

# The Politics of Establishing ICT Governance for Large-Scale Healthcare Information Infrastructures

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## ABSTRACT

In Norway, the focus on interoperability and communication across healthcare practices has increased the need to connect ICT portfolios at different levels of healthcare, into large-scale information infrastructures (II). Governing healthcare practices is exceptionally complex, due to the diverging goals and policies of the heterogeneous actors involved. Establish well-functioning ICT governance organizations to handle these large infrastructures is therefore important. Using information infrastructure theory, and governance literature from the IS field, this paper contributes with empirical insight to the longitudinal and political process of establishing ICT governance in a healthcare context, reporting from one of Norway's largest health ICT projects, situated in the North Norway Regional Health Authority in 2012–2016. Our focus was on the following research questions: How does organizational politics shape the process of establishing an ICT governance organization in a heterogeneous healthcare environment, and what does it take to establish such ICT governance organization?

## KEYWORDS

Electronic Patient Records (EPR), Information Infrastructure (II), Information Systems (IS), Polycentric Governance, Regional ICT Governance

## INTRODUCTION

Standardization of technology and work processes, to reach seamless integrations and semantic interoperability in Norwegian healthcare, has gained increased focus over the last years. The growing need for inter-organizational collaboration (Croteau, Bergeron, 2009; Dahlberg & Helin, 2014) and communication has raised the need for regional information and communication technology (ICT) portfolio. The role of the EPR systems, moving from local information storage systems, to large-scale user-centered work tools, has been particularly important. Consequently, the ICT portfolios have expanded in size and complexity. Hence, well-functioning ICT governance organizations at different levels of healthcare practices has gained increased focus. ICT governance include how to design and implement effective organizations by creating flexible ICT and information system (IS) structures and processes (Patel, 2002). The overall goal is for governance organizations to ensure successful deliverance of healthcare services (Beratarbide & Kelsey, 2009). There are increasing evidence related to establishing a connection between well-organized governance of health care organizations, and improved organizational performance (Tabish, 2012). However, hospitals and

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health systems struggle with matters of governance, particularly related to care standardization, and quality improvement (Tabish, 2012).

When making an effort to regionalize and standardize ICT portfolios, ICT governance organizations are important for maintaining the regional focus and handling challenges along the way. Traditionally ICT governance organizations were run in a top-down manner (Weill & Ross, 2004), this has however rarely proven efficient or successful for heterogeneous healthcare practices (Constantinides & Barrett, 2014; McGinnis, 1999). Therefore, a pressing need for shifting to a more bottom-up governance structure, focusing on the dynamic interactions between technical and social elements in ICT design (Constantinides & Barrett, 2014) has raised. Given the increased ambitions of information sharing, healthcare is characterized as institutions with different goals and policies, different ICT portfolios in play, and, stakeholders with different interests. Hence, it is necessary to look at the complexity of ICT governance, and the challenges of governing ICT portfolios at regional levels of healthcare. Introducing inter-organizational governance is an attempt to overcome the lack of interoperability and standards in healthcare (Dahlberg & Helin, 2014).

The contribution of this paper is to provide empirical insight to the longitudinal and political process of establishing an ICT governance organization within a healthcare context. Based on this, we ask the following research questions: How does organizational politics shape the process of establishing an ICT governance organization in a heterogeneous healthcare environment, and what does it take to establish such ICT governance organization?

We have gathered our empirical data, by following the steps of a regional initiative in the North Norwegian Health Authority. In 2012, this health region completed a large tender, and decided to regionalize their new ICT portfolio. To carry out these changes they established a regional project (dubbed BigProject), to run from 2012-2016. BigProject was one of the largest ICT investments in Norwegian healthcare, and the main goal of the project was to establish a regional ICT portfolio as a foundation for regionally standardized patient pathways, decision support, and integrations between clinical ICT systems (Christensen & Ellingsen, 2013). A regionalization, including standardizing EPR workpractice, was necessary requirements for reaching such goals, and for enabling the Health Authorities to better administrate and compare the hospitals in the region. In addition, the BigProject worked in close collaboration with the largest EPR vendor in Norway, on developing a more structured and interoperable EPR system, in order to communicate across heterogeneous healthcare practices (Nasjonalt IKT, 2012).

The data was collected by using a qualitative interpretive method (Klein & Myers, 1999; Walsham, 1995), including open-ended interviews, document studies, and participation in meetings and workshops. Through this approach, we aimed to emphasize various viewpoints of the process in order to achieve a deeper understanding of the challenges detected.

Theoretically, we applied information infrastructure theory; see (G. C. Bowker & Star, 2000; Hanseth & Lyytinen, 2010; Hanseth & Monteiro, 1998; Hanseth, Monteiro, & Hatling, 1996; Star & Ruhleder, 1996) frequently used to characterize and analyze large-scale integrated information systems portfolios (Garrod, 1998; Meum, Monteiro, & Ellingsen, 2011), and the interconnection between users and technology in heterogeneous healthcare practices (Hanseth & Lyytinen, 2010; Hanseth & Monteiro, 1998). We also used ICT governance literature from the information systems field; see (Beratarbide & Kelsey, 2009; Brown, 1997; De Haes & Van Grembergen, 2005; Simonsson & Johnson, 2005).

The rest of the paper organized as follows. First, the theoretical framework is introduced. Next, we present and elaborate on the method. Further, the case, including the BigProject and the new EPR is describe. We then present a discussion, emphasizing on different governance perspectives, and

methods of structuring an ICT governance organization, aimed at managing large-scale information infrastructures. Last, we conclude the paper.

