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Complexities in securing sustainable IT infrastructures in Hospitals: The many faces of Local Technical Support

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Abstract

This paper contributes to an understanding of the complexity of support work and stress the need for local technical support in hospitals in order to maintain a sustainable infrastructure of information systems (IS) and information technology (IT). Given this complexity it is pointed out that a naïve trust in formal stylized models of support organization is problematic. With an increasing number of critical systems in the hospitals technical support is becoming an essential service needed for maintenance, acute failure of systems and help with the everyday use of hardware and software. In order for the health informatics technologies and systems to work, the healthcare institutions need strong IT organizations to support and maintain the IS/IT infrastructure on which these technologies and systems rely. Through a qualitative study of IS/IT support at hospitals I have examined the work and competencies of the service level in the IT organization. On this basis I recommend a nuanced understanding of the complexity of the work of these local technical supporters. I contrast this to the understanding of the organization of IT support through rationalized, formal, 'best practice' models that emphasize centralization and cost-effectiveness through single point of contact. It is argued that there is a need for local technical supporters in hospitals with organizational and local knowledge because a) the local circumstances are key to supplying effective support and b) the supporter supply pro-active support that aid to secure the sustainability of the IT infrastructure.

Keywords:

Technical support, Local, Maintenance, Health informatics, Organization.

Introduction

Sustainable and appropriate use of information systems is not just based on the system design and the way the systems are implemented even though this is important and is the focus of a wide range of research in the field of IS and Health Informatics. An important factor to the functioning of an information system is the way the systems are supported, and as Pentland states "[…] an unsupported product is hardly considered a product at all"[13]. The focus on and importance of supporting systems within the healthcare sector is also central in the strategy from the Danish public organization SDSD (Connected Digital Healthcare in Denmark): "The increase in digitalization results in an increase in demands of the IT solutions on the related operations. IT solutions that are applied in the healthcare sector are often of vital importance to the treatment of patients. It is therefore of critical importance that the solutions of IT operation are handled professionally in order to produce a high level of reliability of operations."[2]

If the technical background (the IT infrastructure) is not working, the best information systems in the world won't do much good. Besides, a large amount of the cost of IT is related to the work carried out after installation [5][[8]. In spite of this there have been very few studies related to the topic of supporting systems in healthcare within the Health Informatics field.

The empirical basis of this article is a study of the IT organizations providing services to the Danish hospitals. These have changed to a large extent since 2007 where the Danish regions, which are responsible for the hospitals, were reduced from 13 to 5. The structural changes were followed by a focus on a new way of perceiving the regions. The new ideal was seeing the regional organization as a corporate group (in Danish; 'koncern'). One of the implications of this change in Region North Jutland and the other regions was that the IT departments began a centralization of services.[17] The organization of the IT departments was further inspired by and based on an English public IT organization model called ITIL, that focus on streamlining the IT organization in a centralized and uniform way in order to increase service and reduce cost. This has proven difficult for a number of reasons, some of which will be addressed in this paper.

Analytical framework

What is support?

Technical support consists in the maintenance, repair and other services done in relation to securing the function of hardware and software: "Technical support is a post-sales service provided to costumers [or users in organization] of technology products to help them incorporate a given product into their work environment."[1] Technical support is the backbone in securing sustainable infrastructure on which the IT systems of the hospital rely. Support can both be organized as both an internal or external service.

Levels of support/service

The support structures of IT organizations are often divided into levels. There are different ways of defining the levels. One way is to divide them into front-end and back-end support. The front-end support is further divided into helpdesk and product support as illustrated in Figure 1.[8]

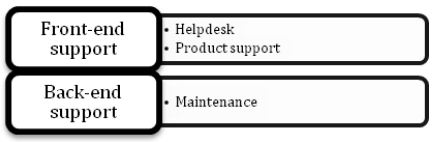

Figure 1- Levels of support

The front-end support is where support has contact with the users or costumers. The first level is the first point of contact for the user and preferably the only one in terms of cost-effectiveness. There are a number of reasons why this structure is preferred. One is to reduce the amount of trivial tasks solved by experts; another is to secure a simple structure for support with easy, one-way contact and tools for managing the technical problems.

