JITTA

JOURNAL OF INFORMATION TECHNOLOGY THEORY AND APPLICATION

ISSN: 1532-3416

Hospital-wide Process-oriented Organization of Care: The Case of Turku University Central Hospital

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Abstract:

In reaction to the productivity challenges that hospitals around the world have faced, some hospitals have begun to move towards a process-oriented organization of care in order to enhance productivity. Existing research on process-oriented organization emphasizes severe challenges along the implementation process. However, the literature contains only a small number of documented cases of hospital-wide process-oriented reorganization. Against this background, in this case study, we explain how hospitals can successfully implement organization-wide process orientation. To do so, we conducted an exploratory single case study with semi-structured, face-to-face interviews and document analyses as our primary data-collection methods. We developed a theoretical framework of antecedents, interventions, enablers, barriers, and consequences that explain the trajectory of this successful hospital-reorganization project. We contribute a substantive theory on which other researchers can build and can extend in future studies. Further, in analyzing our unique case, we identify factors that the extant literature has not yet discussed, such as the blackboxing of diagnosis and treatment activities as an enabler. In line with existing literature, we also found that, even in this case, inflexible healthcare IT represented a barrier that hindered the case study in implementing process orientation.

Keywords: Business Processes, Healthcare, Case Study, Process Orientation.

1 Introduction

Healthcare organizations around the world face enormous productivity challenges (Hollingsworth, 2008; Sherman, 1986). In most developed countries, the demand for healthcare services has grown in part due to their quickly aging populations and the increasing speed of medical innovation (Goldman et al., 2005; Rettig, 1994). In reaction to these developments, hospitals have sought ways to enhance productivity, and some have begun to move towards a more process-oriented organization of care (Coulson-Thomas, 1997; Elkhuizen, Limburg, Bakker, & Klazinga, 2006; Vos et al., 2011). Traditionally, hospitals have adopted a functional organizational scheme, such as according to body part, organ, age group, or medical technology (Vera & Kuntz, 2007). In a process-oriented organization of care, a hospital designs its main organizational units according to home-to-home patient flows that cut across medical specialties (Vos et al., 2011) and that so-called patient flow managers sometimes manage (Axelsson, Axelsson, Gustafsson, & Seemann, 2017). This rationale concurs with Hammer and Champy's (1993) observation that "often the efficiency of a company's parts comes at the expense of the efficiency of its whole" (p. 9).

So far, most process reorganization projects in hospitals have targeted specific hospital areas, such as offsetting up selected multi-disciplinary departments (e.g., emergency departments, stroke units) or implementing clinical pathways for specific patient groups (Vos et al., 2011). Given the narrow scope of such initiatives, Vos et al. (2011) has observed that "many hospitals struggle with the question of how to deal with process-orientation at the hospital level" (p. 1). In reviewing more than 300 scholarly papers on process orientation in hospitals, they identified only five documented cases of *hospital-wide* process reorganization (Vos et al., 2011).

Research has found mixed evidence about whether hospital-wide process-orientation implementations succeed (Caccia-Bava, Guimaraes, & Guimaraes, 2005; Elkhuizen et al., 2006; Rohner, 2012; Vera & Kuntz, 2007). On one hand, most studies have reported positive effects, such as decreased waiting times, reduced length of stay, cost reductions, and increased patient satisfaction. On the other hand, virtually all studies have emphasized severe challenges along the implementation process and reported that the implementations had less far-reaching outcomes than expected. Accordingly, Vos et al. (2011) has contended that "it is important that the main focus of future research is on the preconditions or contingencies for an effective application of process-oriented organization designs in healthcare" (p. 12).

In order to contribute to filling this research gap, we conducted an exploratory single case study at a large Finnish university hospital, the Turku University Central Hospital (TUCH), which changed its organizational structure from a functional design to a process-oriented design based on care lines that comprise patient-treatment processes.

This paper proceeds as follows. In Section 2, we present the research background. In Section 3, we describe our case study hospital and the starting points for the work there. In Section 4, we describe our research methodology. In Section 5, we present our findings from the case study; in particular, we present a framework of the antecedents, interventions, enablers, barriers, and consequences to explain how our case organization implemented process orientation. In Section 6, we discuss the theoretical and practical implications of our study, and, in Section 7, discuss our study's limitations and conclude the paper.

Contribution:

This paper presents a comprehensive analysis on what process orientation means in a major hospital. Our results show that hospitals need to work on the information systems and that process orientation in hospital settings starts from clinical practices, which appropriate ICT solutions can support. The findings also suggest that the performance improvements mature first after a long time and are hard to measure.

2 Research Background

Little research has examined large-scale process reorganization in hospital settings (Elkhuizen et al., 2006; Vos et al., 2011), but Table 1 overviews the hospital-wide process reorganization projects that Vos et al. (2011) identified from reviewing the literature. All hospital-wide reorganization projects that they identified focused on improving the quality of patient care, although some projects focused also on improving productivity and employee satisfaction as additional goals. Four out of the five hospitals applied a coordination mechanism approach to implementing process orientation; as a result they did not change their organizational deep structures (Gersick, 1991) but installed governance structures such as clinical directorates and clinical pathways on top of the old structures to improve cross-departmental coordination. Only the University of Wisconsin Hospitals and Clinics (UWHC) conducted an actual organizational restructuring: it gradually dissolved old functional departments and introduced care lines according to disease-based care processes. All of the studies discussed enablers of and barriers to implementing the required organizational change extensively. They repeatedly mentioned clinical leadership, iterative change, external change agents, and medical staff participation as factors critical to a successful implementation, and typical barriers included clinical hierarchies, medical staff resistance to change, and poor cross-departmental communication and collaboration. Leicester Royal Infirmary (LRI) and UWHC reported detailed quantitative data on the outcomes of their reorganization initiatives. The data indicates that a process-oriented organization of healthcare can lead to substantial improvements in service quality and operational efficiency. UWHC, for instance, simultaneously reduced the length of patient stays, treated more patients, increased patient satisfaction, and improved its financial margins (Turnipseed, Lund, & Sollenberger, 2007).

Table 1. Overview of Prior Research on Organization-wide Implementation of Process Orientation in Hospitals

	Denver Health (DV)	Flinders Medical Center (FMC)	Leicester Royal Infirmary (LRI)	Policlinico A. Gemelli (PG)	University of Wisconsin Hospitals and Clinics (UWHC)
Literature sources	Vos et al. (2011), Nuzum, McCarthy, Gauthier, & Beck (2007)	Vos et al. (2011), Ben-Tovim et al. (2008), Ben-Tovim & Bassham (2007), McGrath & Bennett (2008)	Vos et al. (2011), McNulty (2002), McNulty & Ferlie (2002), Bowns & McNulty (1999)	Vos et al. (2011), Marano, Fioretti, Bellomo, & Ceruti (1998)	Vos et al. (2011), Turnipseed et al. (2007)
Unit of analysis	398-bed hospital in Denver, CO, United States	500-bed teaching hospital in Adelaide, Australia	1,000-bed university hospital in Leicester, United Kingdom	1,500-bed teaching hospital in Rome, Italy	489-bed tertiary care center in Madison, WI, United States
Scope	Clinical care and administrative processes	Clinical care (emergency, surgical, medical)	All patient services (clinical and outpatient)	All patient services (clinical and outpatient)	Heart and vascular care, oncology, pediatric care
Timeframe	2003 – 2008	2003 – 2007	1995 – 1998	1995 – 1998	2000 – 2004
Antecedents	Improve patient safety Improve patient satisfaction Increase productivity Improve employee satisfaction	Improve patient flow	Improve quality of care Increase productivity Improve employee satisfaction	Improve patient-centered orientation Increase productivity	Improve patient satisfaction Increase productivity

Table 1. Overview of Prior Research on Organization-wide Implementation of Process Orientation in Hospitals

