Documents as Mediating Artifacts in Contemporary IS Development

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Abstract

In this paper, we analyze the roles of project-related documents as mediating artifacts in contemporary IS acquisition and development. We draw on a range of theoretical concepts to propose four ways in which documents are implicated in IS development through (1) the translation of meaning and interests, (2) in boundary-spanning knowledge transfer, (3) in the enactment of structures, and (4) through their materiality. We explore the occurrence of these roles through a case study of the external development of a sophisticated financial database solution using a purchased commercial software package. In conceptualizing documents in this way, we seek to address the need for further empirical work that focuses on understanding the variety of roles such objects can play, the nature of the objects as well as their role, and how such objects emerge as mediating artifacts in practice.

1. Introduction

Contemporary information systems (IS) development occurs in an environment characterized by increased outsourcing of development, high levels of packaged software acquisition and customization, rapid delivery of systems in short time frames, and the participation of a wider range of participants, both internal and external to the client organization. The latter includes vendors and outsourcing contractors, together with the external consultants who play an increasingly active role in mediating between these actors and the IS client [3, 16, 23, 24, 34].

If IS development is a “social process of communication, learning and negotiation within and between individuals and stakeholder groups” [37], then the active participation of a wider range of actors increases the need to negotiate and integrate different knowledges, viewpoints and interests in the cross-disciplinary and temporary project-based settings in which contemporary IS development occurs. In this paper, we argue that various project-related artifacts and documents mediate this process of negotiation and integration. Indeed, the social process of IS development is better conceptualized as a ‘sociotechnical’ [20] or ‘sociomaterial’ [28] process, in that material resources and technological artifacts mediate the work practices and interactions of various individual actors and groups involved in IS design, development and deployment [35].

By documents, we mean typified and material communications in various media, whether paper-based or digital [29, 31]. Documents are used “to communicate and coordinate … activities and knowledge in a complex environment incorporating many locations, people, and material resources” [31].

In this paper we explore the role of documents as mediating artifacts in contemporary IS development through a longitudinal case study of the development of a sophisticated financial database solution in a large New Zealand organization. The project involved a solution build by external consultants using a purchased commercial software package.

Our analysis draws on a range of theoretical ideas to conceptualize the role played by various project artifacts and documents in IS development activities. We suggest that such documents are implicated in the translation of meaning and interests, in boundary-spanning knowledge transfer, in the enactment of structures, and through their materiality. In conceptualizing documents in this way, we seek to address the need for further empirical work that focuses on understanding the variety of roles such objects can play, the nature of the objects as well as their role, and how such objects emerge as mediating artifacts in practice [11, 21].

The remainder of the paper is structured as follows. First, we discuss our theoretical conceptualization of documents as mediating artifacts. Second, we outline the research approach followed in the case study. We then present our analysis of the case study based on our theoretical conceptualization. Finally, we discuss the significance of our findings and their implications for theory and practice.
2. Conceptualizing documents as mediating artifacts

IS development can be conceptualized as a trajectory of situated, sociotechnical interactions between various individuals and groups involved in an IS project, in which meanings and actions around an emergent solution are interpreted and negotiated [9, 13]. An important part of the iterative and emergent process of IS development is the production of documents that reflect representations of the design problem and solution [12].

These design artifacts represent an attempt to materialize a particular meaning or ‘translation’ of the design problem or solution. The term ‘translation’ is derived from actor-network theory and refers to the alignment of the interests of different actors through, for example, a problematization or particular interpretation of a problem situation [7, 19]. While actor-network theory tends to focus on translation as a political process in which influence and power are exercised, the translation of interests can also occur in a less reflective or intentionally political way, such as in the definition of best practices in a procedures manual [13].

