Investigating System Development Processes in Healthcare Organizations

**Abstract**

Information Systems (IS) have become critical for healthcare organizations. However implementation and adoption of integrated healthcare IS continues to be a non-trivial task. This research suggests that insights into this phenomenon may be achieved using theoretical perspectives related to boundary spanning amongst distinct fields of practice. It further argues that successful use of IS within a healthcare organization requires its IT-practice to act as the boundary-spanning agent for the diverse fields of practice. Using an interpretive case research approach the research examines the nature of the boundary-spanning role played by an organizational IT-practice in Saudi-Arabia. The primary conclusion of the investigation is that successful IS implementation and use requires the organization’s IT-practices to act as effective boundary-spanners. Further it is suggested that such boundary-spanning activities have different modes for development and the maintenance phases.

**Keywords**

Healthcare Systems, Boundary Spanning, System Integration, EHR, Case Research

**Introduction**

There is extensive research about Information Systems (IS) implementation and use in the healthcare sector within IS research (Blaya et al. 2010). A theme that emerges from this research is such organizational IS is critical to a healthcare organization for reasons of efficiency, safety of its patients, better treatment, and also for legal compliance (Berner and Moss 2005; Braa et al. 2004; Chaudhry et al. 2006; Meystre et al. 2010; Vest and Gamm 2010). A similarly pervasive theme is that of challenges to their implementation and adoption (Berner and Moss 2005; Sood et al. 2008). Given the repeated nature of such finding, it makes sense to understand how organizations can overcome these obstacles. This research attempts to do so by proposing a new theoretical perspective towards understanding such challenges and then carrying out an empirical investigation of a successful IS adoption and use in a healthcare settings.

A basic premise of this research is that the challenges faced by healthcare organizations in implementing and using IS is contextual, and related to the nature of such organizations. At center of such a premise is the fact that healthcare organizations are somewhat unusual of the unique characteristics of the Healthcare profession (Braa et al. 2004; Häyrinen et al. 2008). Such professions are bound to different fields of practice, which extends beyond the organization (e.g. doctors, nurses, pharmacologists). Each of these professions commit to different norms, guidelines, and code of conducts (Charette 2006).

Thus work practices in healthcare organizations develop numerous heterogeneous characteristics. However within the context of an organization, these diverse fields of practice need to collaborate. Such collaboration requires efficient boundary spanning (i.e. communication across boundaries of the fields of
practice) (Currie and Suhomlinova 2006), and consequently the fields of practice need to develop norms and standards for such activities. Research indicates, that in such situations technology objects facilitate the collaboration by being objects that allow translation of information across the field boundaries (or boundary objects), and such facilitation is maintained through their extensive maintenance and evolution. (Bechky 2003; Carlile 2004; Orlikowski 2000). Therefore it follows that for such technology objects to be effective, they need to inscribe within themselves the standards and norms for collaboration. However designing, developing and evolving such technology objects is not a trivial task. It requires boundary spanning agents that can translate the norms for agent collaboration into explicit, standardized boundary objects in use, and maintain them (Friedman and Podolny 1992). This research argues that successful introduction and use of IS within a healthcare organization requires its IT practice to act as the boundary spanning agent for the diverse fields of practice (Levina and Vaast 2013).

Consequently, this research adopts an interpretive case research approach to examine the nature of the boundary spanning role played by an organizational IT practice. Specifically this research analyses the case of a successful implementation and use of IS in a major Saudi Arabian hospital and is guided by the following research question:

1. What is the nature of the boundary spanning role played by an IT practice in implementing and developing an integrated IS in a healthcare organization?