Interventions	Local process improvements and implementation of coordination mechanisms (e.g., identification of value streams, reduction of waste in existing processes (lean), rapid process-improvement events, continuous improvement, implementation of new healthcare IT, new hiring and training practices)	Local process improvements and implementation of coordination mechanisms (e.g., identification of high-volume processes, improvement of processes applying lean manufacturing principles (reducing waste), process standardization, continuous improvement of processes)	Local process improvements and implementation of coordination mechanisms (e.g., improvement of core treatment processes in specially created "reengineering laboratories", appointment of process managers in clinical directorates and specialties)	Local process improvements and implementation of coordination mechanisms (e.g., identification and improvement of core treatment processes for major patient groups)	Complete organizational restructuring according to patient processes (e.g., definition of service lines according to market analysis, restructuring into matrix organization (service lines/focused clinical units), definition of business plans and budgets per service line, physical relocation of services and resources)
Enablers	Iterative change Clinical leadership Government support Training in process improvement methods Experience with change projects	Iterative change Clinical leadership Participation of medical staff Focus on patient journey Availability of performance data External change agents Stakeholder communication	Clinical leadership Top management support External change agents	No enablers reported	Grassroots approach to change Involvement of medical staff Close collaboration between hospital administration and clinical leaders
Barriers	Lack of collaboration across departments and sites Failure to promote use of industrial process improvement methods Lack of data	Clinical hierarchies	Clinicians' resistance to change Complexity of care processes Divergent mindsets of re-engineers and clinicians Poor management cross-departmental change	Poor management of cross-departmental change	Clinicians' resistance to change
Consequences	Reduced costs	Increased operational efficiency Improved patient safety	Marginal efficiency improvements Most changes have not sustained	Increased operational efficiency in surgical wards Efficiency goals in medical wards have not been met	Increased operational efficiency Improved financial performance Improved patient satisfaction

3 Case Overview

Turku University Hospital is one of five university hospitals in Finland. It functions as a third-level healthcare provider and takes care of the most difficult and severe patient cases. TUCH is the main hospital of the Hospital District of Southwest Finland, a region that contains 26 healthcare centers. Table 2 presents some key figures about TUCH.

Our case study followed up on a major construction project at TUCH called the T-Project. The name came from a new building called T-Hospital that hosted the hospital's most acute care services in a 108,000m^2 area. As the project plan expressed, the hospital inscribed the idea of process thinking into the T-Hospital project from the beginning: "T-Hospital is a top process-oriented hospital appreciated by customers, staff and owners. New ways of acting and good quality of care make T-Hospital a popular and secure hospital.".

Process orientation at TUCH concentrated more on implementing clinical pathways. These pathways needed to integrate different areas of care and extend beyond the central hospital's operations. However, beyond such pathways, process orientation contains other higher-level goals that the hospital had to focus on, such as:

- Avoiding unnecessary patient transfers (i.e., services move to the patient, not vice versa)
- Minimizing patient transfer needs in the hospital's new physical layout
- Fluently exchanging staff between different areas of care
- Giving special attention to material flows
- Minimizing patient and resource waiting times
- Minimizing patient overnight stays, and
- Paying special attention to bottlenecks in the processes.

Importantly, the T-Hospital project did not involve updating the hospital's IT-systems. However, as we discuss in Section 6, it became painfully clear during the project that missing IT capabilities hindered the hospital from achieving the project's goals.

Table 2. Key Figures about Turku University Hospital (TUCH) 2011 (VSSHP, 2012)

Population to be served	466,000
Staff	3,085
Beds	829
Individual patients treated	123,613
Inpatient treatment days	226,764
Outpatient appointments	476,472
Inpatient surgeries	18,056
Ambulatory surgeries	10,483
Operating expenses	€569 million (complete hospital district)

Table 3. T-Project Phases

Phase	Description	Timeframe
Phase 1	Initiation	2007/08
Phase 2	As-is analysis	2008/09
Phase 3	Planning	2009
Phase 4	To-be design	2010
Phase 5	Organizational change and training	2011
Phase 6	Moving to the new building and sustaining organizational changes	2012 – 2013

The industry healthcare environment in Finland has seen many changes during the past few years, which have resulted in challenges for TUCH. Of note, according to Finnish law, patients are entitled to receive treatment and care in certain time periods. For example, when a hospital receives a referral from a basic healthcare provider about a patient, the hospital must have begun to assess the patient within three weeks and have finished it within three months, and the actual care must start within six months after the hospital has identified that the patient requires care. All Finnish hospitals have struggled to meet these timeframes. In December, 2015, 0.54 percent of patients at TUCH had waited for care for more than 180 days.

Another change relates to emergency duty operations. The new Finnish law on emergency duty operations concentrates emergency duty activities to large units with good facilities, which has meant that emergency duty operations has had a much bigger role in TUCH than before. In 2014, the number of patients that TUCH served grew by more than 4.1 percent, but its emergency duty operations grew by

10.8 percent. As DiLeva and Sulis (2017) document, process analysis and design can bring especially promising results in such emergency care settings.

4 Research Method

We conducted an exploratory single case study in order to explain how hospitals can successfully implement organization-wide process orientation. Given the small number of documented cases of hospital-wide process orientation, this case represents what Yin (2008) calls a unique case that is worth analyzing.

As a meta-framework for our study, we used a set of broad a priori categories (i.e., antecedents, interventions, enablers, barriers, consequences) that researchers have typically used to describe organizational change processes (Glaser & Strauss, 1967). To collect data, we primarily conducted semi-structured, face-to-face interviews and analyzed documents. Specifically, we held eight interview sessions that took 45-90 minutes each; as such, we obtained more than eight hours of interview data. Before conducting the interviews, we sent a single-page summary of the main interview questions to every interviewee. We tape-recorded and transcribed all but one interview, and we took field notes during or shortly after each interview. We also collected written materials that documented the reorganization project that amounted to more than 150 pages. We stored all interview transcripts, field notes, and collected documents in a central database and subsequently coded them using a computer-aided qualitative data analysis software program (NVivo). The CEO of the healthcare district and the project manager reviewed the final case report. Table 4 and Table 5 summarize our data sources.

Table 4. Overview of Interviews

#	**Interviewee**
1	Project manager (not recorded and transcribed)
2	Chief executive officer (CEO) of the Hospital District of Southwest Finland and TUCH
3	Organizational development manager
4	Head of orthopedics and traumatology
5	Director of nursing for conservative care
6	Director of nursing development
7	Project manager
8	Chief medical information officer (CMIO)

Table 5. Overview of Documentary Data Sources

#	**Document**
1	Project report
2	Official project presentations
3	High-level organizational charts (as is and to be)
4	Detailed to-be process models (excerpt)
5	High-level IT architecture (excerpt)

We analyzed the data in a two-cycle process as Saldaña (2009) describes. In the first cycle, we applied open coding to identify potentially relevant text fragments from the interview transcripts. To conduct that open-ended process, we did not use any a priori constructs. In the second cycle, guided by our broad a priori categories, we used focused and theoretical coding to group the initial codes into concepts and relate them to each other. Figure 1 illustrates the process.