## THEORY

The goals of integrated care, evidence-based treatment and standardized patient pathways have led healthcare organizations to invest heavily in integrated ICT systems (Chantler, Clarke, & Granger, 2006; Chiasson, Reddy, Kaplan, & Davidson, 2007; LeRouge, Mantzana, & Vance Wilson, 2007). Accordingly, we are not dealing with just one system, but instead with a portfolio of interconnected systems across institutional, departmental, and professional boundaries. As a way of conceptualizing this idea, the notion of information infrastructure (II) is particularly useful (G. Bowker, Timmermans, & Star, 1996; Ellingsen, Monteiro, & Munkvold, 2007; Star & Ruhleder, 1996; Timmermans & Berg, 2003). From a technical viewpoint, assembling an II involves designing, implementing, integrating, and controlling increasingly heterogeneous ICT capabilities (Tabish, 2012). Socially, creating an II requires organizing, and connecting heterogeneous actors with diverging interests, in ways that allow II to grow and evolve. Furthermore, IIs are heterogeneous, and open to an unlimited number of participants, such as users, vendors, and technical components (Hanseth & Lyytinen, 2010; Hanseth & Monteiro, 1998), which is important for use in a healthcare setting. A particularly important concept is the installed base (Hanseth & Monteiro, 1998), which implies that an II never develops from scratch, but emerges and evolves from an existing installed base. When developing new EPR systems, considering the old portfolios and practices in Health Trusts is important. For the different parts of an II to communicate, standards are core elements (Hanseth & Lyytinen, 2010). Standards ensure high-quality care through best practices development (Timmermans & Berg, 2003), increased efficiency, as well as ensuring seamless patient trajectories over organizational borders (Pedersen, Meum, & Ellingsen, 2012).

A pressing question is how and to what degree an II in general and standards in particular can be managed at different levels of healthcare. In the II literature, several authors; see (Edwards, Bowker, Jackson, & Williams, 2009; Karasti, Baker, & Millerand, 2010; Pipek & Wulf, 2009), have used the notion of infrastructuring, in order to emphasize the proactive engagement with large ICT portfolios. These insights are relevant for understanding the mechanisms for change; however, there has been less focus on the more formal governance of organizational structures and configurations of II's. There is an increased need to establish ICT governance organizations that make decisions, as well as monitor results, and performances (Beratarbide & Kelsey, 2009), at different healthcare levels. Our focus in this paper is on interorganizational ICT governance at a regional level.

Most information systems had in-house ICT governance until the mid-1990s. Therefore, ICT governance has often been applied from an internal perspective (Boynton, Jacobs, & Zmud, 1992; Brown, 1997; Brown & Magill, 1994; Sambamurthy & Zmud, 1999). It is thus challenging to establish regional interorganizational ICT governance. ICT governance specifies the decision rights and accountability framework to encourage desirable behavior in ICT usage (Weill & Ross, 2005). We adhere to the following definition of ICT governance: "The preparation for, making, and implementation of decisions regarding goals, processes, people, and technology, on a tactical and strategic level of the IT organization" (Simonsson & Johnson, 2005). Stars and Ruhleder (1996) stated that the configuration mechanisms of governance are typically a mixture of various structures, processes, and relational aspects (Star & Ruhleder, 1996). Implementing ICT governance contributes to ensure successful delivery of healthcare according to Beratarbide & Kelsey (2009). The overall goal of an ICT governance organization is "to assure the stakeholders that things will go as expected, and ensure the successful delivery of healthcare services" (Beratarbide & Kelsey, 2009). Many ICT-related management frameworks, methodologies, and standards are used today; see (Beratarbide & Kelsey, 2009; Van Grembergen, De Haes, & Guldentops, 2004). None forms a complete ICT governance framework, but all have a role in assisting organizations towards more effectively managing

and governing their information and related technologies (Beratarbide & Kelsey, 2009), as well as identifying ICT governance weaknesses.

Previously, a top-down approach with a clear ICT governance structure defining necessary decisions, and who should make them, was frequently used (Weill & Ross, 2004). Management studies promoted this design based on pre-defined models of work practices see, for instance, (Ashkenas, Ulrich, Jick, & Steve, 2002; Davenport, 1993). However, such strong controlling ICT governance for defining and making decisions (Weill & Ross, 2004), has been ineffective, and even impossible to apply to II in healthcare (Constantinides & Barrett, 2014). Several actors on the clinical and technical sides of healthcare need to be included in such governance. Due to the constant growth in complexity and deviation from original intentions, an II is impossible to govern completely in a top-down fashion (Croteau & Bergeron, 2009; Hanseth & Lyytinen, 2010).

In interorganizational contexts (such as in our case), Van Grembergen et al. (2004) suggest that ICT governance should include cooperation mechanisms to improve coordination of stakeholders with different ICT backgrounds (management and governance histories), and competence (ICT assets and resources) (Dahlberg & Helin, 2014). This because interorganizational relationships mature dynamically, and collaboratively, over various states (Croteau & Bergeron, 2009). The purpose of such governance is to ensure that organizations like Health Trusts have structures, processes, and mechanisms for collaboration, resolving disagreements, and organizing work on the interorganizational and organizational levels (Dahlberg & Helin, 2014). Improved quality and more interoperable health information is necessary, but very challenging to match with ICT governance principles and benefits in large scale interorganizational IIs.

