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# Enterprise Architects' Logics across Organizational Levels: A Case Study in the Norwegian Hospital Sector

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# ENTERPRISE ARCHITECTS' LOGICS ACROSS ORGANIZATIONAL LEVELS: A CASE STUDY IN THE NORWEGIAN HOSPITAL SECTOR

*Research full-length paper*

*Track N°4 – Health Information Systems and Bioinformatics*

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## Abstract

*In this paper, we report about a multilevel case study on the introduction of enterprise architecture (EA) in the Norwegian hospital sector. We utilize institutional logics as a theoretical lens, focusing on the enterprise architects' logics that are underexplored in information systems research. We have collected empirical evidence at national (macro), regional (meso), and local (micro) levels. The findings are classified into nine categories with illustrative statements from the informants, demonstrating their reasoning about the contributions of EA. Furthermore, we identify tensions between enterprise architects and managers and between enterprise architects and medical actors, which indicate the co-existence of multiple competing institutional logics. The most prominent tension is the paradox of EA—demands for local flexibility and autonomy at the micro level versus the predefined rules and standardization that EA imposes across all levels—which makes the institutionalizing process challenging. The enterprise architect logics demonstrate similarities and differences across the various levels, indicating heterogeneity. We conclude this paper with a suggested persona of the enterprise architect, which illustrates the empirical findings.*

*Keywords: Enterprise architecture, enterprise architect, institutional theory, institutional logics, hospital sector*

## 1 Introduction

Information systems are pivotal for revolutionizing healthcare (Drucker, 2007, Kellermann and Jones, 2013) and meeting the triple aim of improving health, enhancing the care experience, and reducing per capita costs (Berwick et al., 2008). Nevertheless, introducing and managing information systems in such a complex domain have proven to be challenging (Romanow et al., 2012, Gandhi, 2016, Ajer and Olsen, 2018). Healthcare complexity stems from the interdependencies among medical specializations with their own processes and data requirements, the variety of decision makers at different levels of healthcare systems, the rapid technological advancements, and the shifting regulative requirements (Gebre-Mariam and Bygstad, 2016, Aanestad et al., 2017). Traditionally, healthcare information technologies and processes have evolved in a mixed approach with both large-scale top-down initiatives (e.g., related to the introduction of electronic patient record systems) and bottom-up initiatives closely linked to the information needs of specific functional areas. Over the last two decades, healthcare organizations have started introducing enterprise architecture (EA) as a more systematic way of designing, planning, and implementing process and technology changes (Venkatesh et al., 2007, Bradley et

al., 2012). In a hierarchical way, EA describes the processes, their supporting data and applications, as well as all related information and communication technology (ICT) arrangements (Bernard, 2012).

Norway has followed the trend, introducing EA as a strategic tool for hospital information systems and processes (NICT, 2012). Norwegian hospitals are supported by complex information infrastructures that evolved over many years. The earliest use of electronic documentation of patient information in health services dates back to the 1970s while the first implementations of applications for entire hospital coverage started in the 1980s (Norwegian Center for Electronic Patient Records, 2009, Doupi et al., 2010). With the adoption of EA, structured, comprehensive and aligned blueprints for current and future states of hospital systems and processes can be developed. Furthermore, EA can provide guidance for implementing the necessary processes and technology changes to execute strategies. Nevertheless, the promise of EA remains largely unfulfilled. EA tends to be underutilized in the Norwegian hospital sector, and the complexity of the current landscape keeps increasing.