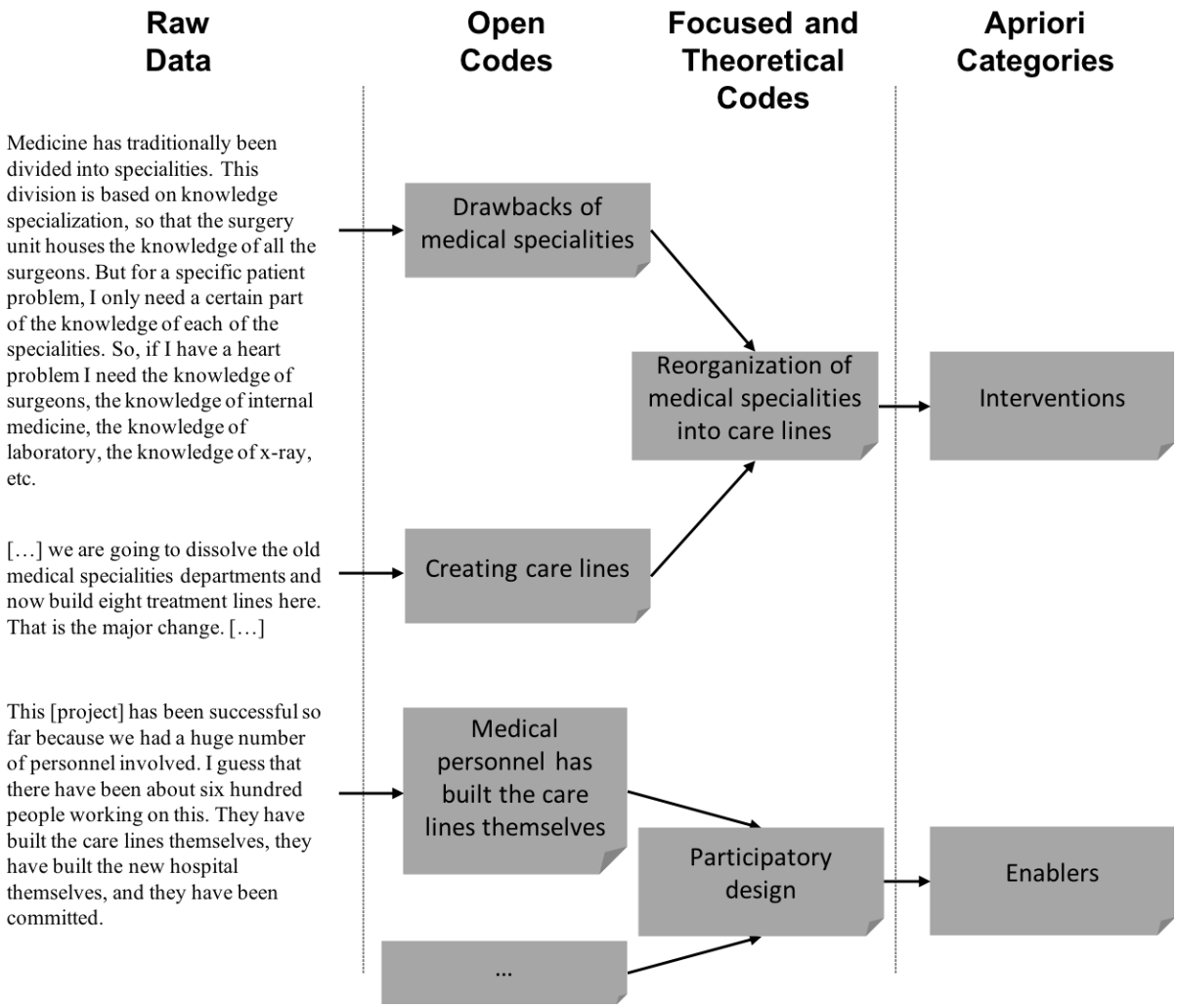

Figure 1. Overview of Data-analysis Process

5 Findings

Figure 2 illustrates our major findings. At the macro level, the a priori categories (e.g., antecedents, interventions, enablers) that we used as a lens to collect and analyze the data structure the framework. At the micro level, the framework contains the focused and theoretical codes that emerged from our data analysis. We discuss each category below.

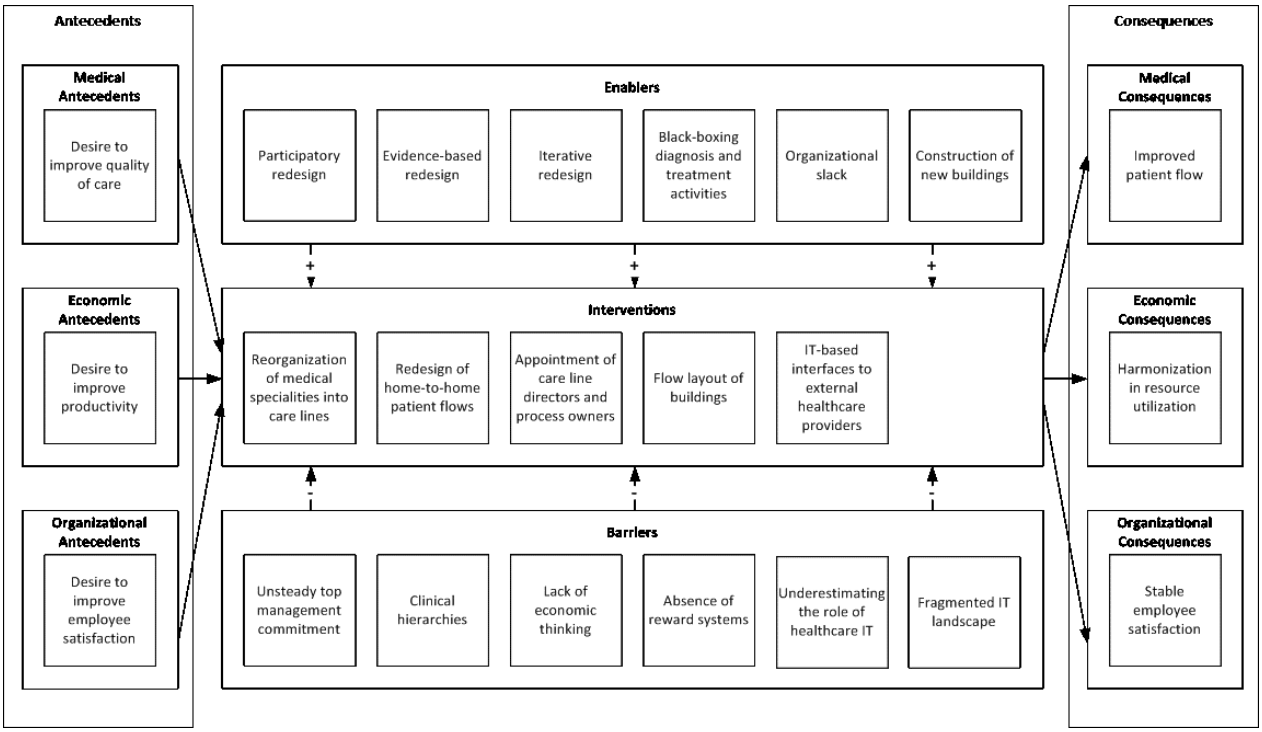

Figure 2. Framework for Implementing Organization-wide Process Orientation in Hospitals

5.1 Antecedents

In analyzing the case, we found a mix of medical, economic, and organizational factors that led to the decisions to change TUCH's organizational structure from a functional to a process-oriented structure.

TUCH already provided high-quality care before the change project. However, new and demanding (both clinically and economically) treatment procedures put pressures on the hospital as they would on any healthcare organization. Against this backdrop, the strong belief that organizing the hospital around cross-departmental patient flows instead of medical specialties would lead to a more patient-centered orientation and improved quality of care mainly drove the project. The organizational development manager explained the drawbacks of the old functional organization:

> *[The old hospital] was not organized based on patient needs. It was organized based on the needs of...different specialties. Within one function they were..., in most of the cases, very well developed. But who takes the responsibility when the patient moves between the functions?*

Besides leading to better-quality care, TYCH management also saw process orientation as a means to improve hospital productivity. Most of the staff knew about the operational inefficiencies (e.g., long patient wait times, interruptions in information flows) that the bottlenecks in the old divisional organization caused. The management believed that switching to a process-oriented structure would eliminate many of these deficiencies and increase productivity by at least 10 percent. However, both the CEO and the project manager stressed that the productivity gain constituted a positive side effect of the project and not a goal in itself. As one of the interviewed TUCH manager said: "It's a secondary result; it is not our first call. If you are trying to make processes better by saving, by using less money, then you won't succeed". Indeed, as we describe in Section 5.2.2, the T-Hospital project implemented process orientation to not only improve quality of care (customer's view) and productivity (owner's view) but also increase employee satisfaction.