However, despite establishing cooperation mechanisms, the size and scope of an II may be a serious challenge to ICT governance. Heterogeneous stakeholders have different goals and strategies for reaching them, resulting in frequent tension. This is particularly evident in a healthcare context. As a result, regionalization processes may be extremely challenging to accomplish. An obvious challenge is the tension between standardization and flexibility, recognized by Hanseth et al. (1996). However, flexibility is necessary at the local level of a healthcare II, which enable users to work efficiently. In contrast, the regional perspective emphasizes a need for standardization, and the ability to compare different units as a part of running a more efficient and cost-effective healthcare services. In this regard, Constantinides and Barrett (2014) suggest a polycentric governance approach in which different stakeholders are engaged in dynamic and adaptive governance processes (Constantinides & Barrett, 2014).

Polycentric governance includes organizing a number of governing units at diverging levels, instead of one monocentric governance unit (McGinnis, 1999). In such governance model, there is a distribution of decision-making across organizational layers, and among a broad range of stakeholders, where each layer deals with associated subjects at a gradually larger scale and less-detailed level (McGinnis, 1999). This way, different actors in an II (such as a Health Trust) participate in ICT governance by controlling parts of an ICT portfolio. Consequently, this may lead to a smoother regionalization process in which the actors do not need to give up all local control. One key advantage of polycentric governance is the possibility of creating general formed rules that can later be adapted to specific local needs (McGinnis, 1999).

However, this model does not represent a “fast track to salvation;” it requires that actors spend extensive time and energy on negotiating and compromising on acceptable collaborative solutions (Latour, 2005). Even in cases where a common forum is established, it may be impossible to agree on governance structures acceptable to all parties, because of the heterogeneity of interests and resources involved in healthcare IIs (West, 2007). In order to grasp the challenges of governing information infrastructures, it is crucial to understand the various interests and associated mechanisms and how they play out over time (West, 2007).

## METHOD

This study is positioned within a qualitative interpretive paradigm (Klein & Myers, 1999). It contributes to a longitudinal qualitative study connected to a large-scale EPR project in the Northern Norway Regional Health Authority. Analysis of longitudinal research is a continuous and iterative process, with an ever-changing intensity, focusing on developing and increasing the understanding of a phenomenon, by exploring diverse viewpoints within a specific context (Klein & Myers, 1999; Walsham, 1995).

This North Norwegian Health region consists of five Health Trusts including 11 hospitals. The regional EPR project (BigProject) has 25 employees and 5 sub-projects, of which two focuses on ERP. We interviewed participants from Health Trusts, local and regional management organizations, Regional Health Authorities, and BigProject to establish different viewpoints of the regional processes. Since regional standards had not yet been implemented in the Health Trusts, interviewing physicians and other end-users was not required at this point. Their perspectives will be more important to enlighten after completing the implementations of standards in 2015–2016.

The fieldwork builds on the first author's role, working in the standardization of practice project for two years, in addition to participating in workshops, discussions, and meetings in this project, and also the development of the new EPR. The data collection includes 11 open-ended interviews conducted in 2014–2015. Except from one, all the actors asked agreed to be interviewed. The interviews lasted 60–120 minutes each. The interview guide was semi-structured with questions related to the standardization of practice projects. This included pros and cons of standardization, why regionalization is important, and what regional challenges remain after the projects are finished. There were also questions concerning challenges with establishing and organizing a regional ICT governance organization.

Refer to Table 1. The first author transcribed the interviews, and analyzed, and categorized the text into main issues in collaboration with the other authors. We used the hermeneutic circle, moving from understanding parts of the process to understanding the whole process (Klein & Myers, 1999). The challenges of organizing a regional governance organization, and how to deal with tension between different actors, were some main issues. Then we discussed and reflected on these subjects in relation to the context, the theory, and the research questions. In addition, we supplemented the data analysis with project documents and reports to acquire the best possible outline of the processes.

## CASE

### The Regional Strategy

After a prolonged bid for tender process in 2011, the North Norwegian Health Authority decided to invest in new clinical ICT systems for all their 11 hospitals, and at the same time regionalize the ICT portfolio. As a result, the Health Region established BigProject for the 2012–2016 period. With a cost likely to exceed €100 million (Christensen & Ellingsen, 2013), this project constitutes one of

Table 1. Overview of interviewed participants

Informant	Time	Background
<i>Four informants from BigProject</i>	60–90 min	Laboratory, nursing, health secretary, technical
<i>Three informants from regional ICT management</i>	60–120 min	Technical, nursing.
<i>Two local project leaders from Health Trusts</i>	60 min	Nursing, occupational therapy
<i>Leader from the local governance organization, UNN</i>	60 min	Nursing
<i>Leader from a Regional Health Authority</i>	90 min	Economy

the largest and most ambitious ICT projects in Norwegian healthcare. The goals of the project were to establish

- Standardized clinical pathways
- “Best practice” standards for EPR workpractice and procedures across the Health Region
- Clinical decision support
- Regional integrations and interoperability between clinical systems

A crucial part of the project was contributing to developing a new EPR system (NewArena), using a completely new architecture with a user-centered configuration, and structured clinical content. As the hospitals in the Health Region already had an up-and-running EPR system (ClassicEPR), a crucial part of this project was to establish a strategy for a smooth transition between ClassicEPR and NewArena. In the next sections, we elaborate in more detail on these efforts.

In this process, BigProject had the primary responsibility for handling the major activities. However, the existing regional ICT management organization was also ascribed a crucial role. Their 250 employees were responsible for delivering ICT services, as well as running and maintaining the technical parts of the ICT portfolio in the Health Region. The regional ICT management collaborated closely with various sized local ICT organizations in the different Health Trusts. In addition, both BigProject and the regional ICT management collaborated with a regional clinical ICT advisory board, established for handling the clinical content of the ICT portfolio at a regional level. The advisory board had representatives from all the five Health Trusts in the region, and met about once a month to provide strategic recommendations for the Regional Health Authorities. The advisory board acted as decision-makers for regional ICT issues, and thus represented a temporary de facto regional ICT governance organization. Even so, it was a common understanding in the Health Region to replace the advisory board with a permanent regional governance organization, which worked on a daily basis, when this organization was established.