In this paper, we aim to elucidate the intricacies of introducing EA in the Norwegian hospital sector through the analysis of empirical material collected across different levels of the sector (national, regional, and local). In our research, we acknowledge institutional heterogeneity, building on prior research that has identified that EA implementation is influenced by tensions and interactions among stakeholders in its institutional context (Hjort-Madsen and Pries-Heje, 2009, Janssen, 2012). Healthcare is a multifaceted organizational field where multiple competing institutional logics co-exist (Currie and Guah, 2007, Reay and Hinings, 2009, van den Broek et al., 2014). Institutional logics are bases for action (Friedland and Alford, 2012), and by understanding key logics at play, we can make better sense of experiences in hospital EA (Ajer, 2018). Prior research has identified differences among three types of logics (managerial, medical, and information technology [IT]) that shape information systems governance in hospital contexts (Boonstra et al., 2017), but the logic of enterprise architects has not been singled out and explored. To gain insights about EA introduction, our research traces the institutional logic of enterprise architects by answering two questions. a) *How do enterprise architects and managers perceive the contributions of EA?* b) *What kinds of tensions are experienced?*

We have structured the rest of the paper as follows. First, we briefly present the theoretical foundation of our research. Second, we describe the empirical setting and explain our research method. Third, we provide the findings. Finally, we discuss the findings and conclude the paper by pointing out the limitations of our research and outlining avenues for future work.

## 2 Enterprise Architecture and Institutional Logics

Over the last decades, IT has vastly changed. Organizations are leveraging new technological capabilities, primarily by investing in and developing information system portfolios, which become more complex and heterogeneous over time. Thus, it has become essential for organizations to define overall plans that include their business strategy, IT strategy, and organizational and IT architecture (Ross, 2003). The IT architecture is “the organizing logic for applications, data and infrastructure technologies, as captured in a set of policies and technical choices, intended to enable the firm’s business strategy” (Ross, 2003, p. 5). An EA perspective goes beyond IT architecture by providing a holistic view. “Enterprise architecture provides a long-term view of a company’s processes, systems and technologies so that individual projects can build capabilities, not just fulfil immediate needs [...]. [...] enterprise architecture is the organizing logic for business processes and IT infrastructure, reflecting the integration and standardization requirements of the company’s operating model” (Ross et al., 2006, p. 9). Architectural practices in organizations support innovation, change, and flexibility, as well as stability (Jonkers et al., 2006). EA is important for bridging and aligning IT and business and for understanding their mutual interdependencies. Additionally, EA is a strategic tool for management. “Enterprise Architecture is an instrument to manage operations and future development in an organization” (Borbinha, 2007, p. 183). The introduction of EA can reduce IT efforts and contribute to the manage-

ment of IT complexity to generate business value (Bossert et al., 2017). However, implementing EA (e.g., by adopting an EA framework, such as The Open Group Architectural Framework [TOGAF<sup>1</sup>]) is a challenging undertaking, especially in large-scale organizations.

Hospitals are complex at both technology and process levels and can gain benefits from EA. EA initiatives may contribute to better health services by aligning IT with processes. Furthermore, EA can provide support for addressing long-standing healthcare problems related to fragmented IT portfolios, immature IT infrastructures, and silo-structured organizing (Ross et al., 2006). However, to gain advantages from EA, it is important to understand the sociocultural identities of different professional communities co-existing in a work context (Boland and Tenkasi, 1995, Brown and Duguid, 2001). In a healthcare setting, stakeholders come from different institutional backgrounds and may have distinct perceptions about EA and its implementation. The multiple (and sometimes competing) institutional logics need to be taken into account (Currie and Guah, 2007, Reay and Hinings, 2009, van den Broek et al., 2014). In the EA literature, only a few empirical studies have utilized an institutional lens to understand the viewpoints of different stakeholders (Dang and Pekkola, 2016a).

The rationalities and the worldviews of different stakeholders influence EA implementation. For our study, we adopt Thornton and Ocasio (1999, p. 804) definition of institutional logics as “the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality.” The concept of institutional logics is instrumental for understanding the behaviors of different players in healthcare (Currie and Guah, 2007). Heeks (2006) identifies the different rationalities that shape health information systems: technical, managerial, and medical rationalities. Past research on institutional logics in healthcare has focused on the interplay of medical professionalism and managerialism (Scott, 2000, Reay and Hinings, 2009). Based on this research and on Heeks (2006) study, Boonstra et al. (2017) suggest exploring the IT professionals' logic as a third type that is important for IT governance in the hospital context.