ITIL methodology and centralization

Information Technology Infrastructure Library (ITIL) is a paradigm used by or inspiring all the IT organizations of the Danish regions[17], though many have found problems with implementing the paradigm in the organization. ITIL describes different IT practices and provides descriptions of checklists, tasks and procedures that are considered best practice. The focus within ITIL is on the needs of the clients, and on clearly and effectively defined responsibilities and processes for different service tasks within the IT organization. [6][16]

ITIL also divide support work into three levels that determine the level of escalation of a specific problem (incident). First level support is defined by first contact. On this level of support the problem is registered and clarified and attempts are made to solve the problem immediately. This level is also responsible for the communication about the status of the problem to the users. If the problem is too complex (require a higher level of expertise), the task is escalated/transferred to the second level, the expert technical support. The purpose of this level of support is to patch up the more complex problem as quickly as possible. The difference between the first two levels is based on the level of expertise and therefore the cost of the service provided. The second level is, in contrast to the third, generalists in the technical field. The third level of support is the escalation of a problem to highly specialized experts in a specific field. This is often external provides of software or hardware, but can also be internal providers such as server and network maintenance.

Technical support can both be done remotely or as local technical support. In both cases there are a number of tools used for both administering and getting the job done. According to ITIL an incident management tool is essential for recording and managing incident information. A tool like this is also used in Region North Jutland.

Support as interaction and design

Mira Kajko-Mattsson states that "Today, we do not have maintenance models (standards) appropriately reflecting the diversity of maintenance activities. What we have is a very general standard model mainly applicable with perfective maintenance at the third support level."[8] A number of attempts have been made to describe the complexity of support activities. Two of these approaches are described below. One concerning support as mending social situations and another viewing support as design.

According to Julian E. Orr, support is often seen as the diagnostic, repair and maintenance of machines. But this is actually not the whole picture. He points out that "[…] machine problems may actually be problems in the social relationship between costumer and machine, and large parts of service work might better be described as the repair and maintenance of social settings."[15] As illustrated in figure 2 the technician can be seen as a mediator or someone engaged in the reconfiguration and repair of the relation between the user and the machine.

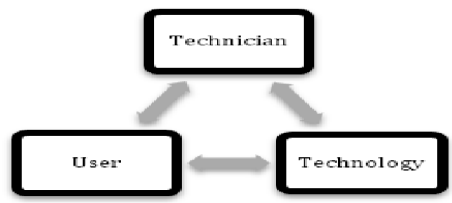

Figure 2- The technical support reconfigures the relation between the user and the technology

This approach sets focus on the fact that being a technical supporter is also being concerned with social relations and consulting the costumer on the interaction with technology.

Another approach to drawing the more complex picture of local support work is to perceive the support activities as a form of local design.[9][10] The concept of local design points toward the constructive features of doing support work. The constructive features of the local support work helps the design of relation between costumers/users and technology in order to secure it "[…] works for people in a context of values and needs, to produce quality results and satisfying experience" [20][9] Anne Marie Kanstrup argues that the local supporters are "[…] domain experts with enough computer knowledge to be able to install, maintain, support, etc., hardware and software in the organization. And they are capable of supporting and teaching other members in the organization with regards to the use of software applications in an efficient way because they take their point of departure in 'the system, the users, and the context all together'."[9] This perspective contributes to an understanding of the importance of a variety of competencies and of having local knowledge along side the technical in order to provide qualified support and systems design.[14]

Methods and Materials

My empirical study is based in the qualitative field and places its studies on a cross between grounded theory and processual research[12][19]. The study of IT support was set up to inquire into the work of IT supporters, but also to uncover features of IT support that could be subject to further inquiry. IT support was in this study taken in the broadest sense as all support of IT systems, involving hardware, software and people-ware.[11] The study is based on 10 interviews (clinicians, secretaries in clinical practices and IT professionals), 6 days of observation of technical IT supporters work and study of reports and other texts. Also an organizational analysis was carried out about the structure of IT support in the organization.

Results

The technical support organization

In Region North Jutland the support organization is build on inspiration from ITIL though the structure is not fully implemented, and is not intended to be. In a document concerning the forming of the regional organization it is written that 'the core in IT maintenance and support will be the implementation of a framework for processes (ITIL) as a means of securing that the appropriate services are delivered to the business at the appropriate price and agreed upon quality.'[3]

IT in Region North Jutland is organized as a centralized function in the organization managing support, maintenance and development projects and tasks across the nine hospitals in the region. The way the Region North Jutland has implemented ITIL in relation to support is by formalizing procedures for contact, escalation and feedback of incidents. This is organized around a problem handling IT tool (software).