5.2 Interventions

While the overall project comprised many organizational and physical interventions, we cannot discuss them all in detail here. Therefore, in this section, we focus on the most relevant interventions from a process management perspective.

5.2.1 Reorganization of Medical Specialties into Care Lines

Historically, TUCH divided its operations into two divisions: conservative care (e.g., internal medicine, oncology, neurology, dermatology, and pediatrics) and operative care (e.g., emergency care, intensive care, anesthesiology, orthopedics and traumatology, gynecology, and ear, nose, and throat). Together, these divisions comprised 18 clinics. In the course of the reorganization project, the hospital restructured these clinics into eight care lines that each represented a profit center and comprised processes for treating specific medical conditions (see Figure 3). While six of these care lines have a relatively restricted set of patients and health problems to solve, two care lines, "other non-surgical care" and "other surgical and cancer care", acted as containers for treatment processes for which it was not medically or economically feasible to create single care lines (e.g., the various plastic surgery processes in the "other surgical care" care line). The hospital organized the medical services (e.g., intensive care, medical imaging, labs, pharmacy) and administrative, technical, and maintenance services (e.g., procurement, logistics, IT) that multiple care lines required into shared service units. Service-level agreements between the care lines and shared service centers defined the quantitative and qualitative performance metrics and the cost rates for service delivery. The hospital organized the emergency and primary care units as an inter-disciplinary department that acted as a hub to the downstream care lines.

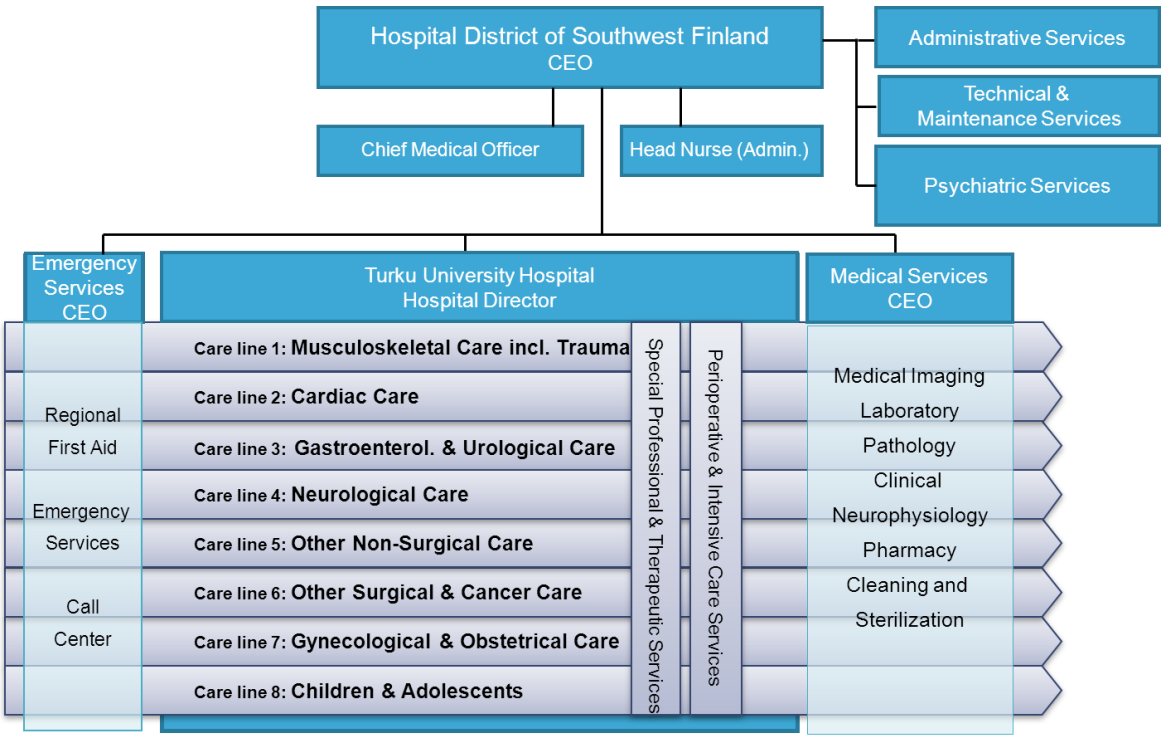

Figure 3. New Process-oriented Organizational Structure at TUCH

5.2.2 Redesign of Home-to-home Patient Flows

A care line comprised between five and 13 main processes, each of which grouped up to ten subprocesses. As such, the hospital had more than 180 processes. Each subprocess had a well-defined template (i.e., process maps structured according to the home-to-hospital-to-home patient flow) for treating a specific disease or injury that specified the departments and actors involved, activities to carry out, information flows, and required medical resources (see Figure 4).