**Literature Review**

Integration of Organizational IS has been frequently advocated in IS research (Carlile 2004; Levina and Vaast 2005; Orlikowski 2002). At the same time research has also identified numerous challenges that can hinder the integration of different systems across an organization, such as political, strategic or structural barriers (Barki and Pinsonneault 2005; Ettlie 1988; Hitt et al. 1993). These factors remain salient in the specific context of healthcare organizations, and can often be exacerbated because of their practice centric nature (Braa et al. 2004; Häyrinen et al. 2008). In addition, critical legal compliance issues related to information privacy (e.g., the Health Insurance Portability and Accountability Act (HIPAA) legislation in the US) result in adding complexity to both the design and the implementation of such systems (Meystre, et.al. 2010). Given the importance of system integration from an organizational perspective, existing research in healthcare have examined the phenomenon (Davidson and Chiasson 2005; Li et al. 2014). For example, Davidson and Chiasson (2005) performed a case based study and suggested that technology use mediation (TUM) processes to be crucial for implementing and using such systems, particularly during the development phase. Additionally, Li et al. (2014) found evidence that a combining of healthcare specific process management techniques, such as clinical pathway management explicitly into software development process leads to efficiencies in integrated systems. Other studies have also examined the issue from a technological perspective. These studies suggested that development and propagation of technology standards such as data communication standards (e.g. HL7), can facilitate the emergence of a fully integrated healthcare IS (Blobel and Holena 1997). While such research is insightful, they typically assume that healthcare organizations do not offer a different context from regular organizations. However such assumptions may not be entirely appropriate, given the inherently practice-centric nature of healthcare organizations (as argued in the earlier section). Consequently, this research argues for a use of new theoretical perspectives that examine and understand integration processes in healthcare organizations.

In particular we feel that practice based research offer an attractive option, given that integration has been defined as interconnecting different independent organizations, systems, or practices through the use of technology (Barki and Pinsonneault 2005). Such research (e.g. (Carlile 2004; Levina and Vaast 2005; Orlirkowski 2002) provide key theoretical perspectives for integrating diverse practices across boundary spanning organizations (a context very similar to healthcare organizations). A key concept that emerges from such research is the importance of boundary spanning, which involves translating and mapping between the diverse fields of practice (Levina and Vaast 2005; Levina and Vaast 2013; Orlirkowski 2002). Such boundary spanning is achieved by agents who have the knowledge capabilities to mediate between the different fields of practices (Friedman and Podolny 1992), and typically facilitated through the development of boundary objects that have the critical translation elements embedded within them. Research also suggests that boundary spanning activities change depending on the relations between the individuals and the objects in a shared institutional context. Levina and Vaast (2013) label these as
transactive and transformative. Transactive boundary spanning involves mapping diverse practices by having boundary spanners translating such mapping. On the other hand, in transformative boundary spanning new relationships among agents are defined, and boundary spanners negotiate the meaning of such relations. Such perspectives provide a fertile theoretical landscape for understanding integration of IS in a healthcare perspective. In the remaining part of the manuscript we describe our empirical study and the insights gained from applying such theoretical perspectives.

**Research Method**

This research used an interpretive case study approach following guidelines from (Walsham 1995; Walsham 2006). This approach is deemed as an effective tool for carrying out research related to Information systems (Orlikowski and Baroudi 1991). The site for data collection is a government hospital located in the capital of Saudi Arabia, Riyadh, King Faisal Specialist Hospital and Research Centre (KFSH&RC). The hospital was established in 1975. It runs a 936-bed tertiary care facility and a total of 6,946 personnel. Moreover, there are 1,942 nurses, and 1,235 employees in clinical services (KFSH and RC 2013). This hospital was selected because it fits the description of our study as it was one of the first hospitals in the middle east to be recognized by the Health Information and Management Systems Society (HIMSS), ¹as a stage six for it’s system adoption level.

**Data Collection**

Qualitative data for our study was collected from forty-two interviews of health care professionals. The semi structured interviews included open-ended questions related to the nature of system use, as well as the users daily workflow and interactions with it (see table 1). Within this structure, the interviewer encouraged the respondents to elaborate on personal experience, provide examples, and express their perceptions about the system.

