

Realizing organizational benefits with ICT in healthcare: the challenge of integration

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Abstract. There is strong political pressure to curb the high and rising healthcare expenditures. ICT is expected to play a vital role here, given its potential to increase cooperation and communication among and across the many actors in the healthcare sector. Given that work routines are tied up in existing, semi-independent information systems, this pressure for closer and more efficient cooperation translates into a corresponding pressure to integrate the information systems. Drawing on an empirical case of increased cooperation and efficiency from a hospital in Norway, we critically analyze the tendency to conflate – and ultimately misconstrue – the *technical* issue of integration with the *organizational* effects of cooperation and collaboration.

Keywords: cooperation, communication, integration, healthcare.

1. INTRODUCTION

The healthcare sector is currently under strong and growing pressure to collaborate and coordinate more efficiently across geographical, institutional, disciplinary and professional boundaries. Given the huge and escalating health expenditures – doubled in Norway from 1990 till 1998 to a staggering 73,5 billion NOK, a yearly growth adjusted for inflation averaging 4,4% per year [1] – the expectations towards the role of ICT are high. In Norway, we have especially seen a deepened commitment to these efforts through the 1990s and into the new millennium as voiced by core policy documents: “*The healthcare sector is an area where the profits in using electronic information networks may be as high as several billion NOK per year*” [2].

Reiterating prevailing thinking in organization and management science [3], health policy initiatives in the Western world emphasize strongly the importance of dismantling ‘vertical’ boundaries in favor of ‘horizontal’ processes of work and sharing of knowledge [4][5]. As Boochever [6] argues, “*system integration would provide the platform for improved workflow, patient throughput and patient safety, as well as decreased cost*”.

Yet the actual *realization* of the widely recognized *potential* of ICT has proven notoriously difficult to achieve. The implementation – when “implementation” is recognized to extend well beyond the mere technical realization – of information systems in hospitals contain a disturbingly tall number of partial or complete failures.

The appreciation of how, to what extent and in what form, the development and subsequent introduction of information systems raises organizational, political, legal and technical challenges, is slow. No systematic overview exists, but the emerging picture strongly suggests that under-estimating or misconstruing the non-technical issue account for a very significant portion of failures of information systems in healthcare [7][8].

Given that the existing work routines more often than not are supported by and embedded in one of the many special-purpose applications (laboratory systems, radiology information systems, patient administrative systems, order entry), the impetus for *organizational* integration translates very much into an issue of *technical* information systems integration. In the words of one of the proponents of managerial science, “*to put it bluntly, if a company’s systems are fragmented, its business is fragmented*” [3]. Similarly, for the healthcare sector Lenz et al. [9] point out that “*it’s amazing that today’s large scale hospitals rarely have a truly integrated hospital information system*”.

The aim of this paper is to discuss socio-technical challenges related to realizing the potential for cooperative, integrated information systems in healthcare. We are particularly concerned about the *organizational integration* (or lack thereof) of technical and standardized communication solutions (messages) with existing work-routines. Empirically, we draw on a project of establishing electronic services for referrals, bookings and discharge letters intended to increase the efficiency and improve the quality of the interaction between general practitioners (GPs) and regional hospitals (as well as within hospitals).

2. ICT AND HEALTHCARE: POLITICAL VISIONS – AND EXPERIENCES

There is literally a jungle of information systems supporting healthcare providers today. This abundance of different information systems is the mirror image of the enormous variation in healthcare work along several dimensions: level (hierarchically organized spanning from primary healthcare to large hospitals), geography (municipalities, counties, districts, nations and regions), professional groups (nurses, secretaries, physicians and physiotherapists to mention a few), agencies (patients, health providers, public health authorities and insurance companies) and specialization (for instance, cardiology, neurology, radiology and immunology together with service functions such as laboratories). Given this large number of partly overlapping, complementary and interdependent information systems, it is hardly surprising that considerable efforts have been poured into a tighter integration of these [10][8]. Indeed, the integration of health information systems is currently something of a truism, a taken for granted ambition. As pointed out almost ten years ago:

“The necessity for integration of systems and communication of information in [the healthcare] sector becomes evident when studying the variety of interested parties, the multitude of applications and their importance” [11].