In this paper, we use translation to describe the ways in which certain actors (individually or collectively) interpret design goals and solutions, which are often materialized in artifacts such as models or project documents that represent a (more or less) negotiated and (temporary) stability of meaning in the IS development trajectory. In practice, such documents do not necessarily reflect a consensus on understanding or meaning, as different actors may have more or less influence in their construction. Project participants draw on the meanings attached to commonly used project documents and artifacts, such as design representations or models, work procedures, charts, and plans, in performing IS development activities. In this sense, such documents can be thought of as ‘mediating artifacts’ [9, 13] that stand in for particular viewpoints, representations or interests.

Design documents and representations can also be understood as ‘boundary objects’ that facilitate understanding and interaction between different groups of IS project participants [13, 22]. Boundary objects are objects for enabling cooperation across social worlds or communities of practice. They maintain a common identity across various intersecting communities, but are sufficiently flexible to meet the informational needs of each [36]. In this way, heterogeneous groups can engage in productive communication and cooperation while maintaining their specific purposes, viewpoints and interests [30]. As Bowker & Star [5] put it, “Such objects have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation” (p. 297).

In the literature, four main categories of boundary objects have been delineated: (1) repositories of objects indexed in a standardized fashion, which supply common reference points across groups; (2) standardized forms and methods, which provide a shared format across groups; (3) models or representations, which provide an abstraction that can be used across different groups; and (4) maps, which have coincident boundaries but allow different internal contents [8, 13, 36]. Boundary objects can take many forms, both abstract and material, although they are most commonly understood as material objects [11]. For example, various studies have shown how different functional groups involved in engineering design and development interact and communicate around a range of boundary objects such as assembly drawings and prototypes [4, 8, 15].

In IS development, documents and representations acting as boundary objects enable boundary-spanning knowledge transfer or sharing across different communities [13, 22]. They offer a common focus or reference for the negotiation of interpretation without necessarily enforcing a particular shared meaning among project participants [9, 33]. For example, in situations where the emerging IS solution becomes part of the IS development, such as in prototyping or the case study discussed in this paper, it acts as a boundary object, facilitating interaction and knowledge sharing between users and developers [2]. Published representations of a solution design may be used to communicate design ideas, allow collaborative problem solving, and coordinate the actions of various participating groups [11]. They may also perform a contractual role in the IS project, for instance in defining the problem and solution boundaries [12]. Other examples of boundary objects in IS development include development tools, which can offer a common schema to facilitate shared understanding between users and developers [6], system documentation and requirements specifications [21, 32], and project management tools such as status reporting tools or project timelines, which facilitate the temporal coordination of divergent interpretations of project progress [33, 38].

Levina and Vaast [21] suggest that despite individuals or groups designating particular objects as valuable for boundary spanning, these only become ‘boundary objects-in-use’ if the artifacts are
both meaningfully incorporated into the local practices of different groups while acquiring a common identity in the context of joint practices. They argue that for the latter to occur, “there must be a joint field within which agents jointly recognize and value the artifact in question” (p. 354).

In mediating the decisions and work practices of various actors involved in IS development, project documents, technologies and tools are also implicated in the enactment of organizational and social structures. Orlikowski [25, 26], drawing on Giddens’ [14] structuration theory, argues that technologies (and by extension, other material artifacts) are both the product of human action and structure human action through their routine use in organisations. In their fabrication, technologies and other artifacts are ‘inscribed’ [1] with symbolic and material properties that reflect existing structures of knowledge, authority and relations within an organization and which are drawn upon by actors in their design and development of these artifacts. When organizational actors routinely use the resulting artifacts, these properties become enacted as ‘rules and resources’ [14] associated with the use of those artifacts [26]. The enactment of rules and resources both structures human action, in the way individuals draw upon them to make sense of and guide their actions, and reproduces and institutionalizes the structures they constitute. Giddens [14] refers to this as the ‘duality of structure’ – a reciprocal and recursive relationship between social structure and human agency. It is important to note that artifacts do not ‘embod[y]’ structures as such, since social structures exist as ‘traces in the mind’ [17], a virtual order of rules and resources [14] that only shape action when instantiated and enacted in recurrent social practices [26].

