

IS DEVELOPMENT IN AN OUTSOURCING CONTEXT - REVISITING THE IS OUTSOURCING B AND WAGON

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ABSTRACT

Outsourcing has been one of the most influential factors contributing to changes in information systems development in the last decade. The paper presents findings from an action research project of information systems development in an outsourcing context at a large university hospital in Denmark. The research, and general findings in the literature, indicate that the intended positive effects of outsourcing are hard to achieve without negative by-products. Decision frameworks to guide the decision-making in this respect are evaluated based on the empirical findings. It is illustrated that the issues of flexibility and controllability are among the most important when an IT department determines its outsourcing policies. Continuity issues are also important in understanding the relationship between buyer and seller in IS-acquisition as being more complex than in a simple market model.

1. INTRODUCTION

During the last decade one of the most profound changes in information systems development has been outsourcing. In the years of outsourcing and business process re-engineering, many organizations have chosen to outsource the costly and hard-to-manage software development. Bansler and Havn (1994) refer to this as "the industrialization of information systems development", and they argue that in the future, most information systems will be based on prefabricated generic systems. Sparked by the Eastman Kodak-IBM outsourcing contract in 1989 many models and frameworks for decision making in relation to IS outsourcing have appeared in the IS literature. From the literature one might get the impression that "outsourcing" did not exist before - which it of course did. Loh & Venkatramen (1992) also note this in stating the Eastman Kodak-IBM contract as having an "imitative effect throughout the IS-community".

In this paper I present a number of findings from an empirical study of how information systems development (ISD) takes place in an outsourcing context. The empirical study was performed in the IT-department of the Copenhagen University Hospital, Denmark as part of a larger project related to changing work practices in design (Bødker et al., forthcoming). If focus on issues of outsourcing related to ISD practices, hereby providing some flesh and blood from IT-designers' work practice perspective to the dominating micro-economic perspective in studies of outsourcing. The paper's subtitle - quoting the title of (Lacity and Hirschheim, 1993) - reflects my intention towards this end: to put these models and frameworks to a kind of reality test. In the many papers on outsourcing various different definitions of the topic appear - a kind of variation on a theme. In line with Looft (1997) and Lacity and Hirschheim (1994) I use the term "outsourcing" with the following meaning "the use of a third party vendor to provide information products and services that were previously provided

internally”. Admittedly, this is a very broad definition covering acquisition of off-the-shelf software, generic products (standard packages), or custom development of applications by a third party vendor. However – apart from off-the-shelf software – this actually describes the situation at the University Hospital, which I will return to in subsequent sections.

The paper is structured as follows. In section 2 I give a brief account of the IT-function of the Copenhagen University Hospital focusing on its procedures for information system development. In section 3 the research question(s) and the research approach to answer the questions are presented. In section 4 I discuss the real life practices of information systems development at the University Hospital in relation to models and frameworks for ISD outsourcing.

2. THE UNIVERSITY HOSPITAL AND ITS IT-FUNCTION

The Copenhagen University Hospital is a large, modern hospital with many specialized hospital wards organized in 10 centres. The IT-department – placed in the “Image Diagnostics, Informatics and Medico-technical Centre” – has two sections: “Operations” and “Development and Projects”. In the last part of the 1990’ies the IT-department has been the main actor in an “IT action plan” of 100 MDKK (app. 15M €).

Until the early 1990’ies the IT department relied on in-house development of information systems of all types, i.e. from basic patient administration to clinical applications and applications for research purposes. The IT-department changed its strategy for IS development to acquisition of (customised) generic systems or development of custom developed systems by external software houses for two main reasons. The IT department had experienced difficulties in maintaining a staff with core competencies on modern platforms and modern development technologies. And more and more reliable generic systems became available on the market from multiple vendors. Following the new strategy projects are organized according to the model depicted in figure 1.