The Norwegian government in the 1990s foresaw IT-technology as one of the tools to improve the integration and cooperation between the various parts of the healthcare sector:

“Cooperation, functional division and network solutions between hospitals within and beyond county borders, and between hospitals and the municipal healthcare service are important policy instruments to secure the quality and meet the challenges in the healthcare service” [12].

The IT Committee of the Secretary of State (*“Statssekretærutvalget for IT”*) published in 1996 a report called *The Norwegian IT-road Bit by Bit* (*“Den Norske IT-veien Bit for Bit”*) which also underlined the envisioned possibilities of the IT-technology in the healthcare sector:

“The healthcare services will be improved and the quality increased by the coordinated introduction of information technology in all segments of the healthcare action chain. Local, regional and national health networks will strengthen cooperation and resource management in the healthcare sector” [13]

On the basis of these views the government and the ministry of health saw the need for a more coordinated, goal-oriented and broad initiative on IT than had been the case earlier. The stated aim was to mend the problems of bad integration and cooperation in the healthcare sector. Their solution was to announce the first and larger governmental IT-healthprogram in 1997 called *“More health in each bIT”* (*“Mer helse for hver bIT”*)[2]. The main goal of the plan was to *“[...] contribute to the development of an IT-infrastructure, which can realize the potential of the proper use of IT in the sector.”* [ibid].

A, arguably *the*, hearth of information systems in healthcare is the electronic patient record systems (EPR). They have existed in Norway since the 1980s. Both the general practitioners (GP) and the hospitals, had widely used and established systems, when the government, in the beginning of the 1990s, started to realize that the healthcare sector, as well as its ICT-solutions, was highly diversified, scattered and badly integrated. The focus was on connecting the different regions and areas of the healthcare sector. The condition for doing this was seen to be in the development of the IT-infrastructure and the introduction of message standards. As can be seen in the examples above, the underlying arguments and assumptions were to build networks and infrastructures to achieve integration. By introducing IT-technology in all parts of the sector the desired changes would result. Despite the high aspiration of an integrated solution, Berg [7] accurately characterizes the current situation when he maintains that *“fully integrated [EPRs] ... is hard to find”*.

3. METHODOLOGICAL ISSUES

The case study in this paper was carried out at a regional hospital (RH) in one of the five regional health trusts in Norway. The primary involved parties were KITH (*Norwegian Centre for Informatics in Health and Social Care*), the neurological outpatient care and the IT-department at the RH. KITH is the coordinating actor on behalf of the Ministry of Health in working out standards in the Norwegian healthcare sector. It was KITH that facilitated the introduction to this hospital and to do the study. The first author was to give feedback to KITH about the process and at the same time get material for the study.

The first author participated in several meetings together with KITH and conducted independent research at the neurological outpatient care. The visits at the RH was carried out in the period of autumn 2002 into the autumn of 2003.

In the beginning, the first author traveled with KITH and participated in their meetings with the involved parties, and at the same time staying behind a couple of days to do further research. In total, the RH was visited four times, each time staying for 3 days.

The study was performed using the participant-as-observer role of the day-to-day routines; short semi- structured interviews and short questions to the employees when possible. The first author was also present at several project- and steering committee meetings (in the capacity of an observer) and used documents from related meetings, program initiatives and projects, such as the national Say@hh!-program (“*Si@!*”) of the health ministry [5]. In addition, follow-up interviews were conducted and meetings of a more unstructured type followed, thus allowing for more informal discussions with the informants.

The chief physicians, secretaries, head nurse, IT-manager and IT-consultant at the RH were interviewed as well as informants at KITH.