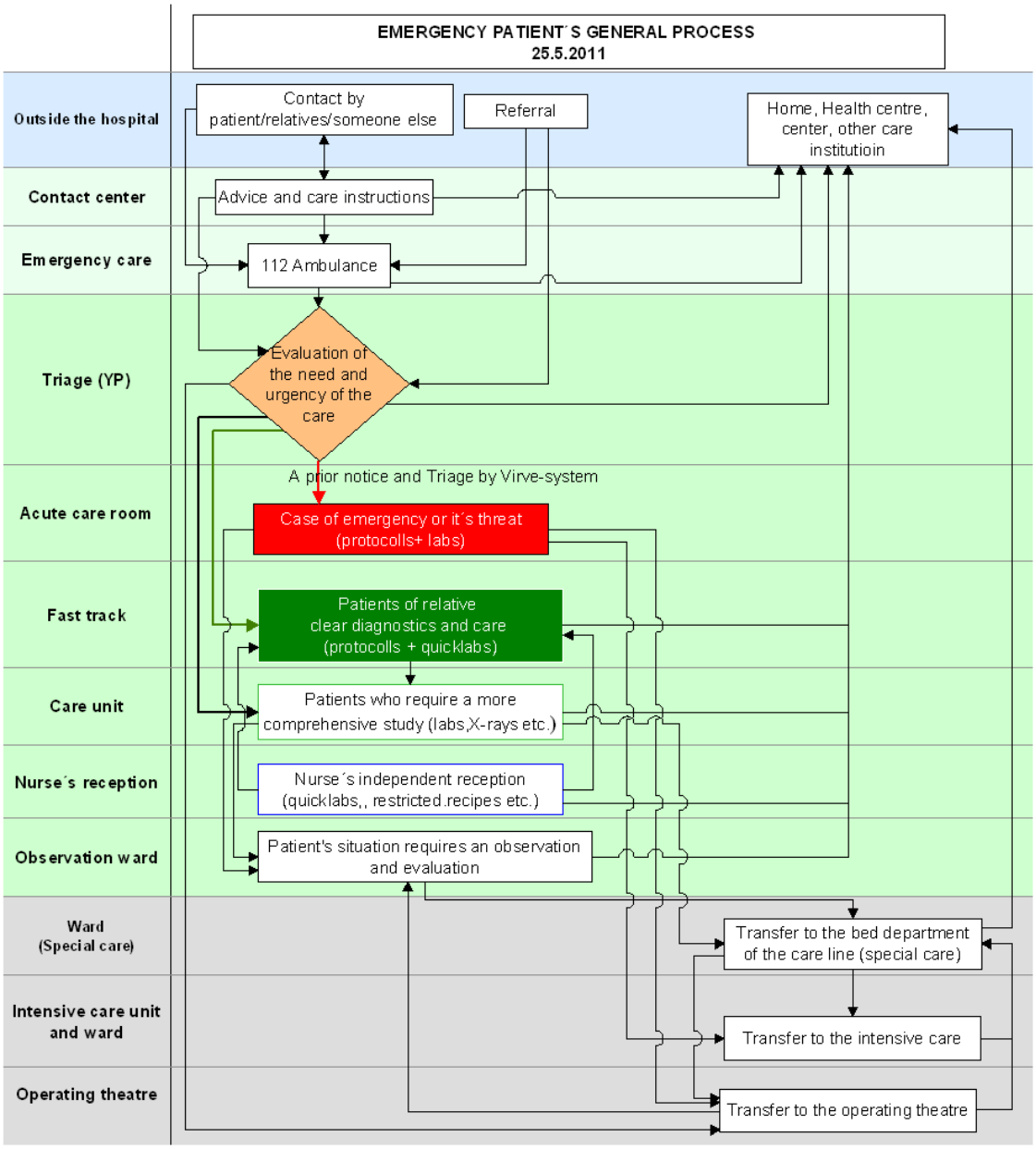

Figure 4. Map of the Emergency Patient's General Process

The hospital redesigned all treatment processes from the patient's perspective as the director of nursing development pointed out: "The rule was to map the process from the patient's point of view. Where does the patient come from? What happens to him or her? Not 'What am I—the doctor or nurse—doing?'". Many streamliners of TUCH processes (re-engineers) both at the project and the hospital level found the switch challenging because they had become accustomed to looking at patient treatment from a provider's point of view. Another challenge that resulted from this perspective switch involved capturing all of a process's relevant variants. In addition to variations due to a patient's characteristics and medical condition, processes might have varied due to, for example, the municipality responsible for the care (restrictions for compensation of different care activities, such as physiotherapy) or even the patient's language (Finnish, Swedish, or another language). Since the re-engineering team could not capture all process variants, the management set the goal to define standard processes for about 70 percent of all cases, which meant the hospital would handle the remaining 30 percent of patients in an ad hoc fashion.

In addition to mapping and standardizing process, TUCH successfully applied lean management principles to improve its processes. A core lean management principle involves eliminating non-value-adding activities, or waste, from processes (Powell, Rushmer, & Davies, 2009). Hence, when analyzing

as-is processes, the reengineers paid special attention to unnecessary defects or corrections (e.g., admission to wrong clinic or department, readmission due to inappropriate discharge), delays (e.g., waiting for doctors or test results), transportation (e.g., long transport routes to imaging resources), overlapping actions (e.g., asking patients for the same information twice), inventory (e.g., waiting lists), motion (e.g., unnecessary movement of patients), and overproduction (e.g., ordering superfluous laboratory test).

5.2.3 Appointment of Care Line Directors and Process Owners

The hospital management defined clear roles and responsibilities and appointed directors and owners for each care line and treatment process. The care line owners had responsibility over the quality of care and the economics of their care lines, so they had the power to make decisions regarding ordering medical services, hiring staff, teaching, and researching. One level below the care line owners, the dedicated process owners had the medical and economic responsibility and decision making power over running and continuously improving one or more specific treatment processes. Medical doctors served as all care line directors and process owners. Initially, the hospital thought to fill some of these positions with non-medical professionals (e.g., people trained in business administration or healthcare management); however, due to medical professionals' condemning the plan due to their distinct values and beliefs (e.g., strong professional identification and hierarchy), the hospital decided not to do so.

5.2.4 Flow Layout of Buildings

As one particularly interest aspect about the case, the T-Hospital project team not only organizationally restructured but also physically restructured the hospital. From the project's beginnings, the project team embedded process and lean thinking into the layout of the new T-Hospital building using production flow analysis, a technique originally developed to design factory layouts, to improve the flow of patients through the hospital. The technique focuses on relocating, splitting up, and/or joining existing organizational units in a way that minimizes transfers between units (Burbidge, 1991; Karvonen, Korvenranta, Paatela, & Seppälä, 2007; Karvonen, Nordback, Elo, Havulinna, & Laine, 2017). Figure 5 shows the results of the production flow analysis for the flow of trauma patients.

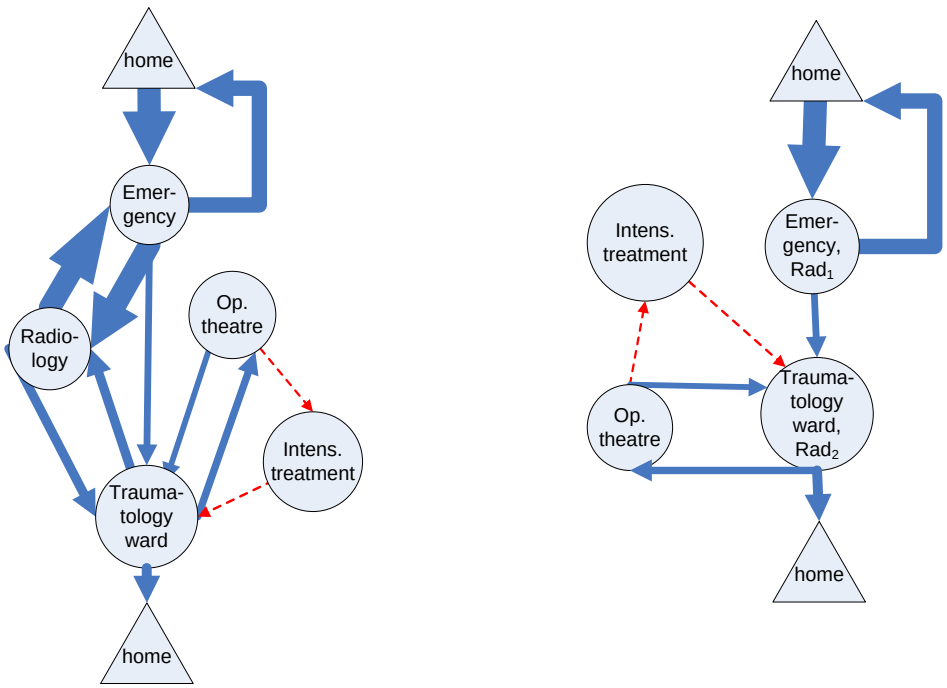

Figure 5. Flow of Trauma Patients in the Old Functional Layout (left) and the New Process-oriented Layout (Right)[1]

[1] Arrow thickness reflects patient flow volume.

The old functional layout (Figure 5, left) required many back-and-forth patient transfers between the emergency department and radiology and between the traumatology ward and radiology. However, the new process-oriented layout (Figure 5, right) reduced these time-consuming and risky patient transfers by physically splitting up the radiology department so the emergency department and the traumatology ward had integrated radiology units (Rad_1 and Rad_2). The hospital performed a similar analysis for the other care lines with similar consequences: the hospital substantially reduced patient transfers from physically decentralizing shared services such as medical imaging, laboratories, and operating theatres.

5.2.5 IT-based Interfaces to External Healthcare Providers

The organizational interventions did not change only internal processes; they also focused on improving the patient and information flow between TUCH and external referring healthcare providers. The project manager explained this effort as follows: "We are working with family healthcare doctors and primary healthcare doctors [to build] treatment chains between here and the local doctors and other hospitals". To implement this "BPM-in-the-large" approach (Houy, Fettke, Loos, Aalst, & Krogstie, 2011), the hospital implemented standardized process interfaces with referring doctors and electronic referral systems. Previously, referring doctors often did not know with what department they should refer a patient to, and the paper-based referral documents were often incomplete, which resulted in incorrect referrals, unnecessary follow-up transfers between departments, and time-consuming communication. Since the hospital has implemented the new IT-based referral process, the information flow with external providers has improved in terms of speed and information quality. As a result, it has substantially decreased the number of wrong or incomplete patient admissions and shortened waiting lists.

5.3 Enablers

We identified several enabling factors that contributed to TUCH's successfully implementing organization-wide process orientation.