That is, the design and appropriation of various documents and artifacts used in IS development in a given context is influenced by organizational and social structures that, in turn, are reproduced and reinforced (although the potential for transformation exists) through repeated use of the documents and artifacts by project participants. For example, many organisations utilize a standard method or set of documented practices of IS development. In applying the standard method, system developers draw upon the associated interpretive schemes, facilities and norms [14] with which the method has been inscribed to mediate their understanding of how to build a new IS. An emphasis in a standard method on technical aspects of the development process may help reproduce a narrow view of the social implications of development [37]. More participative methods may offer different roles and responsibilities for developers and users, which influence the way these two groups of actors interact.

Of course, use of a particular project document or artifact is neither deterministic nor inflexible. Whether deliberately, inadvertently, or by improvisation in response to unexpected events, individuals may appropriate an artifact or its use in ways that were not necessarily intended by its designers [26]. If this change in use or practice is sustained over time and adopted more widely in an organization, it may become institutionalized, potentially modifying or transforming the structures with which it is associated. Thus, in using a standard method of development, developers may choose to deploy only part of the method, use it only for certain projects or adapt aspects of the method to suit their local context, in ways that may eventually become accepted practice.

Finally, adopting a sociotechnical or sociomaterial perspective in understanding the role of documents and technological artifacts in mediating IS design, development and deployment activities involves an explicit consideration of how the materiality of the media in which documents are supported constitutes part of the field of communicative practices used by organizational groups [30]. Such a perspective on IS development answers Orlikowski & Iacono’s [27] call for a more serious and explicit engagement with the social and material nature of IS artifacts.

Østerlund [30] suggests that material objects can be part of communicative practices in three ways. First, documents can be material objects of evaluation – the subject of actors’ attention and consideration. For example, as mentioned earlier, prototypes serve as the focus for engineering design. Second, an object’s materiality can itself be an expressive medium, the form of which helps realize communicative practices. For example, the transition from paper-based to computerized systems for recording the resources used to treat hospital patients opens up increased possibilities for making visible the work of various medical groups. This in turn can lead to new communicative practices around the attempted standardization of medical practice in order to reduce costs [10].

Third, Østerlund [30] suggests that a material object can be part of the actional field in which communication takes place. Thus, “the material object becomes part of the communication and shapes who people can talk to, when and where, how much content they need to include in order to make themselves understood, and for what purposes” (p. 36). He uses the example of a whiteboard used for patient tracking doctors and nurses in a hospital. As a
material object, the whiteboard shapes “expectations about appropriate patient tracking participants, where and when this takes place, and who should control what content and why” (p. 32), in a way that is potentially different from, say, an electronic patient tracking system.

Table 1 summarizes the theoretical conceptualization discussed above. Taken as a whole, these four conceptual elements offer a more comprehensive approach to understanding the role of documents and other artifacts in IS development. Their utility is illustrated using the findings of a longitudinal case study of IS acquisition and development.

Table 1. Theoretical conceptualization of mediating artifacts

<table>
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<tr>
<th>Conceptual element</th>
<th>Analytical application</th>
<th>Key sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Translation</td>
<td>How do IS development documents and artifacts materialize the translation of meaning and interests?</td>
<td>[9, 13]</td>
</tr>
<tr>
<td>Boundary objects</td>
<td>How do particular IS development documents and artifacts emerge in practice to play a boundary-spanning role in communication, coordination and knowledge transfer?</td>
<td>[8, 36]</td>
</tr>
<tr>
<td>Structuration</td>
<td>How is routine use of IS development documents and artifacts shaped by and enacts social and organizational structures?</td>
<td>[14, 26]</td>
</tr>
<tr>
<td>Materiality</td>
<td>How is the materiality of IS development documents and artifacts an inherent part of communication practices?</td>
<td>[30]</td>
</tr>
</tbody>
</table>

3. Case description and research method

AlphaCo is a relatively new organization, operating in a competitive global manufacturing and distribution environment. The IS project studied involved developing a database solution to replace the existing financial spreadsheet models used to manage the company’s information technology outsourcing contract. The project owners were the unit responsible for managing this contract. An external project manager was hired to manage the project, consistent with organizational policy and practice in outsourcing non-core competencies. Similarly, company policy and practice advocated the acquisition of packaged software rather than internal development of a solution. After an extended vendor identification and evaluation process, an external development company, SoftCo, was hired to supply MDS, a multi-dimensional database and OLAP tool and develop the desired database solution.