### **Developing New EPR**

In 2012, BigVendor started developing NewEPR based on openEHR architecture. OpenEHR built on standardized information models, open source components, and highly structured clinical content, including archetypes as core components (Beale & Heard, 2008). Archetypes are structured data elements of clinical concepts, envisioned to ensure technology-independent interoperability, easy reuse of information, and efficient decision support (Chen, Georgii-Hemming, & Ahlfeldt, 2009). Experienced clinicians are responsible for defining the archetypes, this way the clinical personnel control what content to structure, as well as how and when to do it. It is possible to build the entire internal structure of schemes, processes and decision support in the EPR, by organizing all data in archetypes, and combining them to form templates. There is a call for close regional collaboration, to maintain and build the clinical content, including patient pathways and archetypes for NewArena. The goal is to have a new EPR system working across institutional borders capable to follow the patients' entire trajectories (Pedersen et al., 2012).

To support this organizationally, the University Hospital North Norway (UNN) established a regional archetype governance organization in 2013 with 10 employees. This unit will support clinical users in creating and maintaining the archetypes at various levels (locally, regionally or nationally). The regional archetype governance will be organized at an overall regional level in the new governance organization, independent of clinical applications like EPR, radiology and laboratory.

The Health Authority needed to decide on a strategy to combine ClassicEPR with NewArena, since NewArena is developed and implemented in modules over at least five years while ClassicEPR is still operative. This made it necessary to be able to manage two different EPR systems simultaneously, as well as ensure that users could switch seamlessly between the systems. Therefore, the regional ICT management implemented a technical solution, to ensure that the old and new systems can

interact seamlessly. “A context sync is installed, to make the switch between NewArena and Classic EPR seamless for system users. However, switching between two systems increases the risk of user errors, and technical complications” (representative from regional ICT management). This change is technically demanding, as well as challenging, for users, as attention to what platform they are working on is required to accomplish their work (Christensen & Ellingsen, 2014). After implementing more modules of NewArena, some functionalities will be in ClassicEPR and others in NewArena. In addition, both technology and use are very different between ClassicEPR and NewArena. An example described by Christensen and Ellingsen (2014) from the first pilot of NewArena illustrates this: The new system had structured data based on archetypes, but Classic EPR did not support structured text. Physicians created archetype-based documents in NewArena to plan operations. Then they sent these documents to ClassicEPR, and secretaries included the documents in the surgery-planning module. Structured data registered in NewArena then became free-text documents, and the benefits of using archetypes disappeared completely (Christensen & Ellingsen, 2014). This indicated the risk of users not receiving any actual benefits of NewArena, until there are several modules implemented.

NewArena also calls for a close engagement related to user’s practice, and more request for ICT support and governance closer to the end-users. This relates to the goal of designing clinical decision support and patient pathways, and the need to keep them constantly updated. However, this is an impossible task for the existing ICT management organization to provide, due to its regional role, and thus its distance from users. “The distance between the clinics and the regional governance organization is too far. It is cumbersome to get hold of the right person to solve a problem” (local project leader). To make this work, there is a need for a regional governance organization. In the first pilot of NewArena, the testing related to the surgery outpatient clinic confirmed that users would require close follow-up related to make the new functionalities useful for them.

### **The Standardization of Practice Project**

To prepare organizationally for the new system, and attain the Regional Health Authority’s goals of higher quality, efficiency and interoperability, regional standards and routines for EPR usage had to be established. Standards are important for a large II such as a Health Region to work optimally. Big Project’s standardization of practice project was therefore initiated in 2012. The goal was to “increase quality and safety in patient treatment, through standardizing clinical practice related to EPR usage across the region” (Nilsen, 2013). More than 500 system users from all 11 hospitals in the region participated in mapping EPR usage and establishing regional standards in 2012–2013. The project identified existing work practices (the installed base) at all hospitals, and used a best practice principles to standardize work routines and procedures. In addition to system users, the EPR vendor, and both regional and local ICT management organizations participated in this process. The implementation of the regional standards will be completed in 2015–2016, including areas such as organizational configurations, journal structure, access control, laboratory work, and workflow (Nilsen, 2014). A consequence of the regional standards are extensive changes to the different hospitals’ work practices. For example, after implementing the standards, a new form of access control will be required to use the EPR system. Today, there are great variations related to what users at the different hospitals can access automatically. For some, this new admission control will provide them with automatic access to less of the EPR than they have today. Another change is that all hospitals must register equivalent activities at the same organizational level, making information easier to compare at the regional level. Consequently, the organizational structuring of the hospitals has to be altered.