The support organization is divided into levels. The first level and front end support is the Virtual Service Desk. On the second level (technical) we have backend support where the service can be done either on-site or remotely through different tools, e.g. remote access to computers. The third level is internal support or repairs of servers and networks or external help from the manufactures of hardware and software. Thus we see that their IT support (in figure 3) is structured similar but not identically to the general model described above.

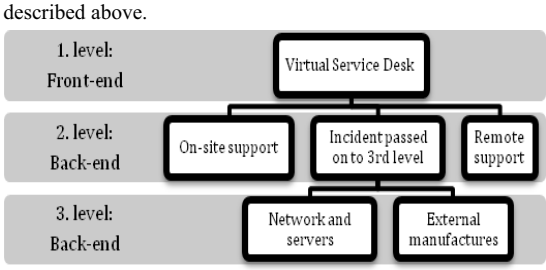

Figure 3 - The structure of technical IT support at Region North Jutland

The virtual service desk is the single point of contact for support. The costumer calls a number and is redirected to the supporter on duty that day. Costumers can call the service desk with acute problems, but must send an e-mail if they e.g. need new hardware or other non-acute services. When service desk receives a call or e-mail they will either solve the problem immediately or escalate the problem to second or third level of support. The hospitals need to call the service desk in order to get in contact with the local supporters. Not even the secretary at the front desk has the phone number to the local technical supporter.

The work tools of the supporters

When using ITIL and IT Service Management strategies, IT organizations usually use problem handling software for logging and managing the incidents. This is also the case for Region North Jutland. They use a system for logging, distributing and acceptance of IT problems/tasks. The system is also used for management of the work of the IT professionals. Most problems are logged in the problem handling system by the supporters at Service Desk, some come in via e-mail with non-acute requests and the local supporters also log some problems that need solving at a later point.

Some of the problems that arise in the local support work stem from the need for completeness from a management/system point of view, not from the usability of the system for managing and distributing tasks. This gives an added workload that seem unnecessary from a work perspective. Lucy Suchman describes this problem through the concept and discussion of visibility of work.[18] The visibility of tasks through an IT system can both mean legitimacy, rescue from obscurity or other aspects of exploitation but it can also create reification of work, opportunities for surveillance, or increase group communication and burdens on the work process. In relation to the problem handling tools these can both prove an effective tool for managing the support services and become a burden to the local supporter given the amount of tasks he needs to solve 'on the fly' while performing other tasks. Even though some supporters expressed uncertainty towards what tasks to log in the problem handling tool, most supporters thought the system was useful for getting a picture of the tasks that need addressing and managing the work.

In addition to the problem handling tool the supporters used a wide range of different, mostly digital tools for managing and performing their work, though I do not have the space to describe these in the present paper. (See figure 4, seond column.)

The work tasks of the supporters

Support of the IT infrastructure is important, but the way of organizing the process is not always as simple as suggested by the formalized ITIL model and the organization model of the support structure in Region North Jutland. This will be illustrated by the following description of the typical work procedures of the supporters.

Roughly two days a week is used on on-site support, solving problems locally in the hospital. Every local supporter also needs to do Service Desk support for half a day once a week. The rest of the time is used on remote support, maintenance of

old equipment and preparation of new equipment. Also supporters participate in projects related to implementation of new technologies in the hospitals.

Because the service desk takes all the calls from costumers the supporter can do his work with fewer interruptions. But this does not mean that he will not be interrupted. When doing on-site support there are often requests for additional help and the supporter is often stopped in the hallways. Despite these interruptions and departures from the plan, the supporters generally expressed a high level of satisfaction with the complexity of their job.

Between levels of support

Though the organizational mode used for managing the support of IT/IS in hospitals is focused on centralization, there are a number of reasons why this can prove difficult. In the explorative study it was evident that the local technical supporters were not just local expert technicians. Their work was also composed of taking tasks 'on the fly' and enquiring about problems they are aware of. In this way their practical work procedures do not fit the model. The supporters can be said to be between levels. They are both IT professionals solving technical problems and tasks takers, taking and solving tasks as they emerge.