The project was followed for two years from June 2005 to July 2007. Field work involved an initial intensive eight-month period of observation and interviews coinciding with the main project activity, followed by a number of follow-up visits to AlphaCo in subsequent years, as work on the project became more sporadic and some form of closure could be made in terms of actual use of the new solution. In total, 558 hours were spent on site, observing project activities and meetings or conducting 34 semi-structured interviews with internal and external staff. In addition, all project documentation was made available to the researcher through the co-operation of project managers from both AlphaCo and SoftCo. A range of AlphaCo internal documents and electronic sources, as well as publicly available articles on AlphaCo and its IS function, were also accessed and reviewed to provide contextual information.

A comprehensive thematic analysis was used to analyze the data collected from field notes, interview and meeting transcripts, emails, and various project and organizational documents. Data were read and re-read multiple times, categorized and compared across common themes that emerged in the enactment of the project. This process was informed by the researcher’s understanding of IS development and by reference to the relevant literature. In this way, the data analysis was an emergent process involving interplay between data interpretation and theory.

4. Analysis

In this section, we will use the theoretical conceptualization of mediating artifacts developed earlier to examine how various project documents were implicated in the IS development activities. Space constraints mean that we cannot present a complete analysis of the case study. Instead, we focus on specific documents as exemplars of how such objects emerge and function as mediating artifacts.

In reviewing the range of documents involved in the project studied, we can distinguish between institutional objects related to project management that exist independent of the specific IS project (e.g. documented project management standards, standard report templates, a published organizational project lifecycle, and various document repositories), and documents created specifically as part of the project.
studied, although often based on standards or templates that pre-exist the project (e.g. RFI documents, progress reports, task allocation plans, issues registers and prototype models). In the following sections we discuss four exemplars taken from these different types of project documents.

4.1. IS Process Document Repository

The IS Process Document Repository (ISPDR) maintains in digital form a range of information related to IS project management practice within AlphaCo. Organized around three main processes of project initiation, project planning, and project monitoring and control, it documents various project procedures (e.g. process diagrams, procedural documents), provides guidelines as to their implementation (e.g. checklists, hints and tips), and specifies project deliverables (e.g. document templates, completed example documents). The ISPDR is a ‘designated’ boundary object [21], intended to provide a repository of information that supplies common reference points on IS development practice across the whole organization. It is a particularly important resource for project managers, who (as in this case) are the typically external to the company and unfamiliar with the specific project management processes that they are expected to follow:

The [ISPDR] is compiling a repository of good practice that's in place within AlphaCo … It's a repository for information about how to produce the work products … An idea for an external project manager to know what the processes are … what you need … in terms of documentation, what the expectations are, what the deliverables are. (ISPDR Project Manager, interview, 25 July 2005)

In many ways, the ISPDR can be considered as a ‘system’ of boundary objects [36], as it also contains a range of standardized forms and methods that provide a common format for producing the various project deliverables required by the company. For example, the external project manager in this case constructed the Project Plan document (a required project deliverable), using a standard template contained in the ISPDR, to which he added project-specific content based on his knowledge of the project and using two examples that he also found in the ISPDR.