“Establishing the regional standards is a success, leading to better collaboration within the Health Region than ever before” (project leader, BigProject). However, for some standards it has been difficult to agree. One example relates to registration. The regional standard states: “Registration is connected to the patient’s illness (Nilsen, 2014).” This means connecting all practice to a specialized field, such as ear, nose, and throat, or neurology. A project leader in BigProject states: “At a small hospital, activity registration can no longer be connected to the clinician doing the job, but rather the

illness of the patient.” Following the regional standard, all activities are registered at a regional level, since all hospitals in one Trust share the departments and sections connected to different specialized fields. This way, the Health Authorities improved their overview of activities related to each field. However, the hospitals themselves no longer have the same local overview. Local hospitals do not see the benefits of changing their registration practice leaving them with less local control of their data. There have been several attempts trying to reach an agreement on this matter, without any luck so far. Similar challenges are likely to appear after implementing the standards, and the users’ experience how their workdays are affected. Project leaders in the BigProject underline the need for a regional governance organization, to form a strategy for handling such issues, as well as others related to aberrations, modifying existing, or forming new standards. Without a governance organization, they fear that the regional structures will fall apart after BigProject is completed. “Regional decisions have already been effectuated, and there is a risk of them dissolving without the necessary regional governance in place” (project leader, BigProject).

Consequently, there is an increased need for a well-structured regional interorganizational ICT governance organization to follow up on the results of the standardization of practice project, and prepare for NewArena. Working out an overall goal for regional ICT management, including what to do and how to get there, is necessary. “It may take several years and the process may need to be done in steps, but to move forward, we need to have a strategy stating what the region wants this organization to encompass” (project leader, BigProject).

### **Establishing a New Regional Governance Organization**

When the Health Region in 2011 decided to regionalize the ICT portfolio and established BigProject, they also started working on forming a regional ICT governance organization. However, it was difficult to negotiate the nature, form, and location of such organization, preferably having the authority to enforce standards on the various Health Trusts, as well as strategically manage a large ICT portfolio.

The experiences and lessons learned with the regional ICT management, was that this organization could not sufficiently support clinical practice, thus be responsible for regional ICT governance. There is a clear difference between ICT governance and ICT management. ICT management focuses mainly on supplying ICT services in addition to products, as well as managing ICT operations (De Haes & Van Grembergen, 2005). ICT governance is much broader, concentrating on performing along with transforming ICT to meet present besides future demands of the business and the customers.

Today, all Health Trusts, especially the largest one, have well-functioning local ICT management organizations, due to the need for user support and governance close to the workers. The local ICT management at the University Hospital also emerged as a de facto organization for clinical ICT management, preparing for the future clinical governance of NewArena, as well as being a key player preparing UNN for developing as well as piloting the new EPR system. “My guess is regional functional governance is placed in the biggest Health Trust, they already have an established organization for governing both NewArena and ClassicEPR” (leader, BigProject). Giving up local control and ICT management for a newly established regional ICT governance organization, did not seem like a tempting offer. However, even if the users agreed on the need for local clinical governance (i.e., the local ICT organization), the actual content of this organization was far from clear. At one point, this resulted in a territorial dispute between the local ICT governance at UNN, and regional ICT management. The regional ICT organization locked out the local ICT management from the administration tool in ClassicEPR (user management, access, role definitions etc.), with the argument that this was a technical issue. The local ICT management, however, claimed this tool was part of the clinical ICT governance, and demanded continued access. They also supported their claim by implicitly referring to the regional ICT management’s managing role: “It is the Health Trust that own the system and decides who gets access to what” (leader, local ICT governance). This indicated a strong need for a regional ICT governance organization to handle similar issues in the future.



After discussing several suggestions without reaching an agreement, UNN was in 2013 pointed out to complete a proposal for organizing regional ICT governance. In their proposal from 2014, they suggested a fragmented governance model in which each Health Trust were responsible for governing separate areas of the ICT portfolio on behalf of the others, meaning that one Health Trust would govern the EPR; one the laboratories, another radiology and so on. This model was established, based on the regional discussions: “Many discussions relates to establishing one small governance unit in each Health Trust, or one regional governance unit” (leader, local ICT governance organization). The solution presented by UNN distributed governance competence and local control across the Health Trusts. The Health Authorities piloted this solution for radiology in 2014–2015. After an evaluation, they will decide whether to apply this model to the rest of the regional ICT portfolio. This model is in many ways comparable to a polycentric governance model. Governance is spread out in the organization instead of assembled in one unit (McGinnis, 1999).

The informants were skeptic of applying such fragmented model to EPR governance, since the EPR is very complex, and has many integrations and interconnections with the rest of the ICT portfolio. It is necessary to include a large group of technical and clinical personnel to handle EPR governance, and a group working specifically with archetypes and NewArena. How to organize this and how to separate EPR related clinical content, is complicated to work out. “The systems are so closely interconnected, especially the EPR and the laboratory, that even if the Health Trust agrees to split their governance this seems impossible without compromising the interoperability” (project leader, BigProject). Even with all the skepticism, this model made it possible to define who was responsible for different clinical governance areas. “It seems like the best solution the region is able to agree on for the time being” (representative, Regional Health Authority). A fragmented governance model was at least a starting point for regional collaboration on governing an interorganizational ICT portfolio. In addition, establishing and updating regional patient pathways across Health Trusts, primary care and other institutional boundaries have to be extensive parts of the regional ICT governance.

## DISCUSSION

De Haes and Van Grembergen (2005) states that ICT governance contains a mixture of various structures, processes, and relational mechanisms (De Haes & Van Grembergen, 2005). We agree, but we emphasize that governing an evolving II should be less concerned with creating uniform organizational structures for generating order, and focus more on a process for handling diverging political interests, managing tensions, as well as complex interdependences. This case has illustrated that establishing a uniform interorganizational governance regime is a formidable, if not impossible, task. Taking into account previous research on complex II (Bowker et al., 1996; Hanseth & Lyytinen, 2010; Hanseth & Monteiro, 1998; Star & Ruhleder, 1996), the current outcome is far from surprising. Modern IIs have become increasingly more interconnected and interdependent. At the same time, ICT systems, and in particular EPRs have been increasingly included in local practice. Thus, the infrastructure must serve regional as well as local interests simultaneously. In this case study, this is expressed by tailoring NewArena to the clinical practice through the new openEHR architecture. At the same time, the Regional Health Authority aims at standardizing practices across the Health Trusts in the region.