Prior research has pointed out the importance of different institutional logics, but the logic of enterprise architects has not been explicitly explored. Dang (2017) notes that the logic in EA itself influences EA programs in the public sector, but the relevant research has focused on the diversity of EA schools of thought and EA philosophies, not on the architects. Enterprise architects often play different roles, requiring multiple skills (Gøtze, 2013). Most importantly, they should align technology with business objectives to manage the complex set of interdependencies in their organization and implement the strategic direction of the enterprise (Strano and Rehmani, 2007). To gain insights about EA introduction in hospital settings, it is important to make sense of the worldviews of the enterprise architects themselves and the tensions that arise when they encounter the established managerial and medical logics.

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<sup>1</sup>TOGAF supports EA development, consisting of interrelated architectures, including business, information systems (comprising data and application architectures), and IT architectures (Hinkelmann et al., 2016). The framework provides guidelines for developing business and technical architectures, principles for decision making, IT resources, and architecture principles in general (Urbaczewski and Mrdalj, 2006).

### 3 Case and Research Method

#### 3.1 Research site

Our study was conducted in the Norwegian hospital sector (Figure 1). In Norway, hospitals are public and organized as health trusts (HTs). One HT can include several local hospitals. The HTs are allocated to four independent regional health authorities (RHAs), which in turn are under the jurisdiction of the Ministry of Health and Care Services.

The Norwegian government has released several white papers that describe how ICT can be used to achieve health policy objectives and be a source of more effective and efficient services, with emphasis on quality and patient security (ehelse.no, 2018). Two of the most important governmental white papers that have formed and guided the development of eHealth services are “The Health Care Interaction Reform” (2009) and “One Citizen – One Journal” (2012). The former is the first to address the collaboration issue, while the targets described in the latter are still valid, and it is an important document for the evolution of health services today (e-Health, 2017, Bergland, 2018).

Investments in ICT are made at both RHA and HT levels. The strategic coordination, prioritization, and consolidation of key ICT issues across the regions are performed by a separate organizational entity called the National ICT HT (NICT), which is owned by the four RHAs. Among the four RHAs, the one that serves the South Eastern region (SERHA) is the largest. It includes 11 HTs with 78,000 employees and an annual turnover of 79 billion NOK. ICT operations for SERHA are supported by the Hospital Partner (HP), which is the ICT service provider for the entire region. We collected data for this study by interviewing informants at multiple levels in the hospital sector, specifically from the national coordinating body (NICT), the South Eastern region (SERHA and HP), and two HTs.