Table 1. Methodological Summary

Event	Count
Semi-structured interviews	15
Project meetings	5
Unstructured interviews/follow-ups	6
Total time spent at the outpatient care	70-80 hours

The combination of interviews and observations helped to make a very detailed picture of the paper based referral process and its surrounding expectations. The interviews were performed using a tape recorder when possible, that is when it was allowed for by the person being interviewed, supplemented by note taking and occasional digital photographing.

4. CASE

As part of the 2001-2003 IT healthcare program Say@hh! [5], a project was established called the Referral- and Discharge Letter project (“*Henvisnings- og Epikriseprosjektet*”). This project was aimed at establishing large scale solutions for electronic referral and discharge letters in the healthcare sector. KITH (*Norwegian Centre for Informatics in Health and Social Care*) was given the coordinating task of this project from the ministry of health. KITH was actually established in the beginning of the 1990s to be the coordinating vehicle of the ministry of healths IT-projects and to be responsible for developing standards in the Norwegian healthcare sector.

Much of the guiding incentive behind the Referral and Discharge Letter project (RDLP) was the thought that these two types of communication controlled the patient flow in the healthcare sector [14]. The volume of the referrals and discharge letters was seen to be the most important form of communication within the healthcare services.

The setting of the case study has been to look at the piloting of the electronic referral message (the Referral Project, one of the subprojects of the RDLP), the work with the forming of the referral message and how this was perceived and worked with at the neurological outpatient care of the RH. How do these findings relate to the stated expectations of the standardization initiatives?

The neurological outpatient care was one of the smallest in the hospital. The neurological department consisted of 35 employees and had both the outpatient care as well as a ward for people being submitted to the hospital. Only the outpatient care, with its 10 employees, was part of the referral project at the RH.

To coordinate the activities of the RH in the Referral project, there was appointed a steering committee consisting of the director of professional competence (“fagdirektøren”), the IT-manager, the IT-consultant that oversaw the Referral project for the RH and representatives from KITH.

The Referral project was aimed at working out a standardized electronic referral message and establishing the necessary IT-infrastructure to make the message a reality. The Referral project had two main goals: to have the message standard of the referral fully implemented in the journal systems of the Norwegian hospitals and GPs by the end of 2002; and that all the hospitals were to have routines to receive electronic referrals by the end of 2003 [14]. Neither of these objectives were met and only goal number two achieved some degree of success. A modest 13% of the hospitals were able to receive referrals by the end of the RDLP project.

What was special about the circumstances in the mentioned RH, was the fact that KITH had managed to get funding for a organizational project, which was to facilitate the local referral projects goal of quality- and efficiency gains by the electronic transfer of referral messages [15]. This RH was chosen as a partner to carry out this organizational project, especially on the basis that the neurological outpatient care at the RH was very small and easily managable. It was therefore agreed to use this care-unit as the target. This organizational subproject was therefore carried out simultaneously with the main Referral project.

KITH had even conducted a organizational prestudy, which was intended to facilitate and support the coordination of the Referral project itself, called “*Surveying of referral and discharge letter routines at three Norwegian hospitals*” (“*Kartlegging av henvisnings- og epikrise rutiner ved tre norske sykehus*”) [16]. This report concluded with the fact that:

“As is evident here, the ‘organizational barriers’ are partially very visible and according to my informants, of great significance as to why it is much harder to ‘harvest’ the gains (both when it comes to efficiency, quality and professional benefits) than what has been hoped for. It is therefore recommended that the hospitals, parallel with the ‘technical’ IT-projects, also carries out planned, strategically and work process related efforts and improvement processes.” [16]

The organizational project at the neurological outpatient care was based on the previous assumptions on how to frame the work with the introduction of electronic referrals. It was a perceived necessity to view technical and organizational issues at the same time. That the issues at hand were larger than just the said technical aspects of the electronic referral. Despite this view, the Referral project at the studied RH became mostly concerned with the message standardization and technical issues.