The two perspectives of the regional portfolio call for different sorts of governance: NewArena requires a governance regime grounded in local practice with high competence on how the new technology affects the clinician’s daily work. Thus, consider how the first pilot of NewArena at the surgery outpatient clinic identified that users would need close follow-up engaging with the new functionalities. In contrast, Big Project’s standardization of practice calls for a more authoritative governance regime. The regional standards and routines must be implemented in clinical practice; in addition, someone have to make sure that the users adhere to the standards for the standards to continue to evolve alongside clinical practice. At this point, the regional ICT advisory board and

the regional ICT management organization are not equipped to handle such a governance task on a permanent basis, since they are management, not governance, organizations. There is a need for a more powerful interorganizational governance organization operating at an overall level on a daily basis, to support successful delivery of healthcare.

In addition, governing an II also implies taking into account and building on the existing ICT portfolio, the installed base (Hanseth & Monteiro, 1998; Nasjonal-IKT, 2012). The BigProject leaders have considered the existing system with their current strategy to plan for years of interplay between ClassicEPR and NewArena. This enables seamless integration of NewArena, by replacing ClassicEPR in a stepwise manner avoiding a “Big Bang” implementation. Operating the two EPR solutions simultaneously however, has created challenges, such as the example from Christensen and Ellingsen (2014) in which a process moved from NewArena back to Classic EPR resulting in an outcome that is the same as today; thus, no improvements in NewArena are detected for users. The benefits for users may not be noticeable until replacing most, or all parts of the old system.

From a governance perspective, a key point is that the interplay between the old and new portfolios require thorough technical insight. Simultaneously, such a technical perspective relates closely to clinical practice, since technical and clinical decisions affect each other. Consequently, governing an II implies understanding and including different interrelated areas, where each part requires a unique governance regime. The three governance perspectives introduced in this paper, the local, the regional, and the technical, are interconnected. Changing one area of the infrastructure may result in unpredicted changes to other areas (Vikkelsø, 2005). These interactions may cause tensions in addition to conflicts of interest. For example, pushing too heavily on a regional perspective and standardization, may have unforeseen effects on local flexibility. An example is how physicians at small hospitals lost local overview and authority of their patient data, when the standardization of practice project implemented regional standards. Consequently, things that are very useful from a regional perspective, becomes a liability for local practice. Accordingly, based on the preliminary results, there are indications that regional ambition has been pushed a step too far, as the different Health Trusts could not agree on how to organize a governance organization able to serve all the various needs. Given New Arena’s heavy influence on future work practice (decision support, patient pathways, structured EPR content, etc.), it is not surprising that the Health Trusts sought highly competent local ICT governance close to clinical practice, instead of relating to a newly established regional ICT governance organization.

A strategy for solving the local and regional challenges has been to divide the governance into smaller domains such as EPR, radiology, laboratory, etc., where each domain is anchored in one of the Health Trusts instead of at the regional level. This solution is similar to a polycentric governance model, with multiple governing units, several overlapping arenas of authority and responsibility (Constantinides & Barrett, 2014). To some degree, this may solve the local/regional tension within the specific area in question. A key challenge with the fragmented governance structure suggested is defining the boundaries, then the areas of responsibility between the different units. Thus, several independent organizational units end up controlling areas of the same system, and the ICT management organization that delivers technical solutions have to collaborate with several Health Trusts. In addition, some parts of the ICT portfolio, such as EPRs and laboratories, are so closely connected that separating them may seem impractical if not impossible. Another challenge may relate to two governance organizations disagreeing on a topic. Who decides the outcome? These borders are not clear-cut (as we have pointed out), and require cumbersome negotiation between areas of responsibility, thus making governance a complex task to handle. Such fragmented governance models have been impossible to agree on in the past, according to McGinnis (1999). Even in cases where a common forum was established, it has been impossible to agree on governance structures acceptable to all parties, since heterogeneous interests and resources are involved in a large scale II.

One of the goals of NewArena is to operate across institutional borders, to follow a patient’s entire trajectory gathering all necessary patient information in one place. The fragmented governance solution suggested, made embracing NewArena extra complex. Governance of NewArena demands

a regional focus on clinical content independent of system vendors, leading to an increased need for regional ICT governance. There is a call for close regional collaboration to maintain and model the clinical content, including archetypes and templates. It is necessary to take into account the goals of the new system, when the interorganizational ICT governance organization is established. This indicates that trying out the suggested polycentric governance model will potentially create room for endless negotiations plus a constant need for compromises. If choosing this model, a key success factor is to define clearly, who makes the final decisions when the different governance organizations disagree. If not, it will be damaging for the whole II, and it will be challenging to assure the stakeholders that things will go as expected. In addition, it is necessary to make an overall strategy securing the appropriate handling of all necessary areas of interorganizational governance.

## CONCLUSION

Given the increased ambitions of information sharing, standardization, and interoperability, to ensure successful delivery of healthcare, it is crucially important to establish a well-functioning II. A key factor for success is establishing an ICT governance organization. We have discussed several challenges of how and to what degree an II in general and ICT portfolios in particular, can be managed, by focusing on organizational structures as well as processes on how to formally govern II's. We emphasized the longitudinal and political process of establishing an interorganizational ICT governance in a heterogeneous healthcare context.