<table>
<thead>
<tr>
<th>Interview Questions</th>
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</thead>
<tbody>
<tr>
<td><strong>Doctor/Nurse/Pharmacy</strong></td>
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<tr>
<td>• Could you lead us through how the system helps you with your day-to-day work activity?</td>
</tr>
<tr>
<td>• If you examine the use of the system critically, what are issues/inconveniences can think of?</td>
</tr>
<tr>
<td>• When and how do you interact with other practices (IT, nurses, pharmacy)? What features do you use to complete this task?</td>
</tr>
<tr>
<td>• Would you comment on the role of the system in allowing this collaboration? Is it beneficial?</td>
</tr>
<tr>
<td>• What feature in the system is the most critical? Mostly used?</td>
</tr>
<tr>
<td>• (Doctor/Nurse): What features and tool do you use during your interaction with the patient?</td>
</tr>
<tr>
<td>• (Doctor/Nurse): Do you use any features or tools before and after interacting with a patient?</td>
</tr>
<tr>
<td><strong>IT Department</strong></td>
</tr>
<tr>
<td>• Could you describe the EHR system that is used in this hospital? When was it introduced and how was it designed and adapted?</td>
</tr>
<tr>
<td>• Did you work on an older system prior to ICIS installation? How is it different?</td>
</tr>
<tr>
<td>• Do you often have to change functionality or features of the system? What is the process of maintaining a well-developed system?</td>
</tr>
<tr>
<td>• Describe your typical system related interactions with the doctors/nurses/pharmacists</td>
</tr>
<tr>
<td>• What was the nature of the training you provided to the hospital personnel?</td>
</tr>
<tr>
<td>• If you examine the use of the system critically, what are issues/inconveniences can you think of?</td>
</tr>
<tr>
<td>• Are there any future plans or initiatives?</td>
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Table 1 Interview Questions

¹ HIMSS is a global non-profit organization, which aims for better health using IT (Analytics® 2014)
In order to be inclusive, we interviewed individuals within the key practices in the KFSHS&RC. The study includes the IT practice, the doctor practice, the nursing informatics unit, and the pharmacy. Interviews ranged between 30-50 minutes, and were tape-recorded and transcribed. Table 2 below summarizes the profile of the respondents involved in this study.

<table>
<thead>
<tr>
<th>Department</th>
<th>Number of interviewees</th>
<th>Position</th>
<th>Follow-up visits</th>
<th>Access to field</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Department</td>
<td>9</td>
<td>System Developers IT Personnel</td>
<td>Yes</td>
<td>Transcribed Interviews</td>
</tr>
<tr>
<td>Doctor</td>
<td>11</td>
<td>Surgeons Fellows Residents Interns</td>
<td>Yes</td>
<td>Field observation</td>
</tr>
<tr>
<td>Nurse</td>
<td>16</td>
<td>Head Nurse Nurse Practitioners Nutrition Specialists</td>
<td>Yes</td>
<td>System run through</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>6</td>
<td>Pharmacists Clinical Specialists</td>
<td>No</td>
<td>Online System Training</td>
</tr>
</tbody>
</table>

Table 2 Data Collection Sample

In addition to the interviews, the first author was also able to gain some hands on experience of the actual system in use and had access to the simulation system used for the mandatory training workshops conducted within the system. The hospital administration also provided literature in form of flyers and handouts that were routinely circulated within the organization.

**Data Analysis**

The data analysis strategy was interpretive, primarily inductive and closely aligned to approach advocated by Walsham (1995,2006). The data analysis was initially done individually, and then discussed and re-interpreted through numerous combined sessions. During the analysis, the availability of the multiple sources was instrumental in helping building up insights about the different aspects of the development and use of the information system. For example, the interviewees had extensive experience on the Integrated Clinical Information System (ICIS) in place, and provided a rich text narrative related to the nature of system use, perceptions about the system, tactics and strategies used to develop a useful system and maintain it. The opportunity to explore the actual system in use (and its training simulation version) helped develop a narrative view of the system and the specific contexts of its use. Finally the different literature related to the system helped develop an insight into the manner in which the IT practice, advocated and facilitated the use of the IS.