In addition to providing a repository of processes and templates, the ISPDR “provide[s] users with a process map of what to do and how to go about it” (AlphaCo intranet document, August 2005). In this sense, the ISPDR represents a translation of what IS project management means within AlphaCo: “I think the information contained in it and the purpose behind it is more … You get the process flows. It's not just a repository” (IS Project Office Analyst, interview, 21 July 2005). It helps implement the company’s interest in “achieving the goal of operational excellence” (AlphaCo intranet document, August 2005).

Pursuit of “operational excellence” is a stated AlphaCo organizational value, interpreted within the context of the IS function as both the development of standard processes and process improvement. As a means of achieving standard processes across the company, use of the ISPDR enacts the ‘rules and resources’ associated with this value, both ensuring compliance with and reinforcing this organizational structure:

We’re defining the processes … And then we’ll start doing compliance testing and driving out compliance to process, and getting to that point of the vision of being operationally excellent. (IS Strategy Analyst, interview, 11 October 2005)

The standard processes documented in the ISPDR were shaped by a range of external structures, reflected in the range of frameworks and reference models such as Control Objectives for IT (COBIT), IT Infrastructure Library (ITIL) and Project Management Institute (PMI) standards used to define and organize AlphaCo’s processes around industry ‘best practice’, and consistent with an emphasis within AlphaCo on “applying professional disciplines” (IS strategy document, 2005). The ISPDR is also an integral part of AlphaCo’s “IS maturity journey”, a process improvement initiative to increase the maturity of their processes in alignment with another external industry reference standard, the Capability Maturity Model (CMM).

The digital form of the ISPDR enabled widespread access to it via the company intranet, as well as (potentially) the capability for searching and retrieving specific documents. The external project manager for the project studied made extensive use of the ISPDR, systematically reviewing the main project management-related processes and printing out and collating relevant information and documents which he consulted as required throughout the course of the project: “I’ve … had a look at what’s relevant and what’s not relevant … I’ve looked at them all and printed them out for the whole process” (Project Manager, interview, 21 October 2005).

Given the digital form of the documents contained in the ISPDR, it is interesting that the project manager found it preferable to work with physical copies of the relevant documents. This may have reflected the sheer size of the repository: “Why
4.2 RFI document

The AlphaCo project team decided that an RFI (Request for Information) process would be adequate for the relatively small sized project, without the need to undertake a further, more detailed RFP (Request for Proposal) process. A RFI document was completed by the external project manager several months into the project using a standard template available in the ISPDR. Within the template there are multiple sections, some for standard content and others for adding project-specific content, with some guidance as to what is required. The RFI document brings together background information about AlphaCo and the project, the terms and conditions of the RFI process, a detailed list of the functional requirements for the project, and non-functional specifications that were standardized across the company.

As a formal project document, the RFI document represented AlphaCo’s translation of the design problem and solution, and their interests in acquiring a suitable database solution. It functioned as an important boundary object in transferring knowledge between AlphaCo and potential vendors. Staff from the external development company ultimately appointed, SoftCo, also used the RFI document to develop their understanding of what was required in the project. The AlphaCo project team were able to mobilise the RFI document in subsequent negotiations with SoftCo about the extent to which some changes to the emerging solution requested by AlphaCo were in fact new work rather than necessary corrections or amendments. They expected SoftCo to deliver a solution that met the user requirements defined in the RFI document – no more, no less – and knew that any additional expenditure was going to be hard to justify given the company’s current (constrained) financial climate.

I think we should be clear. They’re not changes at all. These things were always part of the original spec[ification] we wanted done … I can show you it in the RFI. It’s specified in the RFI. (Project Manager, informal project conversation, 13 December 2005)

This appeal to the RFI document itself reflects an acceptance and acknowledgement of its existence as a material artifact, a tangible resource that could be drawn upon in communicating interests and defining functionality in project discussions and negotiations.