The goal is for the EPR systems to evolve from today's information storage systems to interoperable user-centered work tools. Standardization of technology and work processes, as well as interorganizational governance collaboration is necessary to reach such goals. The regional ICT governance organization must operate on a daily basis; make decisions, as well as monitoring results and performance on different healthcare levels. In addition, standards must evolve alongside the EPR to be useful.

For such ICT governance organization to succeed the Health Authorities and the Health Trusts have to define an overall strategy for what they want to include in this organization. Interorganizational ICT governance has to include different aspects of governing the regional ICT portfolio, including local, regional, and technical aspects, plus the ongoing tensions among them. Regionalizing an ICT portfolio is challenging, even if representatives from Health Trusts, ICT management organizations and vendors participate in the process, the standards established might not always fit local needs. Therefore, a strategy for handling regional disagreements, besides evaluating requirements for revising and adding standards, is also important to work out. In addition, it is necessary to define the structure of such ICT governance organization.

The fragmented governance model suggested for the North Norwegian Health Region is similar to a polycentric governance structure, which offers opportunities for organizing several governing units at diverging scales instead of one monocentric governance unit. This is an attempt to get a step closer to regional collaboration, and seems to be as far as the Health Trusts are ready to go at this point. Using this model, they keep some local control of their ICT portfolio. A fragmented governance solution demands close collaboration, and clearly defined borders between the different actors. This implies that a polycentric ICT governance structure may be an acceptable but challenging solution for a loosely connected II as a Health Region.

## REFERENCES

- Ashkenas, R., Ulrich, D., Jick, T., & Steve, K. (2002). *The boundary less organization. Breaking the chains of organizational structure*. San Francisco: Jossey-Bass. Wiley.
- Beale, T., & Heard, S. (2008). OpenEHR Architecture: Architecture Overview. London.
- Beratarbide, E., & Kelsey, T. (2009). eHealth Governance, a Key Factor for Better HealthcareE: Implementation of IT Governance to ensure better care through better eHealth. In *Ethical Issues and security monitoring trends in global healthcare: Technological advancements*.
- Bowker, G., Timmermans, S., & Star, S. L. (1996). *Infrastructure and organizational transformation: Classifying nurses' work*. London: Chapman and Hall.
- Bowker, G. C., & Star, S. L. (2000). *Sorting things out: Classification and its consequences*. Cambridge: The MIT press.
- Boynton, A. C., Jacobs, G. C., & Zmud, R. W. (1992). Whose Responsibility Is IT Management? *Sloan Management Review*, 33(4), 32–38. PMID:10120625
- Brown, C. V. (1997). Examining the Emergence of Hybrid IS Governance Solutions: Evidence from a Single Case Site. *Information Systems Research*, 8(1), 69–94. doi:10.1287/isre.8.1.69
- Brown, C. V., & Magill, S. L. (1994). Alignment of the IS Functions with the Enterprise: Toward a Model of Antecedents. *Management Information Systems Quarterly*, 18(4), 371–403. doi:10.2307/249521
- Chantler, J. C., Clarke, T., & Granger, R. (2006). Information technology in the English National Health Service. *Journal of the American Medical Association*, 296(18), 2255–2258. doi:10.1001/jama.296.18.2255 PMID:17090773
- Chen, R., Georgii-Hemming, P., & Åhlfeldt, H. (2009). Representing a Chemotherapy Guideline Using openEHR and Rules. *Studies in Health Technology and Informatics*, 150, 653–657. doi:10.3233/978-1-60750-044-5-653 PMID:19745392
- Chiasson, M., Reddy, M., Kaplan, B., & Davidson, E. (2007). Expanding multi-disciplinary approaches to healthcare information technologies: What does information systems offer medical informatics. *International Journal of Medical Informatics*, 76, 89–97. doi:10.1016/j.ijmedinf.2006.05.010 PMID:16769245
- Christensen, B., & Ellingsen, G. (2013). Standardizing Clinical Pathways for Surgery Patients through ICT. *Paper presented at the European Workshop on Practical Aspects of Health Informatics (PAHI '13)*, Edinburgh, UK.
- Christensen, B., & Ellingsen, G. (2014). Advances in Intelligent Systems and Computing: Towards a Structured Electronic Patient Record for supporting Clinical Decision Making. In Á. Rocha, A. M. Correia, F. B. Tan, & K. A. Stroetmann (Eds.), *New perspectives in Information Systems and Technologies* (Vol. 2, pp. 297–306). Switzerland: Springer International publishing. doi:10.1007/978-3-319-05948-8\_29
- Constantinides, P., & Barrett, M. (2014). Information Infrastructure Development and Governance as Collective Action. *Information Systems Research*.
- Croteau, A.-M., & Bergeron, F. (2009). *Interorganizational governance of information technology Paper presented at the Proceedings of the 42nd Hawaii International Conference on System Sciences*, Hawaii
- Dahlberg, T., & Helin, A. (2014). Formation of Voluntary Inter-Organizational IT Governance for Healthcare and Social Welfare IT – Theoretical Background and Empirical Evaluation. *Paper presented at the Proceedings of the 8th International Conference on the Theory and Practice of Electronic Governance*, At Guimaraes, Portugal. Retrieved from <http://www.researchgate.net/publication/274251924>
- Davenport, T. (1993). *Process innovation Reengineering work through information technology*. Boston: Harvard Business School Press.
- De Haes, S., & Van Grembergen, W. (2005). IT Governance Structures, Processes and Relational Mechanisms: Achieving IT/Business Alignment in a Major Belgian Financial Group. *Paper presented at the Proceedings of the 38th Hawaii International Conference on System Sciences*, Hawaii. doi:10.1109/HICSS.2005.362