As is frequently the case in interpretive research, theoretical perspectives from existing IS research helped in framing as well as interpreting the data. In particular, given the practice-centric premise driving this research, theoretical perspectives from practice-based studies of boundary spanning organizations (Feldman and Orlikowski 2011; Levina and Vaast 2005; Levina and Vaast 2013; Schultze and Orlikowski 2004), were used as a lens to better understand the work process and collaboration between them. Such theoretical perspective helped in making sense of our observation, and in developing an insight into boundary spanning practices within the organization. In the next section we describe the results of the analysis, beginning with a description of the case.
Case Description

The case focuses on the implementation and use of Integrated Clinical Information System (ICIS), a Healthcare IS at KSFHS&RC. This system is a result of efforts over the past decade within the hospital. The system was originally envisioned as a system that securely interconnects the different hospital information systems into one integrated system.

As respondent doctor mentions:

“the older system was very basic”

Other users indicate:

“We had a system for the lab and a separate system for the nurse department”, “Other programs were used like powercharts and excel sheets for generating reports”

The implemented system has been successfully adopted and continues to be adapted to meet changing needs, ICIS is a source of pride within the hospital, as one doctor mentions:

“King Faisal Hospital is the first hospital in Saudi to implement a well developed system”, “the hospital very active and invested in advancing and developing a state of the art system”

The system was developed using a Component Off-The-Shelf (COTS) approach, then customizing the Cerner Millennium electronic health record software to meet the hospital’s needs. As many system developer confirm:

“ICIS is customizable”, “We customized the system to meet the user’s needs, versus forcing the user to use the system”.

The system includes five modules interconnected together. PowerChart is the main interface the doctor/nurse access when logging on the system. This module includes many features that can be modified by the user for better and easier accessibility. FirstNet is a module for the Emergency Department of the hospital (ER). PharmNet is the pharmacy solution module in the system. It enhances prescription legibility, order completeness, and communication channel between the pharmacist and the providers. SurgNet is the module in the system related to the surgical unit of the hospital. Lastly, PathNet is the module related to all the laboratory related records. It facilitates a medium for doctors, clinicians and nurses to incorporate evidence-based practices into patient treatment (see figure 1).

![ICIS Integrated Modules](image)

**Figure 1 ICIS Integrated Modules**

The implementation and development of this project was done through three different phases. The hospital gradually integrated the different practices into ICIS. Figure 2. Below lists the different features involved in each phase. The hospital took about eight years to incorporate all the different practices in the system as one IT developers explains:

“We implemented the system through phases in order to enhance the physician’s usability”
The system was designed with the highest security standards to ensure accountability and maintain patient privacy. Users are granted accessibility depending on their role and field of practice. Moreover, ICIS is designed to audit and monitor system use as it monitors such data. The majority of the users confirm the system’s security features, as one doctor from the hospital highlights: “This system is more confidential”.

Several pharmacists also state:

“Every note that goes in the system, or even order that goes out is traced and monitored”, “from who is putting the medication in, and what date is what logged, the system records it all”.

During the development of the system and its use, the organization’s IT practice remained pivotal, being particularly instrumental in a) Transforming the COTS based system into one more aligned with the organizational work practices through user driven customization, and b) Providing operational translating support to make the user best realize the affordances within the system. This has resulted in a well-liked and universally used system. As one doctor highlights:

“From all the hospitals I have worked in, KFSH has the best system in place”

Other respondents comment:

“The system made it easier to communicate”, “the system saved us a lot of time and travel across the building of the hospital”

Findings

Practice-centric nature of the healthcare organization

First, our preliminary exploration revealed the existence of a number of distinct fields of practice (e.g. doctors, nurses, pharmaceuticals, hospital IT). Our analysis also exposed how each practice is structured with different well-defined boundaries. For example, Agents from the nurse practice are required to perform certain tests and procedures on new patients and report their results to the assigned doctor. The majority of the hospital’s nurses distinguish themselves from other agents as one nurse mentions:

“The nurses have assessments duties, vital science, and different requirements than the doctors”.