The RFI document also illustrates structural influences on IS project management in AlphaCo. The company has a number of institutionalised ‘guiding principles’ developed around IS acquisition and development practices. These principles provide a decision-making framework and shape behaviour in regard to these areas. The guiding principles are operationalized in IS projects through their incorporation into aspects of project management processes and their inscription in various templates used in managing a project. For example, AlphaCo adheres to a ‘total cost of ownership’ principle, which is inscribed in the RFI template contained in the ISPDR in the form of a requirement to provide a “total cost of the proposed solution” pricing model that can be used to assess RFI responses from potential vendors. Not only did use of the RFI template to construct the project RFI document shape project action in this way, but that action in turn enacted and reinforced the prevailing structure underlying this guiding principle.

4.3 Prototype models

Members of AlphaCo’s project team were of the opinion that the large, unstructured and cumbersome original spreadsheet models, which had been incrementally developed in somewhat ad hoc manner over an extended period, needed to be rationalized into a more usable form for whoever would be developing the database solution. To accomplish this, the external project manager spent considerable time creating a set of simplified and less complicated prototype models in Excel. These prototype models provided new design artifacts that substituted for the original models as the basis of project work. They
were important boundary objects that mediated understanding between the AlphaCo owners of the original models, prospective vendors, and the developers eventually responsible for implementing a database solution. For example, copies of the prototype models that the external project manager had prepared were distributed to prospective vendors as part of an RFI process, and used by them to develop “a good understanding in terms of how the model’s going to work” (SoftCo Director, SoftCo product demonstration, 30 September 2005).

The prototype models acted as boundary objects for facilitating knowledge transfer between AlphaCo and the SoftCo developers, who developed their understanding of what was required: “By spending a lot of time in the prototype evaluation model that I was given” (SoftCo Senior Developer, interview, 21 December 2005). While the external project manager seems to have intended the prototype models to have been the basis of extended discussions between himself and the SoftCo staff, the tight timeframe under which development proceeded restricted the extent to which the SoftCo developers took advantage of this opportunity. Instead, they relied primarily on developing their own understanding of the prototype models and assessing that against the external project manager’s validation of the emerging MDS solution (itself an important boundary object in this process).

As published representations of the solution design, the prototype models also performed a contractual role, used as boundary objects in negotiating what tasks fell within the scope of the original project specification and what were ‘out-of-scope’. Although they were a common reference point mobilised by both parties, their meaning differed across the two parties. In particular, the SoftCo staff understood their role in the project to be “replicating” the prototype models, an interpretation their project manager relied on in negotiations. In contrast, the AlphaCo project team considered the project specifications to reside in the RFI document and that the prototype models were simply an aid for development.

The prototype models were mediating artifacts that became the basis of development work by the external developers. It was these prototype models that the SoftCo developers translated into their development tool: “deconstructing it, interpreting it and rebuilding it in MDS” (SoftCo Project Manager, informal conversation, 7 November 2005). However, the prototype models represent a particular translation of the design problem, that of the external project manager. It was his understanding and interpretation of the original models that became inscribed in the prototype models, along with any simplifications, assumptions, limitations or errors. Although the AlphaCo users of the original models felt that the prototype models were an accurate translation of the original models, the SoftCo staff came to realise there were differences between the two versions: “There have been areas where [external project manager] has understood it differently and [main user] has understood it differently … We think that there’s little differences” (SoftCo Project Manager, interview, 21 December 2005).

These differences included some omissions and oversights, an abridged prototype model front-end, and untried additional functionality with incorrect or not fully defined business rules. As a consequence of these differences, the SoftCo developers felt that they would have developed a fuller understanding of the solution requirements and saved time if they had had direct access to the original spreadsheet models and their creator, who could have highlighted “all the quirks and all the problems” inherent in the historical development of the models (SoftCo Senior Developer, interview, 21 December 2005). The artifacts created to simplify things for the developers ended up being perceived by the developers as making aspects of the development process more difficult and time-consuming: “I believe [the external project manager] thought he was making it easier for us, however I believe it caused more problems” (SoftCo Senior Developer, email, 19 January 2006).

