting and promulgating Weborder use amongst current and potential customers. Her role, which also involved on-site training and first line help desk duties, included providing information on current system use. As well as timber products, the supplier now provided regular, detailed information about branch ordering patterns, and the extent to which individuals were, or were not utilising Weborder and hence, realising the company discount,

“We would get a lot of information from the girl [at the suppliers' regional sales office] every month, it was split into two. There is branch [location], here are its phoned in orders, here are its faxed in orders and these are the internet orders and here they are split into two, because obviously they can track them. So we can get our 1% additional on our internet orders and not [on the others]. So we could work out what it cost us in any particular month, if there was a branch that wasn't using it.”

The Merchant's head office used this information to interrogate individual branch managers, in an attempt to achieve the maximum possible rebate. At some sites, low bandwidth ICT infrastructure resulted in chronically slow connection speeds. This

made the order entry task particularly laborious and unpleasant. These frustrations, the additional workload and head offices' new interest in their timber ordering activities were reason enough for some to sever their links with the supplier altogether. As the Suppliers' Regional Sales Manager explained,

“What [branch location] do is they give their business to a competitor. And the reason for why is that we have to report to them at the end of the month the value of orders that have been placed by them over the internet and the value of orders that have been placed by them over the phone and then that branch then gets their backside kicked.”

Rather than delivering the enhanced ordering facility and reduced administration costs as envisaged, Weborder use had restructured and unsettled relationships between the supplier, merchant buyer and the respective branches. Ordering and delivery routines had been disrupted by the dislocation of order entry; with the effect that latent supplier order-checking had been eliminated. Instead, price rebates and inter-organisational surveillance routines had been introduced in an effort to encourage those apparently reluctant to embrace the new technology. The cumulative affect of these alterations had been too much for one branch, with the result that they took their business elsewhere.

Discussion & conclusions

In this paper we have developed a theoretical perspective that conceptualises 'across-space' performances of activities such as ordering, scheduling and delivery planning as recurrent inter-action patterns, or inter-organizational routines. Our cases illustrate the way in which technologies-in-use may be implicated in the transformation of these routines, either as 'structure' and 'agent'. Incorporating insights from Actor-Network theory into the generative change process of organizational routines rectifies the reification of human (over non-human) agency within much of the existing routines literature.

Routine theory suggests that analysis of the 'internal dynamics' of an organisational routine can foreground behaviour and uncover power relationships (Pentland & Feldman, 2005). Our research was designed to achieve this by exploring 'across-space' interactions of notionally identical technologies-in-use, thereby exposing emergent variation as constructed in practice. In common with other practice-based

researchers, we locate the site of local knowledge construction and reconstruction within these performances (Pickering, 1995). Variation or divergence may be explained, in theory, either by the degree of surveillance (i.e. the ability to observe and monitor performances) or artifact specificity (whether existing rules are vague or precise); the implications of divergence vary dependent upon whether the environment is one of empowerment or command or control (Pentland & Feldman, 2005). Dated or careless development had been offered as an explanation for divergence in the former case, resistance and misunderstanding in the later. Our case studies exemplify the extension of inter-organisational negotiation practices into the information system space. These practices arise not only from differences between the respective organisational partners' agendas, but also due to their available options for action, some of which are mediated by ICT-based artifact use.

Drawing on examples from two detailed case studies conducted within the UK retail sector we have presented some empirical illustrations of these effects. These cases illustrate how ICT-based artifacts can produce a representational 'information system' space within which inter-organizational negotiation continues. In each of our cases, artifacts were assembled to produce a 'promissory' system: data representations were constructed and maintained relating to promises of future orders and planned deliveries. Use of these 'simulcrae' (copies for which there were no originals (Poster, 1990)) resulted in various, often unanticipated, effects. Changes in *temporal* (when actions were represented as having been done), *spatial* (where actions were performed) and *factual* (what was done) practices emerged (Gherardi, 2001).

In the Fashion case, 'promises' were jointly monitored, re-negotiated and re-presented as time went on. Inter-organizational negotiations were extended within and transformed through the use of these representational forms. Significantly, the emergent effects of this technology-in-use differed within the distinct institutional settings of 'collaborative planning' and 'purchase order buying'.

In the Timber case, the use of a technological simulcrae resulted in the partial spatial transference of order entry tasks from supplier to merchant personnel. However, order checking activities were 'lost' in this displacement, with some disruption to delivery routines. This and other factors coupled with an increase in inter-organisational

surveillance, led to a complete breakdown of the relationship between the supplier and one of the branches it served.

To conclude, in this paper we argue that mainstream theories of knowledge management fail to account satisfactorily for the effects of information technology-in-use. Rather than the separation and exclusion of the 'technical' from organisational analysis, our case studies suggest that, if this persistent 'blind spot' (Joerges and Czarniawska 1998) in organizational theory is to be satisfactorily explained, greater attention needs to be paid to the interaction *between* both human and non-human organizational actors (Joerges & Czarniawska, 1998; Latour, 1993, 2005; Pickering, 1995). These authors theorise an 'action net' of human and non-human actors, inscribed and 'author/iz/ed' (op cit p364) by organization, related to one another within a given institutional order. This paper suggests and illustrates how the concept of an 'inter-organisational routine' may be adapted to explain the variations found between implementations of notionally similar ICT-based technologies.

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