At the same time, there remains a critical and imperative need for collaboration. As one respondent states:

"Nurses and doctors work different ways but still they are working together and the doctor would check with nurse constantly and vice-versa".
Second, to investigate the nature of the work within the organization, we examined each of the practice’s actions and activities, to understand the boundaries associated in each field. For example, if one considers the nursing practice, it represents a significant amount of the workforce, there being 1,942 agents working within the field of the nurse practice (KFSH&RC, 2010). Each nurse is responsible for three to four patients, and needs to attain all of the patient’s calls, as well as changing his/her bed linens. All the nurses are required to log all the patient’s information in the system. Similarly, the doctor and pharmaceutical fields of practice also have their own workflows and processes. As one user mentions:

“Doctors have their own workflow differently than the pharmacy, and pharmacy is also different from administration or management office”

Third, we found evidence that overall organizational workflows emerged due to collaborative intersections within the different fields of practice. Additionally, IT enabled such collaboration by inscribing in itself the standards for such collaboration. For example one of our respondent stated while describing the prescription filling process:

“When I place a medication order, the pharmacist will know that I am the one who made the order”

This interface used for prescribing the medicine was designed such that it fulfilled the information requirements of the pharmaceutical practice, while ensuring that the doctor remained identified, thus adhering to the norms of the doctors’ field of practice. Our evidence also suggests that the IT practice played a pivotal role in both the implementation and continued use of ICIS. The organizational context in KFSH&RC, shown in Figure 3 below:

![Figure 3 Role of IT Practice in the Organization](image)

An important focus of our investigation was to uncover the details of the role played by the IT practice. We discuss this in the next section.

**Boundary Spanning Roles of IT**

Research on the role of boundary spanners suggest that boundary spanning agents need to be involved in translating, (re)-producing and negotiating the use of boundary spanning objects across practices. Such agents are involved in translating the functionalities of the system, and enabling their use, through recursive interactions of boundary spanning agents across the different fields (Levina and Vaast 2005; Levina and Vaast 2008; Levina and Vaast 2013). Further research suggests several conditions and requirements to qualify as a boundary spanner. For example a boundary spanner must understand all the practices of the different fields, to be able to negotiate or renegotiate the relations and knowledge across boundaries, as well as negotiating the meaning and the use of the boundary objects in the different practices. Moreover, boundary spanning agents are responsible for addressing the concerns of the diverse practices (Levina and Vaast 2005; Levina and Vaast 2013).

Our empirical data illustrated the critical role of the IT practice as such boundary spanning agent in translating boundary objects across boundary spanning practices. This finding is aligned with earlier research that have defined a boundary spanner as an individuals who reach beyond boundaries to build
common ground across diverse practices (Levina and Vaast 2013). In particular the IT practice at KFSH&RC developed work processes (both during development and maintenance of ICIS) to actively solicit information from the diverse practices and map the work-processes of these practices into an integrated system. In the context of an IT personnel:

“We tried our best to understand how the doctors and nurses work and what they need from the system to do, in order to make this system a successful one”.

Another user stated:

“We constantly talk to doctors and learn about their daily job to build the features that would make their life easier”.

Such continuous translating activities resulted in the development of feature sets for the technology objects that were more usable and explicitly user driven. For example a respondent remarked:

“From our deep involvements with the doctors we created a favorites tab in the system now, this tab allows the doctor to assign his/her favorite tools and the most recently used ones”.

The IT practice was also found involved in facilitating the collaboration between the different fields. Our data confirmed the engagement of the IT practice in creating committees from different fields to understand each other’s roles. For example, the IT practice was heavily involved in interacting with all the different practices in the hospital in order to maintain a functional efficient system. In fact it continues to hold required monthly committee meetings from each practice to identify any new practice structure, workflows, and any user reviews about the system performance. For example a respondent remarked:

“We call them physician champion committees”.

Other users highlight:

“Every department has a committee, we have two committees in our department”, “the nurse informatics unit have their own committee as well”, “In this department, one committee is related to medication aspect of the practice, and the other covers the documentation”.