5.3.1 Participatory Redesign

Often, teams of internal or external consultants drive reorganization projects, but TUCH assigned the task of identifying and redesigning treatment processes to people who actually worked in the old and/or new processes (i.e., the medical staff). Staff members participated in the development work through redesign workshops, surveys and interviews, and education and training days. Virtually all interviewees stressed that decision to use participatory redesign practices represented one of the project's critical success factors. The CEO, for instance, explained that the reorganization:

> *Was all done by our existing personnel. Of course, we also hired the help of some consultants and there were some project managers, but the analysis and design of the processes was done by the existing medical personnel…. This [project] has been successful so far because we had a huge number of personnel involved. I guess that there have been about six hundred people working on this. They have built the care lines themselves, they have built the new hospital themselves, and they have been committed.*

In a similar vein, one of the leading organizational development managers explained:

> *Our idea from the very beginning was to involve the people working in these buildings, as they are the experts here. They know how patients should be treated, they know what kind of changes should be made, they know the work processes, and they know how best to change processes crossing functional departments, so we need to listen to them. Actually, not only to listen: we need to have them do the work—the planning and the development work.*

5.3.2 Evidence-based Redesign

To gain acceptance from the medical staff and to motivate personnel to participate in the reorganization, the T-hospital project team heavily used empirical data. During the as-is analysis phase, the core team gathered and analyzed typical hospital-performance measures (e.g., patient volumes, lengths of patient stays, waiting times) for the departments and patient groups. In addition, the team distributed questionnaires to all staff members and interviewed key personnel in order to elicit other issues, such as problems with logistics or IT. External researchers also participated in conducting scientific studies around the T-Project, and collected experiences with reorganization initiatives in other Nordic university hospitals,

such as those in Helsinki and Stockholm, and documented case descriptions from similar worldwide projects. Their collecting and analyzing this empirical data around the change initiative served two purposes. First, it created a sense of urgency (Kotter, 2008; Nadler & Tushman, 1989) that helped to mobilize staff to participate actively in the reorganization efforts. The empirical data turned out to be an effective way to raise interest in the reorganization initiative and to involve all medical staff members. As the director of nursing development explained:

> *We made statistical analyses regarding rooms, patients, and diagnoses, which are interesting to doctors. In the first meetings, we called the teams together and presented these statistics. That was a good start. They were interested, they even found some mistakes, and they did some analysis themselves. I think that was quite a good beginning.*

Second, they used the data as a basis to detect bottlenecks in the old functional organization of care, to improve existing work processes, and to identify new cross-functional treatment processes.

5.3.3 Iterative Redesign

The six-year change project did not follow a linear project plan but involved multiple parallel and iterative streams. Among the eight care lines, the cardiac, neuro, and trauma care lines acted as pilot projects to try out ways to redesign processes. In the beginning, the teams acted with great caution and saw resistance from affected employees (e.g., it took the project term more than a year to analyze and design the first three processes in the trauma care line) but, as the project team gained more experience and realized positive outcomes, resistance vanished. The organizational development manager described this experience:

> *In the first year there was resistance: 'This is not going to work', 'This is not good', 'Why can't we stick to the old system?'. But then after a year you could see that the lights were turned on and people started to realize that there might be some benefits in this. And then it started to spread…. I always say this is like a slow waltz: You take one step backwards, maybe one to the side, and then maybe one or two forward.*

5.3.4 Blackboxing Diagnosis and Treatment Activities

Although the project's scope included almost all patient-related processes, the project team did not analyze diagnosis and treatment activities in order to focus solely on the overall patient flow (i.e., patient logistics and administrative tasks). As the project manager explained: "We don't change anything that defines how doctors are treating patients, how nurses are contacting patients, how the surgeon is making an operation, what kind of drugs the patient gets, or things like that". By "blackboxing" the diagnosis and treatment activities, the project team gained the medical staff's acceptance for the reorganization initiative. Hospital management anticipated that doctors would rebel against externally imposed changes in core medical activities. Instead, the redesign focused on eliminating non-value-adding activities (as seen from a medical perspective) in order "to create more time for patient-doctor and patient-nurse contacts" (project manager).

5.3.5 Organizational Slack

The participatory approach to redesign would not have been possible without the availability of some spare resources, or organizational slack, to plan and implement changes (Goldstein & Iossifova, 2012; Sharfman, Wolf, Chase, & Tansik, 1988). With its large personnel budget (€340 million in 2011; 60% of the total operating costs), TUCH could allow employees to reserve work time to participate in the reorganization teams and workshops. Further, the hospital's central administration had sufficient manpower to undertake the T-Project's project-management activities.

5.3.6 Construction of New Buildings

The T-Project's timing distinguishes it from many other organizational change projects in the hospital context. The management decided to use the momentum that the construction of the new main building (T-Hospital) provided to radically change how TUCH delivered healthcare services. Coupling these two major change projects turned out to effectively facilitate changing work routines and overcome employee resistance. As the head of orthopedics and traumatology described: "Going to a new place is something positive, and because it's positive you can add other changes to it easier than you would do otherwise". One of the organizational development managers stated: "By moving to the new hospital, you don't have

the old habits sticking to the walls. …I think that this kind of change wouldn't be possible without a new building.".

5.4 Barriers

Of course, certain barriers also hindered the process reorganization at TUCH.

5.4.1 Unsteady Top Management Commitment

Although the Hospital District of Southwest Finland initially accepted the reorganization activities at TUCH, the project team occasionally felt a lack of top management support that made planning and implementing planned changes over the long term difficult. During the six-year project, several members of the steering board, including the CEO, changed. This discontinuity caused problems for the project even though the old and the new CEO both viewed the project positively. The project team equally needed to sustain commitment from the board of directors (representatives from the member municipalities). However, top management support varied considerably, and only some top managers understood what the project involved. Many reorganization team members found this unsteady top management support surprising. The project manager observed: "We noticed that [resistance from top management] only two years ago. It has not been a real problem, but it is a point that has to be taken into account.". Similarly, other interviewees stated that top management was "not ready to change" or that "the biggest surprise…was that there is so much resistance in the upper management".

5.4.2 Clinical Hierarchies

The project also had to overcome hierarchies among the medical staff in order to design the new hospital organization in a participatory way. Doctors and nurses had become accustomed to sticking to themselves and discussing issues in their professional groups, so breaking up these groups and fostering communication across traditional hierarchical levels and vertical boundaries turned out to be one of the biggest challenges that the change project faced. Indeed (Uusitalo, 2016) found this kind of deepened interaction between different hospital professional groups to be extremely important. For example, only doctors actively participated in the first redesign workshops. As the organizational development manager explained, the nurses were "just not used to being involved". Hence, the workshop facilitators had to encourage the nurses to express their opinions and ideas about the old and new organizational structures.

5.4.3 Lack of Economic Thinking

By installing process owners for the more than 180 treatment processes at TUCH, many of the mid-level doctors gained economic responsibilities about which they lacked knowledge. Traditionally, doctors in Europe have no formal training in business administration since the hospital management or the government make all economic decisions, but this separation of responsibilities had to change in order for the new process structure at TUCH to succeed. As the head of orthopedics and traumatology explained: "If the people who are treating the patients are not paying attention to money, it means that stupid decisions are being made". Basically, the project team sought to move the economic decision making power to where the actual patient treatment happened and medical decisions were made, but the team found it difficult to find the right people for the job. Doctors usually become leaders based on medical expertise, and, in many cases, TUCH's doctors did a great job in leading a process clinically but had no interest in managing the process from an economic perspective.

5.4.4 Absence of Reward Systems

The project team changed TUCH's budgeting and accounting systems so that care lines and shared service centers had responsibility for financial resources rather divisions and clinics. However, the team had not yet adapted the previous employee-reward systems (e.g., bonus payments). Previously, TUCH had positive results from using financial incentives to motivate employees to support change initiatives, but hospital management stopped these bonus payments in the course of the T-Project, which many interviewees complained about. Many medical doctors at TUCH also worked in the private sector and, hence, had become accustomed to performance-based reward systems. At the time we conducted our interviews, the project team had begun to discuss plans to allow different cost groups to transfer budgets; thus, for example, if a care line or process team saved money by reducing the number of patient days that a specific treatment required, a different care line or process team could spend the money to raise wages or hire more personnel. Experience from other hospitals shows that such team-based reward systems (as

opposed to individual reward systems) represent promising tools that foster individuals to adopt quality-improvement initiatives (Nembhard, Alexander, Hoff, & Ramanujam, 2009; Paulus, Davis, & Steele, 2008).