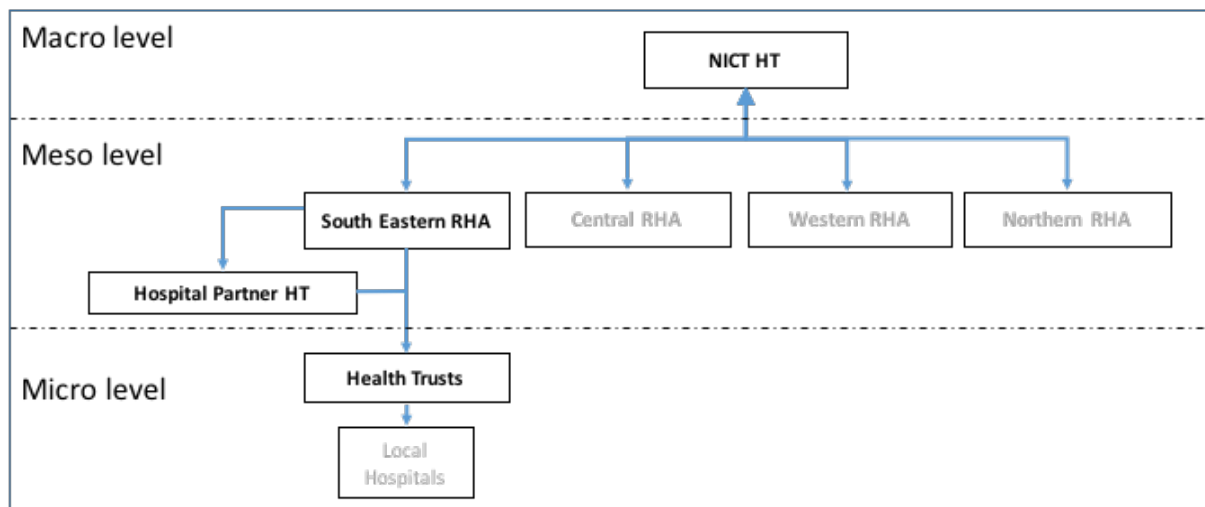


Figure 1. Overview of the Norwegian hospital sector

The ICT landscape in the hospital sector is complex and fragmented. For instance, the hospitals in the SERHA have implemented approximately 1,250 ICT solutions for clinical and medical services (South-Eastern-RHA, 2015). This complex situation makes interaction difficult and is an obstacle to the use of regional ICT services. EA is expected to support ICT work in this environment. In the NICT’s strategy plan for 2013–2016, one of its stated goals is to “establish EA as a strategic tool in the specialist health service” (NICT, 2012, p. 6). The report entitled “Practice of Enterprise Architecture in National ICT, Initiative 42.2” describes the vision and the goals for EA practices for the hospital

sector. “The enterprise architecture’s contribution is to ensure that the healthcare and healthcare sector’s strategies, tools and change processes are viewed in conjunction to achieve desired results” (NICT, 2014, p. 5). Furthermore, the report clearly states that the method used in NICT projects shall be based on TOGAF Architecture Development Method customized according to the purpose, and that “the methodological descriptions shall be regulatory for the National ICT’s architecture function and projects, and guide the regional architecture function and projects” (NICT, 2014, p. 41). The NICT has recognized the importance of perceiving situations holistically; “responsibility for enterprise architecture requires first and foremost good communication skills, ability to think strategically and see ‘the big picture’ in a business perspective, rather than going into detail and creating concrete [technical] solutions” (NICT, 2011, p. 10).

In the SERHA, EA methodologies are used to a certain extent, and it has decided to adopt TOGAF as its EA framework. For instance, the region has established an architectural board to support and guide the work for the portfolio of projects named the Regional Clinical Solution (RCL). The RCL includes 16 projects that are operating as part of the “Digital Renewal” initiative launched in 2013. There is also a separate function for interdisciplinary architecture and design that supports the work across projects and ensures that architectural practices are followed. Since the spring of 2017, EA has become a part of the organization’s formal project roadmap.

Overall, there are some regulative and normative pressures to use EA in the Norwegian public sector. The Agency for Public Management and eGovernment (Difi, 2010) describes a common EA as a means to develop a user- and service-oriented public sector. The report “Superior IT Architecture Principles for the Public Sector” Difi (2012) suggests that different sectors and organizations are individually responsible for implementing the national principles in their own architecture. The report states, “The purpose of a well-described and unified enterprise architecture is, among other things, that individual solutions are realized in a holistic context and not individually. The purpose is to ensure good alignment between work processes and IT solutions and to avoid the creation of non-communicative information systems, or so-called silos” (Difi, 2012, p. 3).

### **3.2 Research approach, data collection, and analysis**

Our research is designed as an interpretive case study (Walsham, 1995, Klein and Myers, 1999) on the introduction of EA in the Norwegian hospital sector. We investigated the views, tactics, and approaches followed by the different actors engaged and the tensions they experienced. The data were collected through semi-structured interviews and reviews of documents. The interviews included topics on how EA was used, the role of the enterprise architect, and issues about national coordination and collaboration in eHealth. The interviews were conducted across multiple levels. The national (the NICT in this study), regional (SERHA and HP), and local organizations (HTs) involved were classified under macro, meso, and micro levels, respectively. The documents collected included policy papers, reports, and presentations officially published by the parliament, the Norwegian Health and eHealth directorates, Difi, the NICT, and the SERHA. Table 1 provides an overview of the interviews.