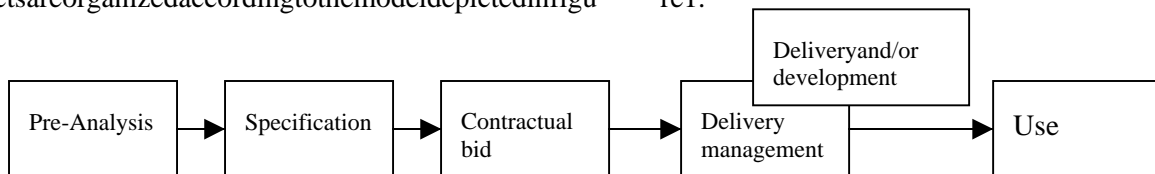


Figure 1. Project model of the University Hospital

The IT-department starts projects upon requests from “user departments”, i.e. management or clinical wards. A project starts by investigating the needs or the problems behind the initiation of the project in the “Pre-Analysis” phase. The investigation results in a small number of alternative models for a solution to the problems, and concludes by recommending one of the alternatives. In some projects the Pre-Analysis involves thorough cost-benefit analyses of the alternatives, while others only briefly sketch the various alternatives and their benefits.

In “Specification” – after the selection of one of the alternative solutions – this solution is designed and specified at a level of details sufficient for a contractual bid. The level of detail primarily depends on whether the solution involves acquiring a generic system, or the solution involves custom development. In the case of a generic system the specification involves specifying and describing the intended functionality and integration with other computerized information systems. When the solution involves custom development the specification also includes a description of user interface issues and a description of the work practices in the user departments (clinical wards, administration, etc.) to be supported by the information system.

In “Contractual bid” a contractual bid is prepared and carried out. This involves determining the type of bid depending on the character and the size of the project. Often this calls for more detailed

specification of parts of the solution. Choosing a contractor and putting together the contract involves legal counselling.

The chosen contractor gets the contract of delivering generic IT products and/or developing a customized system ("Delivery and/or development"). The IT department performs "Delivery management", which involves quality control of deliverables from the contractor(s). Delivery management also includes facilitating the organization's implementation by working with the user departments and external contractors for example in user training. Finally it also often includes a technical implementation where the vendor's product is integrated onto the hospital's technical platforms and network, as well as data conversion. Delivery management ends by a formal acceptance test where the delivery is tested against a number of criteria set up in the contract. Upon a successful acceptance test the system is put to "use".

There are major managerial decision points after "Pre-Analysis" – which of the proposed solutions to go for – and as part of "Contractual bid" – which contractor to choose, and what to include in the contract. Decisions are taken by a steering committee after investigations and proposals from a project group. The steering committee consists of the IT manager, managers from the user departments, and representatives from top management. The project group typically consists of a few IT consultants, sometimes only one, and representatives from user departments, typically future daily users and middle level managers. The project manager is always an IT consultant.

3. THE RESEARCH QUESTION AND RESEARCH APPROACH

The research project – which forms the empirical basis for the discussions in this paper – took place in the Development and Projects section of the Copenhagen University Hospital's IT department. The section with its staff of 15 IT consultants had – at the time of the study – carried out 20 projects using outsourcing of ISD. The projects ranged from small projects with a budget of 2 – 300 thousand DKK and less than one year development time to large multi-million projects with a development cycle of several years. Thus they had profound experience with IS development in an outsourcing context, but had reportedly needed time and resources to reflect on their experience.

On this basis they joined a larger project undertaken by the author and colleagues on changing work practices in IS design (Bødker *et al*, forthcoming). The aim of the project in the University Hospital was to contribute to improved work practices in IS development. A project group consisting of two IT consultants and two researchers was established. The project reported from in this paper started in August 1997 and finished in April 1998. The total effort amounts to 12 months divided equally between the two IT consultants and the two researchers. The project was divided into 3 main activities, each resulting in a report that was presented and discussed among the department's IT consultants and acted upon by the IT department's management. In the terminology of the hospital, the activities were named "screening", "diagnosis", and "proposals for cure". However – unlike in hospitals – in this project the "patient" had the full freedom to choose whatever of the report's conclusions and proposals they would continue with.

In the terminology of Susman and Evered (1995)'s 5-phase model of an action research project the project can be accounted for in the following way: The *specification of infrastructure* in the project was done as part of setting up the contract for the project. Being part of a larger research project with external funding from a national research institution, management in the University Hospital's IT departments should justify the external funding by at least contributing half of the project's cost. The IT manager was part of the steering committee of the larger research project which comprised projects in three separate IT organisations. Projects in each of the three IT organisations were organised with a steering committee with the local management and one senior researcher, and a project group with both practitioners and researchers.

The *diagnosis of problem* was – as noted above – carried out in the project group in the activities called "screening" and "diagnosis". The activities involved two thirds of the IT consultants in data

collection, and all 15 IT-consultants in the discussion of implications of the findings. There was a very open attitude among the IT-consultants in relation to successes and failures in their projects. However, as the project involved external persons, the researchers, and as the diagnosis would include pinpointing problems, we had to take great care not to blame individuals. If the commitment of the IT-consultants were lost, the project would be a bad off-innits need to get to the essence of problems.