5. DISCUSSION: SOCIAL INTEGRATION WITH EXISTING WORK ROUTINES

We will now discuss social integration, i.e. how standardized solutions (messages) are (or rather: are not) integrated with the organizationally based, existing work routines.

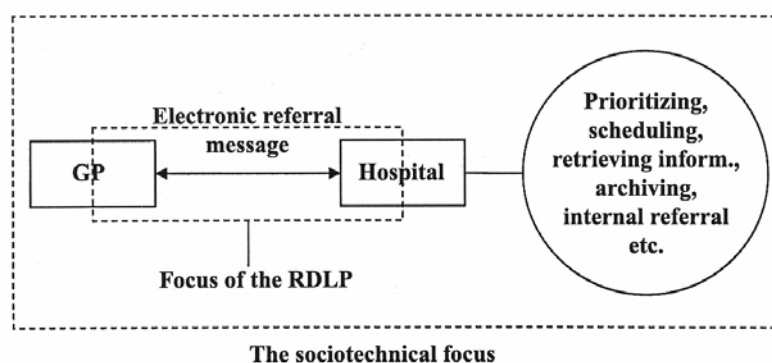


Figure 1 The socio-technical focus vs the technical focus

The main focus of the Referral project was the two stated goals, which in their nature was technical. As illustrated above, the focus of the project was the “implementation” and diffusion of the electronic message and its standardization. The case study revealed that although the organizational subproject looked at the non-technical issues and work routines it never got any implications. They did not try to bring these two projects together and make a more coordinated effort between technical and organizational issues. While the diffusion of the electronic referral message never became a reality at the studied hospital, there were still no attempts to coordinate the organizational issues with the diffusion. The general opinion from the stakeholders at the hospital also underlined that this had to be done **after** the electronic message was a reality. They also seemed confused as to who was to coordinate this process or ensure that something was done at this stage. No one claimed responsibility.

What also became apparent was that most of the work with the referral did not take place in the transferral of it, but began after it was received.

One of the most time-consuming processes was the prioritizing of the referral. What was the suspected diagnosis of the patient? How important was this referral accordingly? How many months would the patient then have to wait? Which information was lacking in order to perform the prioritizing? What additional examinations needed to be done (x-ray, blood samples etc.) and how was this coordinated internally at the hospital?

After the referral was received through mail, the secretary registered it into the electronic patient record (EPR) system and printed a priority sheet (*“prioritetsark”*). This priority sheet contained a priority listing (1-9 months), a diagnosis group (what was the possible diagnosis of the referral?), additional examinations to be carried out, referral result code etc. The secretary also made sure to print a sheet with name labels (patient name and address) which was used to label laboratory samples. All of these

sheets were then put into a blue mailbook ("*postboken*"). It was regularly checked by a predetermined physician – from here on referred to generally as the evaluating physician ("*vurderende lege*"). He saw to it that the paper based referrals in the mailbook was prioritized.

The process of prioritizing took place by deciding when the patient could be admitted for the treatment or examination in question within a period of 1-3 months. Immediate help ("*øyeblikkelig hjelp*") was given within one month. One of the first steps in deciding this was trying to evaluate what the possible diagnosis of the referral might be? In what diagnosis group did this patient belong? Was it a migrene-case? Was it a whip-lash injury? Was it epilepsy? From this information he filled out additional examinations to be performed (x-rays, blood tests etc.) and documents to be retrieved.

The priority was set on the basis of how important the evaluating physician saw the referral.

In some instances the referral would require extra information in order for the prioritizing to take place. In these instances the evaluating physician dictated a note on a tape recorder concerning the additional information required. This tape note was then written electronically by the secretaries and sent to the patient and the GP. The EPR-system was updated with a waiting time, before the referral was closed and subsequently archived in the paper journal. This waiting time was typically one month. If the referral was deemed to be immediate help, the physician on duty ("*vakthavende lege*") made a phonecall to the GP to get the missing information (circumventing the mail process).