We approached the data by first identifying key challenges reported by the informants or documented in the reports analyzed. This initial analysis yielded a wide range of challenges, some related to the technological landscape, the financing mechanisms, and the overall sector structure. Interestingly, we also encountered several issues regarding collaboration among the stakeholders, specifically, the establishment of trust and a basis for understanding the EA concept, the use of a common language, the EA approach in itself, and willingness to change. Drawing from these initial findings, we delved into the literature on EA in healthcare and healthcare IT governance, searching for research on the influence of institutional logics. We found limited relevant research (Boonstra et al., 2017), and most studies did not discuss the different actors’ perspectives. We decided to review and analyze the data by attending to the meaning assigned by people to the topics discussed, focusing on their reasoning about

the contributions of EA (“why EA?”). Furthermore, we examined the tensions among the enterprise architects and the other actors when the former described what they thought was needed and what they experienced as contrasting ways of acting.

Level	# Interviews	Informants	Average length
Macro	5 in one organization	5 enterprise architects from NICT	Approximately 70 min
Meso	6 in two organizations	4 enterprise architects from SERHA and HP, 1 manager from SERHA, 1 project manager from HP	Approximately 90 min
Micro	5 in two organizations	2 enterprise architects, 1 CEO, 1 CIO, 1 project manager (former manager at SERHA)	Approximately 80 min

Table 1. Overview of interviews (CIO = chief information officer, CEO = chief executive officer)

By foregrounding the different perspectives, we aimed to make sense of their underlying logics. We coded our empirical material by using the institutional logics concept as a lens. During the interviews, we avoided leading questions or questions that might yield stylized answers. In this way, the interview transcripts became rich with lengthy statements, amenable to the analysis of the informants’ perspectives. The coding followed the principles of first- and second-cycle coding (Miles et al., 2014). The first cycle was done in NVivo and further analyzed and grouped into Excel forms. In the second cycle, the data were discussed, organized, and compared in an iterative process to identify emerging themes. The results are presented in Section 4 and discussed in Section 5.

## 4 Findings

In this section, we present the findings of the empirical material analysis. In the first part, we map out how enterprise architects and managers perceive the contributions of enterprise architecture in response to the first research question. Interestingly, we find no significant differences between the enterprise architects’ and the managers’ perspectives. Nevertheless, as presented in the second part of this section, several tensions are experienced by enterprise architects when taking action. Answering the second research question, we analyze these tensions and identify that at the operational level, the concerns of enterprise architects diverge from those of managerial and medical actors. In the last part of this section, we synthesize the findings, unfolding the key characteristics of the enterprise architect logics.

### 4.1 Why EA?

During the interviews, different informants provided their reasoning for the introduction of EA. We analyze their different statements when describing the aims of their ongoing work and explaining why the holistic EA approach could make a difference compared with the absence of holistic views. We consolidate the findings of our analysis under broad categories. In Table 2, we provide an overview of our findings, listing the different categories and their descriptions. Then, we map them to different informants and levels. The numbers in the cells denote the number of informants who indicated the category when interviewed.