Planning of actions was part of the “proposals for cure” activity, which involved suggesting potential improvements, first and foremost a revised project model, which could be tested in a pilot project. This would then allow a thorough *evaluation of results*, and possibly *repetition* of diagnosis, action planning, implementation, and evaluation. From the outset the project was set up as a two-step plan. Step one included the “screening, diagnosis and proposals for cure” activities, corresponding to step 1-3 in Susman and Evered’s action research model (1995). After a separated decision – where also the risks of uncertainty and time would be better understood – step two with action taking and evaluation of results could take place. For reasons outside the scope of the project – a contractor’s failure to deliver a central “infrastructure” application that many other ongoing projects relied on – all new projects was postponed outside the time frame of our research project.

As mentioned earlier the three main activities of the project were called screening, diagnosis, and proposals for cure. In the “screening” activity – a survey – all 20 projects carried out following the project model depicted in figure 1 were characterised along a number of key parameters on the basis of a questionnaire to all involved project managers. This gave an overview of the projects, which enabled the steering committee to select five projects for further investigation. The five projects reflect the diversification of IT-projects. Three projects were based on acquisition of generic systems and two projects were based on customised development by external software houses. Two of the projects were finished and in operation, one was partly in operation (phased delivery), one project had been cancelled after specification and a pilot test, and one project was still under way. Three of the projects had a rather narrow user-focus – one or a few wards or labs, while two projects had a broader scope of use.

In the “diagnosis” activity the five projects were studied in detail. Interviews were carried out with all involved IT-consultants and IT-management, as well as with representatives from the user departments who had taken part in the projects, and with representatives from two suppliers. Furthermore central project documents were studied. The aim of this activity was to find areas where the section with its background and experience from the projects could improve quality in its work practices through the use of new methods or ways of working or by the use of new tools. All together the investigation gave voice to 71 problems: 12 from the user representatives, 7 from the suppliers, and 52 from the IT-consultants and their managers. Not all of these were mutually exclusive, and in their report they were grouped into 10 problem areas.

For the final “proposals for cure” activity three areas were chosen as subjects for potential improvements:

- Work practices in pre-analysis and specification,
- Project models and contractual models,
- Roles of IT-consultants and user representatives.

Based on literature studies a number of proposals were made in the “proposals for cure” activity. First of all, a more elaborate project model was suggested. The early activities in the revised project model were suggested to more explicitly support an ongoing decision process. Next, a broad overview of tendering was proposed: In some projects a tender could be made very early to allow innovative visions from suppliers to emerge (with inspiration from architectural competitions and Euromethod (1996)). In other projects a tender could be made on the basis of a more detailed specification. Finally, a project handbook framework including a description of the division of labour and responsibilities between user departments and the IT department was suggested.

4. DISCUSSION

The description of the project in section 2 and 3 has dealt with work practices in IS development. In the following I present and discuss findings in relation to outsourcing issues. Section 4.1 discusses decision frameworks to guide the managerial processes involved in outsourcing ISD. Section 4.2 deals with findings in relation to pricing mechanisms. A discussion of appropriate tools for regulating outsourcing contracts concludes this section.

For the discussion that follows it is important to note that the Copenhagen University Hospital's IT department had chosen outsourcing as a strategic approach to ISD for two main reasons: (1) More and reliable generic systems had become available on the market from multiple vendors making acquisition of generic software products attractive and realistic. (2) The IT department had experienced difficulties in maintaining a staff with core competencies on modern platforms and modern development technologies making it necessary to rely on third party vendors' competencies in situations where custom development was necessary. These reasons can be understood as the number one driving force behind the outsourcing strategy. Additional objectives were:

- cost reductions,
- quality improvements
- improvements in responsiveness to users' IT demands.

These objectives were very much in line with what was "promised" in the management literature and in the consultancy hype around outsourcing in the early 90's. Based on Rao et al. (1996) and Loof (1997) table 1 shows a reconstruction of the potential positive as well as negative effects from outsourcing ISD based on IS management and consultancy literature.

Pro's	Con's
Cost reductions	Loss of control
Quality improvements	Loss of qualified IS staff
Increased managerial control	Loss of flexibility
Effective use of staff	Loss of competitive advantage
Capacity on demand	
Improvements in responsiveness to user demands	

Table 1. Compiled list of positive and negative effects of outsourcing (Source: Rao et al., 1996 and Loof, 1997).