5.4.5 Underestimating the Role of Healthcare IT

Except for conducting a requirements analysis and implementing a few local IT systems (e.g., e-referral systems), the project plan initially contained no major changes to TUCH's IT landscape. But, during the project, it turned out that the existing IT systems—both the medical systems (e.g., for medical order entry or clinical documentation) and the administrative systems (e.g., for budgeting and financial reporting)—resisted the planned changes and had to change. As the CEO of the hospital district explained: "We must start building systems that help us to get the most benefits out of the new organization". The project management, however, underestimated the time and effort needed to plan and implement the required IT changes. Indeed, the initial project team did not even represent TUCH's IT department, which operated as an independent company that the overall healthcare district owned. In fact, for the first two and a half years, the IT department did not participate in any of the reorganization activities, a mistake that the project management has since resolved. But still, the project manager admitted that: "Up to now, we didn't think enough about the IT needs". As at 2018, the hospital had not worked on developing new IT systems for healthcare practically at all since 2015 due to Finland's national social and healthcare reform (Muuri, Krohn, & Wilskman, 2017). Before governance structures become clear, no one wants to invest in healthcare information systems. National state-led development has focused on the nationwide Kanta service (Kouri & Seppänen, 2017), which contains every Finnish citizen's core patient data. This tool might help chronically ill patients transfer between different healthcare units; however, the service does not (yet) provide detailed enough information to support patient transfers between different units in a university hospital-level institution.

Also, Vepsäläinen, Siimar, Nykänen, Hiltunen, and Suomi (2017) recently found that TUCH's basic databases lack coherency and, thus, do not allow different units in a hospital to exactly and flawlessly transfer (both clinical data and non-clinical management) data.

Further still, all five Finnish university hospitals (TUCH included) have introduced disease registers (Zwar et al., 2006) for different diseases in recent years, and they have consumed a big part of these hospitals' IT-investment budgets. While good in the clinical work on one disease, they offer little or no support if healthcare practitioners have to transfer patients between different specialties and units in a hospital setting.

5.4.6 Fragmented IT Landscape

Apart from the project-management issues that we discuss above, the general nature of healthcare IT systems also inhibited change. TUCH's IT landscape comprised more than 70 separate information systems. Virtually all of these systems operated according to the requirements of specific medical functions, so they lacked process awareness. This issue became even more apparent when one considers TUCH's medical and financial reporting systems. For example, employees had to apply workarounds in the existing systems to document and bill treatments that required a patient transfer between departments that the old divisional hospital structure separated but that the new one joined together in one treatment process. Similarly, the electronic healthcare record systems documented episodes of patient treatment, but they contained few functionalities that helped the hospital management to monitor home-to-home processes. Hence, physicians had to expend much effort to obtain a complete overview of the treatment and care processes patients had went through.

Further, the IT systems did not support process-orientation at the clinical-operational level. In addition, they had difficulties in delivering information at the management level. Due to these issues with the IT systems and the lack of consensus about indicators and measurements that healthcare practitioners could use across different medical areas, they found it difficult to produce overreaching information about process efficiency and effectiveness at the hospital level. In addition to lacking data itself, the hospital also lacked a management culture based on evidence that data provides (a mystery since the hospital had adapted the concept of evidence-based medicine well).

In addition to technical IT issues, regulations caused difficulties as well. Due to the strict (and ever increasing) data-security requirements that hospitals in Finland have and continue to face, healthcare practitioners cannot always share and forward available and high-quality patient data. Additionally, the

hospital operational management found managing patient permissions on how to share their data a nightmare.

The IT systems also caused difficulties when the hospital reported data to external parties (often authorities). Medical authorities often demanded reports that differed depending on medical area. Since this heavy and non-coordinated reporting left behind a lot of mismatched data, the hospital found it even more difficult to obtain a total overview of process capabilities.

In sum, the healthcare IT systems' fragmentation and poor process awareness represented major barriers to the hospital's successfully implementing process orientation.

5.5 Consequences

Measuring the efficiency or productivity of any healthcare unit always involves challenges, especially in special healthcare. Due to the complexity and dynamics of TUCH and its environment.

Since the process-oriented reorganization of TUCH has not yet completed (if it ever will), we cannot yet adequately assess the initiative's outcomes, but evidence suggests that the reorganization has had a positive effects, which Table 6 and Figure 5 document (Finnish Institute for Health and Welfare, 2017).

Table 6. Productivity Figures of TUCH[2]

	2012	2013	2014	2015	2016
Episode productivity*	0.97	0.91	1.02	0.97	0.97
Treatment period productivity*	0.94	0.92	1.03	1.02	0.99
Episode productivity index**	100	94	105	100	100
Treatment period productivity index**	100	98	110	108	105
TUCH rank in episode productivity among Finnish University hospitals (n = 5)	5	5	2	2	3
TUCH rank in treatment period productivity among Finnish University hospitals (n = 5)	5	5	1	1	1

* 1.00 is the Finnish national average.
** 100 is the TUCH baseline situation in 2012.

As the table illustrates, the relative productivity of TUCH, compared to the other Finnish university hospitals, has substantially improved. At the same time, note that TUCH's productivity figures have developed into two different directions (see Figure 5). While personnel productivity has grown by nine percent, total productivity went down by 3.6 percent from 2007 to 2014. The heavy investments that the hospital needed to make to carry out the reorganization project and the required learning and adjustment associated with such a large and complex change project likely explain this drop in total productivity. The total productivity increases that one can observe since 2013 might be the first positive effects that one can attribute to the process reorganization project, yet it is difficult to verify this claim. Cost data for 2013 and 2014 (based on press releases of the hospital) also indicate that the average costs per patient at TUCH has decreased by 3.2 percent even though the number of patients in the area of expensive care has increased by 17.5 percent.

[2] How the Finnish Institute for Health and Welfare counts these productivity figures is a complex issue, and describing the items in detail falls outside the paper's scope. The original source documents the exact calculation methods.