In addition, the IT practice was also involved in transferring information across the diverse practices and trying to understand and learn more about each practice in the hospital. A key aim of the IT practice remains the building of common grounds between the diverse practices to facilitate the collaboration through ICIS, as well as addressing the concerns of the diverse groups. As a system developer comments:

“Certain Surgeons, Pediatricians, and also nurses meet with the IT department to report any updates or problems about the system”.

Other users of the system state:

“If someone had a problem with the system, they would call up #6666”, “the helpdesk is available 24/7”, “anytime we can call them to fix our problem with the system”.

While Help desks are not an uncommon feature, our conversations with the respondents indicated that this service was responsive and useful. There was also a further indication that the IT practice was heavily involved in interacting with all the different practices in the hospital. The practice maintained a functional efficient system, by addressing the concerns of the different practices and applying appropriate changes to enhance the employee’s usability. Agents from the practice were found involved in defining the different practice’s norms, structures, and boundaries. The IT practice assigned different agents from each practice to report the workflows and any system related issues that occur. The majority of the system developers confirm the involvement of the IT practice as one personnel mentions:

“The system changes depending on the people’s use, for that we assign different people to report the activities involved in executing their daily workflow”.

Another IT personnel describes the committees as:

“Meeting with committee members from every side and part of the hospital, From the Surgeons, Pediatricians, and also nurses. We call the the champion committee”
Our findings also confirmed the engagement of the IT practice in the continued use of healthcare system. One of the means is through extensive and well-designed system-training workshops. The IT practice requires a system workshop from all hospital employees, and made it contingent for system access. The majority of the system users confirmed the involvement of the IT practice as one-user mentions:

“All of the users are required to go through the IT workshop in order to work in the hospital, otherwise, they won't get accessibility to ICIS”

Other users comment about their training:

“I took a class and after this class they provided me with my login”, “No workshop, No access”, “New doctors MUST attend workshops”.

As can be gleaned from the above discussion, the IT practice in KFSH&RC, developed work practices and norms both during the development and use of ICIS. Such practices embedded within them a number of principles of boundary spanning activity. Given that we were interested in understanding the nature of the boundary spanning in addition to evidence of it existing, we examined the nature of the boundary spanning during the two distinct phases of the ICIS system timeline: development and maintenance (of the system in use). Our data suggests that the nature of boundary spanning differed during these different sets of software engineering activity. We describe these in more detail in the next section.

**Modes of Boundary Spanning**

Research has labeled two modes of boundary spanning, transactive and transformative. Each one differentiates depending on the agent’s relations, the boundary object’s use, as well as the active role of the boundary spanners (Levina and Vaast 2013). In our data, we found evidence of both these modes, but interestingly these were applied in different contexts. For example, we found that the IT practice was typically transformative during development activities, and transactive for maintenance and system evolution related activities. Figure 4 illustrates the transition of the boundary spanning modes found in our data.

![Figure 4 Boundary Spanning Modes](image)

Likewise, table 3 below summarizes the differences of the boundary spanning activities and elements related to the different system implementation and development activities. For example, the evolution of the boundary object’s use, the shifting role of the boundary spanners, and the relationships among agents.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Boundary Object</th>
<th>Boundary Spanner</th>
<th>Agents</th>
</tr>
</thead>
</table>
| Transformative | • Represent different practices  
• Create a shared space among practices  
• Facilitate collaboration | • Translate definition of practices  
• Negotiate meanings of objects  
• Transform/build new joint practices | • Produce novel relations  
• Experience challenging work  
• Requires collaboration  
• System use: Immature |
Table 3. Boundary Spanning Modes

In the transformative mode, boundary spanners invest effort to develop boundary objects that represent the diverse practices, and develop a shared space (Levina and Vaast 2013). Our data reveals, the IT practice at KFSH&RC made explicit attempts to design a system that not only represented diverse practices, but also represented a shared space for their collaborative work practice.

For example a respondent remarked:

“In order to know what any of the doctors, nurses or lab assistants require from our system for example, we try to understand how they interact among each other as well as with the patients. We started by learning their daily job and understanding what tools can help them best”.