From a managerial point of view the challenges in relation to outsourcing of ISD can be formulated as oriented towards manoeuvring or managing the ISD process to obtain the positive effects and avoid the negative ones. Decision frameworks to aid this have been offered in the literature. In the next section I will take a look at some of these.

4.1. Decision frameworks

Nelson et al. (1996) provide a two-dimensional acquisition framework, depicted in figure 2. Along the horizontal dimension there is a mapping of the location of the acquisition team (in source or outsource), and along the vertical dimension the acquisition approach is mapped (custom or package).

Acquisition team	in source	out source
Acquisition approach		
custom	Internal resources for design, coding, etc.	Vendor performs analysis, design, coding...
package	Internal resources for package selection, installation, etc.	Vendor performs package selection, installation, etc.

Figure 2. Nelson et al.'s two-dimensional acquisition framework (Nelson et al. 1996).

This framework does not provide very much help to decision makers in a situation like the management of the University Hospital's IT department. As noted above, they had made the strategic decision to outsource ISD, so the decision along the horizontal dimension was made. Along the vertical dimension, also a general decision had been taken: If a fast and standard package exists that suits the needs, it should be chosen, and the vendor will be asked to do any tailoring needed.

When projects start, users often know if a generic system (package) exists on the market. When it is not known from start whether a generic system or a custom build application is most feasible, this question is resolved as part of the investigation in the Pre-Analysis. When specification is oriented towards a generic system, the specification is seen as a list of functionalities and data volumes. The functionality list is later used as a checklist when evaluating proposals from potential suppliers. The IT department's primary experience from projects acquiring a generic system, or a package, was a caution not to have too much tailoring done. Many vendors were eager to modify their package, even to a great extent, because the University Hospital is a nice name on their product's list of references. However, extensive modifications become a burden when new versions of the generic system are offered, or when technical platforms are changed or renewed.

Specification towards a custom built application also has functionality and data models as central elements. Conciseness and completeness are vital, but not sufficient. To facilitate the system building up a vision of the system, a description of the work practices to be supported by the system was found to be essential. A central question in this respect is to which extent key visions from the users should be included in the specification. The normal understanding in a competitive bid is that the specification describes "what" the client needs, whereas the suppliers propose "how" this can be achieved. However, in certain key areas, users might have very specific ideas of a solution. As part of the proposed revised project model and potential pilot projects it was proposed to identify and experiment with alternative contractual relations in which the user and the designer develop a vision for certain areas to be part of the final system, whereas the supplier in other areas is asked to supply his ideas and visions for how to meet the needs described in the CFP.

Looff (1997) suggests that in order to achieve the positive effects of outsourcing ISD mentioned in table 1, certain conditions must be fulfilled, and that these conditions have to be supervised and enforced. To support this he proposes a framework for information systems outsourcing decision making involving a number of goal variables (Looff, 1997, p.45):

- costs
- leadtime
- quality
- flexibility
- controllability
- continuity.

The research clearly demonstrates these variables as relevant steering points. In general, the "flexibility" goal variable seems to be the most notable one. Judged by the IT department manager and the IT consultants it was without doubt that it had only been possible to carry out 20 projects of the actual size and complexity because of the outsourcing strategy. Even though not all had been completed as successes - delays and excess expenditure had been considerable - the outsourcing strategy of the University Hospital was termed a partly success. In many projects, it had turned out to be difficult to ensure deliveries on time and budget. To a large extent this was explained by the fact that requirements were changed either in terms of changes to or added functionality, or in terms of changes to the technological infrastructure (development tools, platforms, etc.).

With regard to "controllability", the research supports Loeff's findings that decision makers' expectations toward controlling the supplier's performance by enforcing the contract are hard to meet (Loeff, 1997, p. 260). In section 4.2 below it is described how it turned out to be difficult to enforce the contract in a strict sense. Further the research revealed that controlling deliveries also might include a good deal of work on the client side. Setting up test beds for intermediary tests and the final acceptance tests had often required considerable efforts.