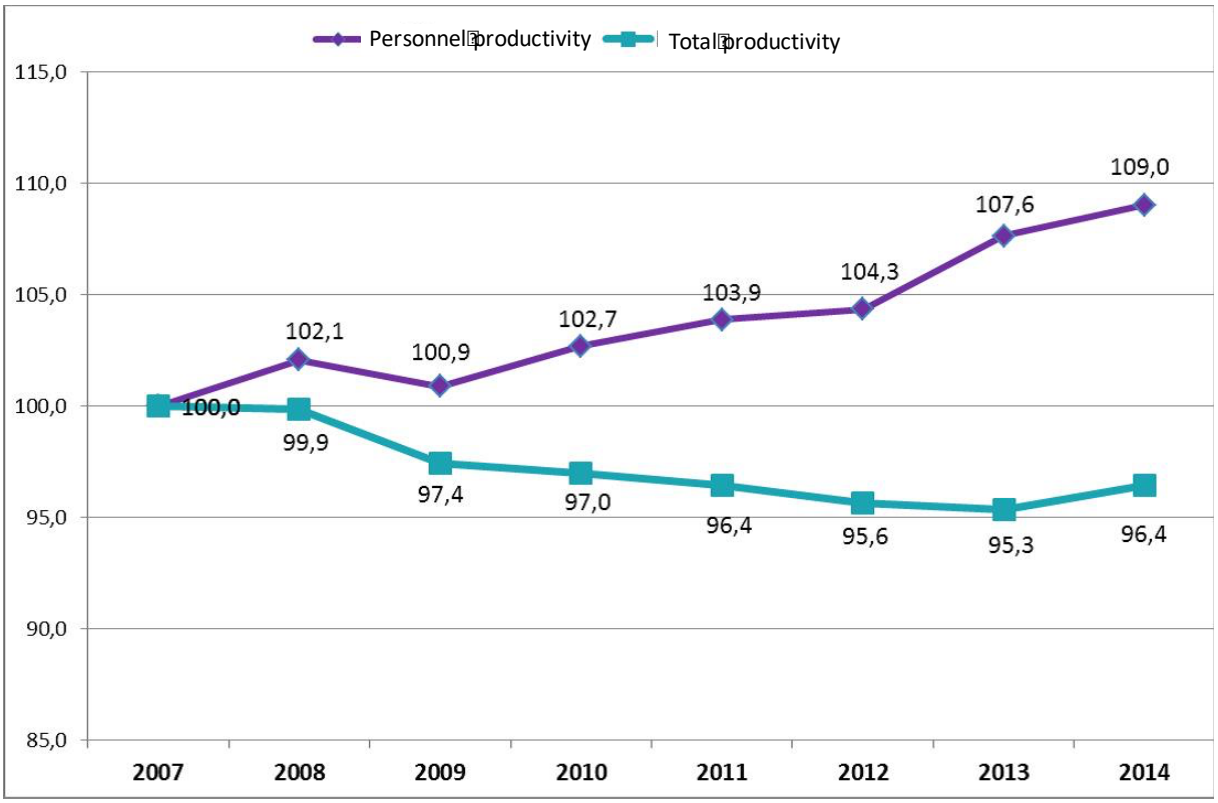

Figure 6. Productivity Developments in the Somatic Care in the Whole Healthcare District (Varsinais-Suomen Sairaanhoitopiirin Tarkastuslautakunta, 2016)

Overall, we observed no extraordinary productivity jumps at TUCH. However, the hospital still showed positive developments in many aspects, especially in personnel productivity, due to a decrease in staff members and increase in relatively productivity in relation to the country average (especially for treatment-period productivity).

6 Discussion

Other studies have acknowledged some of the factors that we identified. For example, virtually all related studies have named the desire to improve quality of care and overall hospital productivity as drivers for the process-oriented re-engineering of the hospital. In addition, many studies have reported on some of the enablers and barriers that we identified (e.g., enablers: the importance of clinical leadership, involvement of medical staff, and an iterative change process; barriers: the lack of top management support, resistance to change, and the lack of collaboration between communities of practice). Still, we think that our study provides additional rich insights into some of these issues. As our analysis shows, the participatory redesign approach that TUCH took constituted an important—perhaps the most important—factor in the project's success. Participatory design extends beyond clinical leadership and the involvement of medical staff (Muller & Kuhn, 1993); at TUCH, the people that actually performed both the old and new processes each day drove the process reorganization efforts even though such efforts began in a top-down fashion. This kind of participation enabled the project team to access employees' valuable local knowledge and to avoid the not-invented-here syndrome that frequently occurs when external parties (e.g., consultants) impose ideas on individuals or groups (Lichtenthaler & Ernst, 2006). As for enablers, in order to achieve the required participation level, TUCH had to raise initial interest in the reorganization and sustain it over the project's six-year duration. To do so, it found that heavily using empirical data and an iterative analysis and design approach—two ideas that fit the medical profession well—helpful.

In contrast, the extant literature has not discussed the other factors that we identified, such as the blackboxing of diagnosis and treatment activities as an enabler and inflexible healthcare IT as a barrier. The decision to exclude core diagnosis and treatment activities from the redesign helped the hospital to avoid resistance from medical doctors. Physicians tend to have especially negative attitudes toward

organizational change (Le Tourneau, 2004), especially organizational changes that focus on productivity improvements. The medical profession's nature, which involves high levels of autonomy, extensive expertise, and distinct professional values, partly explains this attitude (McNulty & Ferlie, 2002). By restricting the reorganization efforts to routine processes (e.g., administrative processes and patient logistics), TUCH avoided this anticipated resistance. The literature documents similar strategies for distinguishing between routine and non-routine activities in process improvement under labels such as "islands of routines" (Lillrank, 2003; Lillrank & Liukko, 2004) and "pockets of creativity" (Seidel, Müller-Wienbergen, & Rosemann, 2010).

Further, we found that IT served more as a barrier than enabler to the process-orientation implementation. The business process reorganization literature usually sees IT (e.g., enterprise systems and inter-organizational information systems) as a means to implementing business processes and realizing process improvements (Davenport & Short, 1990), but our case suggests this view contains only partial truth. The project team set up electronic referral systems to improve the patient flow between remitting practices and TUCH, but TUCH's fragmented IT systems inhibited the planned process changes. Further amplifying that effect, the project team underestimated IT's role in the organizational change project's beginning and excluded it from the project's scope—a decision it had to reverse as the project proceeded.

Finally, we could not confirm some factors that prior studies have mentioned. For example, some studies have stated that healthcare processes involve too much complexity and variability to analyze and improve using methods and tools from the industrial domain (Becker, Bergener, Müller, & Müller-Wienbergen, 2009; McNulty & Ferlie, 2002; Schäfermeyer, Rosenkranz, & Holten, 2012), but we found no such indications in our case. On the contrary, TUCH successfully applied traditional operations management methods, such as process mapping, process standardization, lean management, and production flow analysis. We think that the key to the successful applying such methods in healthcare settings lies in dividing home-to-home healthcare processes into subprocesses dominated by standard and routine activities (e.g., administration, patient logistics) and subprocesses characterized by non-routine activities (e.g., diagnosis and treatment) and applying the appropriate methods to each subprocess.

In summary, the theoretical framework we develop in this study enhances our understanding of process orientation in hospital settings. It provides a solid basis on which other researchers can build. Future studies could extend or refine the framework via using additional qualitative case studies and, in particular, via examining hospitals of different types and sizes or hospitals in different geographies to identify additional antecedents, interventions, enablers, barriers, and consequences. Taking a quantitative approach, researchers could use our framework as a foundation to develop and test hypotheses about the efficacy of different process management approaches. For example, one could test the expected positive relationships between, on one hand, iterative, evidence-based, and participatory redesign and, on the other, resistance to change.

Healthcare managers and chief physicians may find our study useful since it illustrates proven process improvement interventions and their enablers and barriers. Our results suggest, for instance, that IT plays a major role in such initiatives and that one should include it when planning a project from the beginning rather than tack it on as an afterthought. Likewise, our study indicates that coupling process improvement projects with other interventions, such as constructing or refurbishing hospital buildings, can reduce employee resistance.

7 Conclusion and Limitations

In this paper, we examine how hospitals can successfully implement organization-wide process orientation. Given the lack of prior research in this area, we conducted an inductive exploratory case study at a large European university hospital that changed its deep structure from a functional structure to one based on processes. We developed a theoretical framework of antecedents, interventions, enablers, barriers, and consequences that explain the trajectory of this successful hospital-reorganization project. As a result, we contribute substantive theory (Glaser & Strauss, 1965) on which other researchers can build and can extend in future studies. From a practitioner's point of view, this study documents field-tested interventions and their consequences, so it can help them to successfully undertake future hospital-reorganization initiatives.

As in all research, this study has several limitations. First, our findings stem from a single case study. Due to the small number of hospital-wide process-reorganization projects, costs prohibit multiple case studies on such projects. To counter this deficit and increase the study's external validity, we compared and

contrasted our findings with the extant literature. Nevertheless, we do not know to what extent one can generalize our findings to other units of analysis. Second, this study builds only on qualitative data. Since not all parts of TUCH had switched to the new process-oriented organizational structure, we could not conduct a rigorous before-and-after quantitative performance analysis. Therefore, in this paper, we focus on qualitatively analyzing the organizational change process. As such, future research needs to quantitatively analyze process-related performance indicators (e.g., wait times, length of stay) and outcome measures (e.g., cost reduction, quality of care, patient safety).

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JITTA

JOURNAL OF INFORMATION TECHNOLOGY THEORY AND APPLICATION

JITTA is a Publication of the Association for Information Systems
ISSN: 1532-3416