When all information had been received, the physician on duty completed the prioritizing and made an appointment. If it was not immediate help, the evaluating physician wrote the number of months before the appointment would take place.

After this prioritizing was complete and the priority sheet had been filled out, it was given to the secretaries. They saw to it that a waiting list letter ("*ventelistebrev*") was written and sent by mail to the patient and the GP, including information on how many months the patient had to wait for the examination or treatment. The priority sheet and the original paper based referral mail was then put into waiting list binders ("*ventelistepermene*") sorted by the patients last name (the month when the appointment was to be made was written on top of the priority sheet). The secretary regularly checked the binders to collect all the patient sheets which had one month left before their appointment. These sheets were then placed in the shelf of the head nurse to be given specific appointments.

The head nurse (and sometimes one of the secretaries helps) then started to give the patients appointments. This was performed by reading the diagnosis group set by the evaluating physician on the priority sheet. In addition she looked at what other additional examinations needed to be performed (like x-ray). This had to be coordinated by making phone calls internally at the hospital to arrange these additional examinations or tests. She also had to evaluate how long the various examinations would take, so that she didn't put too many patients on one physician during a single day. There was also the matter of taking necessary allowances for the local boat- and bus schedules in the region, as this would affect the practicality of when the patient could reach his appointment.

On the basis of the above mentioned considerations, the head nurse decided the specific time and date for examination or treatment. The secretary then sent out a mail to the patient with this information. The priority sheet and the referral was placed in the red binder ("*rødmappen*"), where they remained until the patient came in for his

appointment. The EPR-system was also updated to reflect the assessments made (diagnosis group, scheduled time and date of appointment etc.).

What this description shows is that the referral process is much more than just sending electronic messages. The bigger picture, the sociotechnical focus, is that you have to consider the electronic messages as well as the work routines when you frame these projects. The real efficiency gains seem to exist beyond the confines of the outer “layers” of the organization.

6. CONCLUSION AND IMPLICATIONS

The report issued by KITH summing up the RDLP [14], gives several reasons why the goals of the Referral project failed to materialize. It underlines the fact that the referral is a much more complex issue than the electronic message for discharge letters. The referral message requires changes to be made on the technical subsystems of the hospitals. It is much more tied to the organizational issues at the hospitals. In addition, the referral process was not started until the fall of 2002 and became partly overshadowed by the Discharge Letter project (which started first). And the Hospital Reform (“*Sykehusreformen*”) came in the middle of the Referral project and changed the organization and allocation of resources and personnel in the healthcare sector, when the responsibility for the hospitals were transferred to the central government.

The report also lists another very interesting reason. The National Booking Project (NBP) made added demands to the Referral project. On a visit to Orkdal Hospital on the 8th of October 2002 the health minister was shown a testsystem in which he could make an appointment at a Hospital from a GP [17]. Because of his enthusiasm for this idea and its perceived quality gains for the patient, the health ministry stated that booking was to be a part of the Referral project. This posed several problems for a project that was already well on its way.

The goal of the National Booking Project (NBP) was to give the GPs the possibility to book appointments for the patient at the hospitals during his session with the patient. This solution depended heavily on the Referral project. The NBP required that the referral message was already in place. You needed to send information about the patient and which examination desired to be performed, before an appointment could be made. Another, and much more disconcerting problem, was that the NBP resulted in a displacement of the organization of the time tables at the hospitals. In this scenario, the patient and the GP would control how the time tables of the hospitals were utilized. This posed both oppositional problems at the hospitals, as well as practical problems.