The research further demonstrated two contributing factors to success in outsourcing of information systems development at the University Hospital:

1. It was considered a positive effect to have the supplier at a close physical distance. In some cases the supplier of custom developed applications had been located in the department with a positive outcome. This allowed for close interaction and for exercising control on a daily basis". In other successful projects the supplier's development staff was located in the Copenhagen area.
2. Organisational simplicity on the supplier side was evaluated as having a positive effect. Projects with suppliers who had subcontracted development of added functionality to a third party (software house) was considered burdensome. It was difficult to interact with the suppliers in these projects, because the formal contact person did not have the competence to engage in discussions on technical subject matters, while the subcontractor's personnel did not have the formal competence to do so with the client.

4.2 Pricing mechanisms and contractual relations

Fitzgerald and Willcocks describes six pricing mechanisms (Fitzgerald and Willcocks, 1994):

- time and materials
- fixed fee
- fixed fee and a variable element
- cost plus a management fee
- fee plus incentives scheme
- share of risk and reward

The IT department only uses a few of the above mentioned mechanisms with the "fixed fee" as the general one. It is normally combined with a fixed lead time with provisions if the supplier does not meet the deadline.

The research clearly supports the view that in IS outsourcing the relationship between a buyer and a seller become far more complex than the traditional market model. In the basic market model, a transaction takes place instantaneously, and buyers and sellers have no relationship before or after the transaction (Loeff, 1997). When the IT department made the strategic choice of outsourcing ISD many of the "outsourcing pros" listed in table I certainly were in play, i.e. a situation where one could say "if a supplier fails to deliver what was agreed in the contract, he doesn't get his money" simply was a

nice image, even if it was a naïve one. Even though in the case of the Copenhagen University Hospital there is no attempt to form strategic partnerships with suppliers, the research shows that the relations between the hospital and its IT suppliers become far more complex than just a question of delivering the stated software on time and budget. When suppliers were unable to deliver according to the contract, be it in terms of functionality, time or budget, the hospital often had no interest in withholding steadily its contractual rights, i.e. various *lock-in effects* come into play. The reason is that the IT -department needs the vendor to be able to maintain and expand the system in the coming years. This requires first that the vendor stay on the market, and secondly that the particular segment still is worthwhile pursuing for the vendor. So, in practice the IT -department has had to accept a "satisficing" delivery instead of the one described in the contract.

4.3. Convenient tools for an outsourcing strategy and the limits of outsourcing

The strategy of the IT -section "Development and projects" is to buy generic systems, which are maybe customised, or have custom applications built by an external software house. The acquisition is accomplished by a competitive bid and a succeeding contracting with an external vendor/software house. This section has developed great experience in such acquisition processes. However, it is also clear that some of the present tools, especially the government issued –and mandatory for a public University Hospital –standard contracts are inexpedient. So for various national, as well as EU, legal reasons, alternative ways of contracting, for example the Euromethod (Euromethod, 1996), thus were not possible.

One example may illustrate the problems. As mentioned in section 4.1, the IT -department had experienced during specification towards a custom built application that suppliers needed more than written specifications in order to build up a vision of a new system, including the relations between the new IT -system and work practices. Insights from the IS literature clearly indicated that close interaction between designers and future users would be beneficial in this situation. However, the rules and regulations for a contractual bid did not allow this. All potential suppliers should have the same information, so the rules laid out procedures as being based upon written material as part of the CFP, and a possibility for suppliers to ask questions for clarification where questions and answers would be made available to all invited suppliers in the bid.

One of the main reasons for choosing the outsourcing strategy was that the IT -department had difficulties in maintaining a staff with core competencies on modern platforms and development technologies. However, it turned out that during contracting and delivery management there is often a need to match the competence of the supplier on technological issues. Thus the department had realized that it still needed competence on the most widely used platforms and development technologies, which has to be provided by external consultants if not available within the section.

5. CONCLUSION

Outsourcing of ISD looks appealing to many decision makers –and it certainly did in the Copenhagen University Hospital. As illustrated by the research reported here the objectives are hard to achieve. New problems may arise, and also some old problems may show up in new disguise. In this context decision frameworks are helpful. However, they are also general, and thus need to be adjusted from a design work practice perspective. Based on findings and lessons from an action research project in an environment with extensive experience from ISD outsourcing, various decision frameworks have been discussed.

In general, Nelson et al.'s framework did not provide much help, whereas Looff's (1997) goal variables were "tested positive": Our research demonstrated these as relevant steering points. Especially two goal variables, flexibility and controllability, were central to findings in our research.

Based on our findings, two contributing factors were added: Physical proximity to the supplier and organisational simplicity on the supplier side.

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