Another way in which the local technical supporters did not fit the model is the multitude of tasks they are part of. As described by Orr [15] the technical support task is not just focused on solving a technical problem, they are actually repairing and maintaining a social setting and as described by Kanstrup [9] they are also designing the workplace. This was also supported by the empirical study. In the study a multitude of roles, skills and knowledge emerged as part of the everyday work of the supporter. (Illustrated in Figure 4)

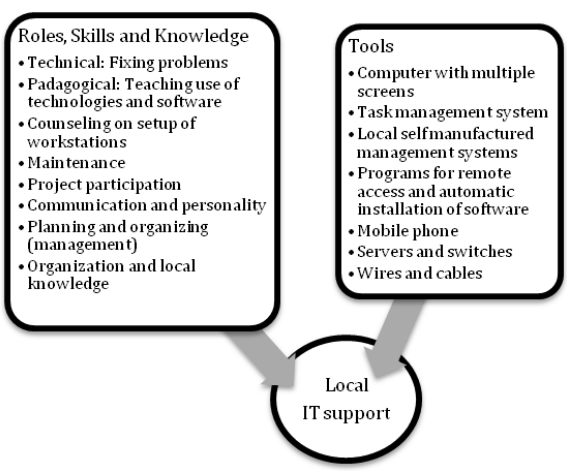

Figure 4- Examples of the multitude of roles, skills, knowledge and tools needed by the local technical supporters.

Meeting the costumer

Generally the customers/users were satisfied with the support they got. However, the problems they mentioned in interviews were generally related to a) problematic communication with supporters, b) insufficient number of local supporters, b) lack of relevant updates to all involved parties when a task was solved, and d) getting more complex support tasks done.

Most of the staff interviewed expressed the desire for knowing their supporter personally. The reasons mentioned for this were e.g. that it made communication easier, because they could continue to build on an understanding that was already established. Another reason was that the supporters generally need a certain amount of knowledge about the clinical practice in order for them to help resolve the technical problems. Even though there are a lot of changes in the support staff, the clinicians thought that the relationship to the supporters was build rather quickly and was needed for securing proper support and solutions of their technical problems.

It was also enlightening to look at the everyday work practice of the clinicians. Their work is characterized by being mobile and structured around the face-to-face communication between clinicians, patients and other staff. The mobility of the work implies that the majority of the clinicians seldom have their own workspace, but share computers and other office related tools among the staff of the wards. The distribution of work is done on daily and weekly meetings. And most of the critical information is documented in writing, but is supplemented and passed on to others in speech. Technical problems are often passed on to secretaries or leading nurses because solving these problems require a break in the work flow. This is also the reason why some technical problems are just left as they are and 'work-arounds' are implemented.

In order for the supporter to communicate efficiently with the clinicians they need to somehow fit in with the practice. It can be argued that this is done best by fitting in with the way clinicians generally communicate, that is face to face. The fact that clinicians often let secretaries or leading nurses pass on their technical problems is likely to lead to misrepresentations of the problems or the omission of certain details that will complicate the solutions of the problems. All in all this view on the daily practices shows that the possibility to have face to face communication with a local supporter would be preferable in order to solve technical problems efficiently. To have a competent person with knowledge and awareness of the local setting fixing the problems is likely to help satisfy the costumer/user.

Discussion and Conclusion

In this paper it is argued that the local supporters, with the multitude of skills, roles and tools at their disposal are needed in order to keep the IT infrastructure of the hospital in working order. They are not just needed in order to fix technical problems, but also as maintainers and designers of the interactions with and around the many technological products in hospitals today. The contribution of this paper to the field of health informatics is an attempt to a) set focus on the complexity of local support work and b) to emphasize the need for this kind of support work as a means to keep the hospitals running with as few technical problems as possible.

The problem when using relatively stylized models like the ITIL model is that the complexity of the job can be forgotten or that the significance of the local circumstances of the job is can be overlooked or neglected by the top level managers. In the case of Region North Jutland there were made efforts of centralization where the local supporters were taken away from the local setting. This was reversed due to protests from the staff of the hospitals in the region. One of the reasons for this, as argued in this paper, is that the supporter is not just solving technical problems, but is also an integrated part of making the work with and around IT systems seamless. The local supporters, with their specific multitude of roles, knowledge and tools, are an important part of securing this repair, maintenance and design of the social setting of users and technologies. The work done by the local IT supporters cannot be centralized because of the complexity of competencies and tasks needed to keep the IT infrastructure running smoothly.

On the basis of this analysis I recommend a general caution towards using general models and seeking centralization in relation to technical support of IT/IS in hospitals. I recommend that we use models that emphasize the close-knitted working relationship between supporters and users as not only a potentially valuable local resource, but also an essential part of having/using information systems at all.

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