In contrast with the case study, we see that it is difficult or impossible to achieve the perceived goals. The referral process requires specialized medical considerations to be made before an appointment is made – what are the possible diagnosis? How important is this referral? What additional examinations needs to be done? In this case study, the internal referrals for x-rays, blood samples etc was carried out by phone. No system existed which could make these available to the GP when he made an appointment. As such, the patient would run the risk of having to make yet another appointment when the physician at the hospital discovers that he have to do a x-ray at his first appointment. The NBP was not firmly grounded in the micro-level realities of the healthcare trajectory. The NBP would also displace the activity planning of the neurological outpatient care, as they no longer would control the prioritizing on the

importance of the referral, the layout of the day etc.. How is the GP supposed to make educated opinions about it?

All of this illustrates a more general problem: the neglect or incapacity to frame the projects so that they also take into consideration the work routines and processes of the inner layers of the organization. The only reasonable way to achieve greater efficiency gains seems to lie in the broader, bolder, yet firmly grounded framing of the IT-projects. The work with organizational issues and message standards diffusion must go hand-in-hand.

What can be said in retrospect of all this? One of the main goals of the Hospital reform in transferring the control of the Hospitals from the counties back to the central government was to achieve a more simplified and direct management of them, while still retaining the autonomy of the regional health trusts. The role of the central government in working out the framework within which the trusts are to operate, and to arrange for the correct environment for these developments would seem to demand that they take a broader and yet micro-level view of the IT processes. The NBP example illustrates the “interference” of politicians with micro-level realities which they are seemingly unaware of. The referral process also illustrates that the real work is being done in the inner layers of the hospital organization. This does not bode well for the projected gains in developing these technical solutions.

Another point is that the focus on the creation and diffusion of the message standards as a means for achieving a better integration of the health care sector, illustrates the central conundrum. Why does the nature of the projects remain technical, despite the truism about organization and technology? We argue that the work with the message standardization is a one-sided effort with technical aspects. Isolated it only surmounts, at best, to scrape the outer layer of the organization.

We can also see traces of the one-sided effort with technical aspects in the way that the calculation of possible economical gains from the RDLP-project was perceived. One of the central ideas behind the project was, as stated earlier, that referrals and discharge letters were the two central communication flows in the health sector, and as a consequence of this, the perceived economical gains from performing them electronically were seemingly high. This central idea came from a note on the possible economical gains achieved by doing this, as opposed to paper-based [18]. The note willfully oversaw problems as work being performed simultaneously and proceeded to calculate the cost of a stamp, a letter, the time used to print the referral or discharge letter and so on and put these costs in contrast with what it would cost a GP and/or a secretary to do it. The whole idea behind this note is so enticing and seemingly common sense, that it is impossible to object to the perceived gains. However, if you look at the way that the idea behind it is constructed, you see that it perceives technology as neutral, unable to affect the organization in any way or vice versa and that the organization is stable and static before and after the diffusion of the electronic referral and discharge letter. There is little or no empirical evidence to suggest that this relation is correct. Technical and human aspects, work routines, affect each other in a socio-technical symbioses at every level and at all times.

All of this amounts to the sub-optimalization of the IT-solutions being diffused. The healthcare sector still depends heavily on paper based routines. They work in manners which affects how the IT-technology is both consumed and perceived.

The mentioned organizational truism becomes even more apparent when we consider one of the informants at KITH, being acutely aware of the organizational problems related to the projects, underlined the point that he saw the RDLP as having

had an organizational setting. In this statement he put the fact that they had at all times tried to focus on the organizational issues at the seminars, in the workshops etc. with the various stakeholders. However, the truth still remains that these projects were technical in nature. There is something to be said of the project framing and the allocation of resources to these projects. The central government needs to be better at framing organizational oriented projects to achieve their efficiency goals, to delegate and underline the responsibilities of the various stakeholders in reaching the common goals.

Actually, one of the greater concerns being raised by the aforementioned informant at KITH was the difficulty in raising money for organizational projects. Most of the projects at KITH was tied up to technical solutions. There is disturbingly little interest or awareness of recognizing the organizational issues of these projects – which ultimately undermines the possibilities of achieving real, organizational benefits.

7. REFERENCES

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