The materiality of the prototype models was implicated in their use in the project in several ways. As noted above, they served as objects of evaluation – the material basis of the developers’ attention and consideration: “If you get given an Excel sheet … then you can follow through how things fit together … If you give me something, I can see that … It’s always best just to have it there” (SoftCo Project Manager, interview, 21 December 2005). The material errors and incomplete rules contained in the prototype models meant that amendments to the emerging solution were continually required when the problems were subsequently discovered, a source of frustration to the developers: “We’d understand what we had to do, but it wasn’t quite right when we got further down the line … There was just little nigglly bits that were left out” (SoftCo Senior Developer, interview, 22 December 2005).

4.4 Issues register

After development on the database solution had commenced, SoftCo created an issues register (in the form of an Excel spreadsheet) that resided on the project development server to provide a record of any
issues identified by members of the AlphaCo project team during checking and testing of the emerging solution. Such issues were subsequently fixed by the SoftCo developers, ready for retesting, and remained open until AlphaCo were satisfied with the fix. The issues register functioned as a boundary object, sharing knowledge and facilitating coordination between the external developers and the AlphaCo project team. It shared a common identity understandable to both parties, but was sufficiently flexible to meet the informational needs of each.

The SoftCo developers used the issues register as a reference point on necessary changes, the priority given to them by AlphaCo, and their eventual completion: “To track all the things that we have … Just so we know where we are” (SoftCo Senior Developer, project meeting, 7 December 2005). From AlphaCo’s perspective, the issues register was an artifact of the testing process, a place to record required corrections and amendments to the developing solution. It also became the document against which project sign-off with SoftCo was to be given. As such, it was useful for auditing purposes, forming part of the formal record of testing sign-off: “Just so that if an auditor comes back in the future and says, ‘Did you test?’, we can go, ‘Well, here’s the list’” (IS Commercial Analyst, informal project conversation, 14 December 2005).

The issues register became a material object of discussion around project progress, attached to the agenda for project meetings. At one point, the SoftCo project manager became concerned about the way AlphaCo project members were approaching the SoftCo developers directly to raise problems with the solution and get them fixed. She was able to use the issues register to re-impose control on the process by requiring that all requests for changes to the solution be logged through it:

These guys [the developers] are just running around a little bit … I want them to go, ‘Issue 1: done, fixed. Issue 2: done, fixed.’ Not moving on, until they’re done. But you guys have got to tell us what's most important for you … I think this issues register, everything should go through here. So, we know what's changing … because I'm not here all the time to know what's going on. (SoftCo Project Manager, project meeting, 15 December 2005)

Her last remark indicates the way in which she intended the issues register to act as mediating artifact between herself and AlphaCo, standing in for her and representing her interests as she was not always on site to monitor requested changes on a daily basis.

The issues register was also used by the SoftCo project manager in a contractual role, to attempt to characterize certain outstanding project issues as “out of scope”, and thus requiring additional payment from AlphaCo. Her actions in doing so triggered an extended negotiation between SoftCo and AlphaCo over the nature of the project specifications and the definition of out of scope items, a discussion in which the issues register played an important boundary-spanning role. At a subsequent project meeting, a member of the AlphaCo project team distributed a printout of the issues register at that time, which he had colour-coded green for closed off issues, yellow for issues that still required checking, and red for issues defined as out of scope by SoftCo. The colour coding focused attention on the out of scope issues and the validity of their classification as such: “If it’s in this document [the issues register] and it’s red, it means either we or SoftCo have to do something” (IS Commercial Analyst, project meeting, 16 January 2006). It also provided a means of signalling sign-off and the consequent payment of fees to SoftCo.

[We] will leave this [issues register] as the master. And as soon as [we] turn everything green, we'll send it to you guys, and you can take that as it's signed off … You can take it for read that the invoice will be processed at the same time. (IS Commercial Analyst, project meeting, 16 January 2006)

5. Discussion and concluding remarks

The examples discussed above emphasize the role of project documents as mediating artifacts in contemporary IS development. Drawn on by various actors exploiting the documents’ potential roles in situated practices, each document performed multiple and different functions in project activities. Table 2 summarizes each of the four project documents discussed in the case study in relation to the four conceptual roles proposed in this paper.