A doctor describing his work process indicated how the system allowed a share space to exist between doctors and pharmacists:

“Now I can place a medication order and it will go to the pharmacy on the spot, the pharmacist will see who placed the order and for who it is placed. It will alert me if there is any contradictions with other medications, it will also notify me for an alternative or a generic drug”.

Research suggests that transformative boundary spanners have to act as both translators and negotiators in order to build or transform a new joint practice. Moreover, agents in the practice produce novel relations (Levina and Vaast 2013). When examining the development activities, our empirical data yielded themes that were similar to Levina and Vaast’s notion of transformative boundary spanning. It emerged that during such activities the IT practice (boundary spanner) remained active translating and negotiating the terms and structures of the system as well as its use. As one IT developer mentions:

“We were heavily involved in trying to convince the physicians to the use the system properly at first”.

Other system developers’ state:

“Users are the biggest challenge for the system. Some doctors are old fashioned and like the paperwork”, “it is very challenging to change people’s behavior”.

While the IT practice demonstrated predominantly transformative boundary spanning mode during development activities, as discussed above, they were more transactive, during maintenance activities. In the transactive mode, boundary spanning agents primarily act as translators (Carlile 2004; Levina and Vaast 2013). This mode is characterized by a reduced need for frequent interactions with the diverse practices within the hospital, as the boundary object in use (ICIS) has reached a certain state of maturity. Consequently, the IT practice has focused on optimal system usage by being an advocate of the system, pointing out new features or better ways to use them. This has been done through establishing a support system, and also by providing forums where users can provide their feedback. As one system user indicates:

“We have assigned designated doctors and nurses from every department to report any problems encountered with the system use”.

During the maintenance phase and current usage of the system, a difference was also observed about the perceptions of the boundary object. The IS is perceived as more mature, and is accepted as an integral part of collaborative practices of the different fields. Additionally the system has become widely accepted as the conduit for information and data transfer. For example, a respondent remarked:

“Now we can prescribe medication automatically through the system, this made it easier to both us as doctors as well as the patients”.

Other users describe the system as:
“The system made it easier to communicate with the laboratory department”, “the system has the pharmacy built in it, which made ordering medication much easier!”

**Contribution**

In our opinion this research has certain interesting implication for both IS research and practice. The primary conclusion that emerges from this research is that successful IS implantation and use scenarios require the organization’s IT practices to act as effective boundary spanners. Furthermore, it is suggested that such boundary spanning activities need not be uniform, and suggests that transformative mode of boundary spanning is more suitable for development related activities and transactive for maintenance related activities. This contributes to IS research by providing a novel lens in terms of boundary spanning, and further explicating the role of the IT department within a healthcare organization in terms of a theoretical framework. We believe this lens provides a relevant and insightful theoretical framework for investigating other IS development and use related phenomenon. We also believe that the identification of the relationship between IS development processes and boundary spanning modes, contributes by a) providing interesting insights about optimality of boundary spanning modes and changing roles of both the agents and the technology in use as the boundary object, and b) opening up the possibility of developing a more granular understanding of IS development and use in an environment of diverse fields of practice.

The theoretical conclusions of this paper also have implications for practice, because they provide some prescriptions of how to navigate the somewhat unique organizational context posed by healthcare organizations. First of all the boundary spanning role of the IT practice in KFSH&RC, in a successful integration of IS resources, provides encouragement for practice to include theoretical ideas of such activities within the formal design of organizational workflow. Further our theoretical identification of a relationship between IS development phase related activities and boundary spanning modes provide directions for such a design. Finally our theoretical narrative contains numerous good practices followed by the IT group at KFSH&RC; these could be informative of practice, even in term of piecemeal adoption of these practices.

To conclude, this paper represents a preliminary step at examining healthcare IT operations from a practice perspective. The exploratory nature of this research brings with it the implication of an initial conceptual foundation that needs to be enriched by further research. For example, while this research hints at a recursive relationship between the use and evolution of IT as the boundary object, our existing data falls short of allowing us to explore it. We believe that this direction of research could provide valuable insight into the essential design characteristics (of IT interfaces) that enable collaborations between fields of practices.

**REFERENCES**