- Edwards, P. N., Bowker, G., Jackson, S. J., & Williams, R. (2009). Introduction: An agenda for infrastructure studies. *Journal of the Association for Information Systems*, 10(5), 364–374.
- Ellingsen, G., Monteiro, E., & Munkvold, G. (2007). Standardization of work: Co-constructive practice. *The Information Society*, 23(5), 309–326. doi:10.1080/01972240701572723
- Garrod, S. (1998). How groups co-ordinate their concepts and terminology; implications for medical informatics. *Methods of Information in Medicine*, 37(4-5), 471–476. PMID:9865045
- Hanseth, O., & Lyytinen, K. (2010). Design theory for dynamic complexity in information infrastructures: The case of building Internet. *Journal of Information Technology*, 25(1), 1–19. doi:10.1057/jit.2009.19
- Hanseth, O., & Monteiro, E. (1998). *Understanding information infrastructure*. Retrieved from <http://heim.ifi.uio.no/~oleha/Publications/bok.html>
- Hanseth, O., Monteiro, E., & Hatling, M. (1996). Developing Information Infrastructure: The tension between standardization and flexibility. *Science, Technology & Human Values*, 21(4), 407–426. doi:10.1177/016224399602100402
- Karasti, H., Baker, K., & Millerand, F. (2010). Infrastructure time: Long-term matters in collaborative development. *Computer Supported Cooperative Work*, 19(3-4), 377–415. doi:10.1007/s10606-010-9113-z
- Klein, H. K., & Myers, M. D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *Management Information Systems Quarterly*, 23(1), 67–94. doi:10.2307/249410
- Latour, B. (2005). *Reassembling the Social: An introduction to actor network theory*. New York: Oxford University Press.
- LeRouge, C., Mantzana, V., & Vance Wilson, E. (2007). Healthcare information systems research, revelations and visions. *European Journal of Information Systems*, 16(6), 669–671. doi:10.1057/palgrave.ejis.3000712
- McGinnis, M. (1999). *Polycentric Governance and Development: Readings from the Workshop in Political Theory and Policy Analysis*. Ann Arbor, MI: University of Michigan Press. doi:10.3998/mpub.16052
- Meum, T., Monteiro, E., & Ellingsen, G. (2011). The Pendulum of Standardization. *Paper presented at the ECSCW 2011 Proceedings of the 12th European Conference on Computer Supported Cooperative Work*.
- Nasjonal-IKT. (2012). Tiltak 48: Klinisk dokumentasjon for oversikt og læring. [Action 48: Clinical documentation for overview and learning]. Retrieved from [http://www.nasjonalikt.no/no/dokumenter/andre\\_publicasjoner](http://www.nasjonalikt.no/no/dokumenter/andre_publicasjoner)
- Nilsen, A. (2013). *Prosjektplan HOS Implementeringsprosjekt*. Retrieved from Nilsen, A. (2014). *Standardiseringshåndbok for bruk av DIPS i Helse Nord*.
- Patel, N. V. (2002). Emergent Forms of IT Governance to Support Global E-Business Models. *Journal of Information Technology Theory and Application*, 4(2), 33–48.
- Pedersen, R., Meum, T., & Ellingsen, G. (2012). Nursing Terminologies as Evolving Large-Scale Information Infrastructures. *Scandinavian Journal of Information Systems*, 24(1), 55–82.
- Pipek, V., & Wulf, V. (2009). Infrastructuring: Toward an Integrated Perspective on the Design and Use of Information Technology. *Journal of the Association for Information Systems*, 10(5), 447–473.
- Sambamurthy, V., & Zmud, R. (1999). Arrangements for Information Technology Governance: A Theory of Multiple Contingencies. *Management Information Systems Quarterly*, 23(2), 261–290. doi:10.2307/249754
- Simonsson, M., & Johnson, P. (2005). Defining IT Governance – A Consolidation of Literature. KTH Royal Institute of Technology, Sweden. Retrieved from <http://www.ics.kth.se/Publikationer/>
- Star, S. L., & Ruhleder, K. (1996). Steps toward and ecology of infrastructure: Design and access for large Information spaces. *Information Systems Research*, 7(1), 111–134. doi:10.1287/isre.7.1.111
- Tabish, S. A. (2012). Healthcare: From Good to Exceptional Governance. *JIMSA*, 25(2), 147–149.
- Timmermans, S., & Berg, M. (2003). *The Gold Standard: The challenge of evidence based medicine and standardization in health care*. Philadelphia: Temple University Press.

Van Grembergen, W., De Haes, S., & Guldentops, E. (2004). *Structures, Processes and Relational Mechanisms for IT Governance*. Retrieved from Hershey. doi:10.4018/978-1-59140-140-7.ch001

Vikkelsø, S. (2005). Subtle Redistribution of Work, Attention and Risks: Electronic Patient Records and Organisational Consequences. *Scandinavian Journal of Information Systems*, 17(1), 3–30.

Walsham, G. (1995). Interpretive case studies in IS research: Nature and method. *European Journal of Information Systems*, 4(2), 74–81. doi:10.1057/ejis.1995.9

Weill, P., & Ross, J. (2004). *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results*. Boston: Harvard Business School Press.

Weill, P., & Ross, J. W. (2005). A Matrixed Approach to Designing IT Governance. *Sloan Management Review*, 46(2), 26–34.

West, J. (2007). *The economic realities of open standards: Black, white, and many shades of gray*. Cambridge, UK: Cambridge University Pres.

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