As boundary objects, the various project artifacts mediated understanding, facilitated collaboration or served as the basis of negotiation between the AlphaCo project team and the SoftCo developers. In some instances, particular boundary objects stood in for or delegated for individual participants and their knowledge. In general, the boundary objects associated with the project provided sufficient flexibility in interpretation to accommodate individual meanings and interests while facilitating collaboration and acting as a basis for translation and negotiation.
Table 2. The project documents as mediating artifacts

<table>
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<th>Translation</th>
<th>Boundary object</th>
<th>Structuration</th>
<th>Materiality</th>
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<tbody>
<tr>
<td>RFI document</td>
<td>Translates design problem and solution</td>
<td>Transfers knowledge between AlphaCo &amp; vendors</td>
<td>Use enacts guiding principles on IS acquisition</td>
<td>Tangible artifact drawn on in negotiations</td>
</tr>
<tr>
<td>Prototype models</td>
<td>Translation of original models and into MDS solution</td>
<td>Knowledge transfer and negotiation between AlphaCo and developers</td>
<td>Reproduces accounting rules in outsourcing contract management</td>
<td>Material object of developers’ evaluation</td>
</tr>
<tr>
<td>Issues register</td>
<td>Translates problems and interests in emerging solution</td>
<td>Facilitates coordination and negotiation between AlphaCo and developers</td>
<td>Enacts SoftCo project management processes</td>
<td>Material object of project discussion, progress and sign-off</td>
</tr>
</tbody>
</table>

While the concept of boundary objects is well-established in the sociology of technology, only relatively recently has it been applied within the field of IS research. The research presented here confirms the usefulness of this theoretical concept for examining the role of development documents in knowledge sharing and negotiating an intersubjective understanding in IS development. It also demonstrates how these objects may be designated as having that role by organizations or emerge as such during the course of development. From a practice perspective, IS professionals also need to understand the role of these artifacts, so that they pay attention to the potential for such artifacts to influence interaction and negotiation between participants in an IS project.

However, project artifacts play roles other than that of boundary objects. Various documents and representations produced during an IS project also function to (temporarily) stabilize translations of problem or solution goals and parameters. For example, a project’s scope, goals and objectives, requirements and budgeted resources become defined and communicated in various material forms during the course of IS development. Such shared representations offer a common focus or reference point in the negotiation of meaning and action. However, although the AlphaCo project team had intended various project documents and artifacts to adequately define the solution design, the developers’ experiences during development did not always confirm the accuracy of these translations. This echoes Keil and Carmel’s [18] caution against relying on intermediaries which may intentionally or unintentionally filter or distort information.

The structuring influence of various contextual elements within AlphaCo and its wider environment could be discerned in the way that standard procedures, templates and project documents both reflected structures based around industry ‘best practice’ or organizational project management standards and IS guiding principles. Their inscription or implication in AlphaCo’s IS project discourse, documents and practices reproduced these rules and resources. As Giddens [14] suggests, through their enactment of structures in everyday, routine and recurrent interaction and practices, organisational actors reinforce and institutionalise those structures. While the possibility of transforming structures such as the IS guiding principles exists through their appropriation and enactment in different ways than intended by organisational actors, in the database project studied their enactment reproduced the existing structural status quo.

Finally, in response to Orlikowski & Iacono’s [27] call for engagement with the material nature of IS artifacts, we have attempted to identify the various ways in which the materiality of project documents plays a role in IS development. Confirming aspects of Österlund’s [30] discussion of the material nature of documents in communicative practices, we show how the various documents produced and utilized in this project functioned as material objects of evaluation, and how their materiality at times influenced the course of development through facilitating or constraining project action and interaction in different ways.

10. References