Category	Enterprise Architects			Managers	
	Macro	Meso	Micro	Meso	Micro
<i>Future to-be (F-tb)</i> is about supporting the organization's strategy, suggesting solutions, making plans, supporting decision makers in prioritizing investments, and managing the portfolio.	2	3	2	1	2
<i>Overview as-is (O-ai)</i> refers to having an overview of the existing architecture: what kinds of systems are in the portfolio, integrations in place, an overview of interfaces, and dependencies.		3	1	1	
<i>Methodology (Met)</i> relates to EA practice. It can include EA modeling tools, frameworks for managing EA (e.g., TOGAF), project management roadmaps, and organizational arrangements for architectural conformity (e.g., an architecture board).		2	1	1	
<i>Standardization (Std)</i> includes technical or semi-technical guidelines (e.g., type of hardware and software relevant for the ICT landscape). It also comprises best practices and architectural principles as parts of organizational standards.	4			1	
<i>Interoperability and Integration (I-I)</i> entail facilitation of exchange and reuse of data and coherence among systems.	2		1	1	1
<i>Data management (D-m)</i> involves control over data handling and flow, especially the master data.	1			1	1
<i>Process support (P-s)</i> means having information systems to support the work processes.	1	1	1	1	
<i>Coordination and Collaboration (C-C)</i> : Coordination denotes assessing several relationships in relation to the whole and adapting parts to comprise the best possible for the whole. Collaboration is about stakeholders working together toward a common aim.	4	2		2	
<i>Looking beyond (L-b)</i> means realizing that other units of the organization are influenced by locally used systems, as well as having an overview of the stakeholders.	1		1		

Table 2. Overview of the identified categories, describing "why EA"

Both enterprise architects and actors with managerial roles recognize the potential of multiple contributions of EA, ranging from providing methodological support to facilitating key healthcare requisites, such as interoperability, standardization, coordination, process support, data management, and enabling better charting and steering of "as-is" and "to-be" configurations. We understand that the informants experience the EA approach as a means to address the implications, not only for the ICT landscape, but also for the organization when systems are introduced or changed. In Table 3, we present sample quotes for the different categories identified. In several instances, the quotes are rich, relating to more than one category. The informants are coded according to their roles (EA stands for enterprise architects and MG for actors with managerial roles), and the first column indicates the organizational level.



Level	Why EA?	Category
Macro	EA1: "We want to contribute to show how we can support the organization's strategy and how to deliver good results for the future."	F-tb
Macro	EA1: "We are a strategic unit for the regions, to look at coordination and standardization. [...] We will focus on what is happening in strategy, vision, and business architecture and perhaps something about information because it is important for coordination."	F-tb C-C Std
Macro	EA2: "Coordination will not happen without architects. It is our job to look beyond the area [where] you currently work and see what influences the project and who are the stakeholders."	C-C L-b
Macro	EA2: "I have worked quite broadly, and that is something I have perceived that enterprise architects should do. I work very much within standardization [...] for interoperability."	Std I-I
Macro	EA2: "There is a bit of lack in understanding the big picture; they actually should listen more to the enterprise architects and look beyond their own department because, among others, the way we do it in Norway, having so many different solutions, is expensive."	L-b
Macro	EA3: "There is a need for more coordination for the clinicians to both get a better end-user product and not have so many systems as they have today and do double registration. It is a challenge for the clinicians that they must write the same information in multiple systems; furthermore, they must log in to multiple systems."	C-C I-I D-m
Macro	EA5: "Our job is to find the areas in a large system landscape, together with the regions. Where is it expedient to work together? [...]. We must think smart all the time and through EA, find where it is wise to get a common... call it a component. An outcome is a technical solution and perhaps more coordinated work processes."	F-tb C-C
Meso	EA6: "In architecture definition documents, [...] what types of objects to describe and what relationships they have and why, to describe the objects and the relationship."	O-ai
Meso	EA6: "We will use [EA] tools that are appropriate for the task, facilitating reuse of the documents that are produced."	Met
Meso	EA9: "The culture today is to go for a solution without assessing: What is it we want to achieve? How are we going to achieve it? Which organizational and ICT changes must we undertake? [...] Which processes are involved? Where and what are the problems?"	F-tb P-s
Micro	EA10: "It is about seeing things in an EA context and prioritizing new systems. For example, in implementing new systems, the relation to standards, reference models, and application platforms—trying to associate this with stakeholders and users out there. Everything must be connected in a way—interactions among meta-models, building blocks, charts, and those out there [...]; everything must be seen in a context. TOGAF helps us and is a possible approach to see these relationships in the enterprise."	F-tb O-ai I-I L-b Met
Micro	EA11: "[The] enterprise architect's role [is] to ensure that what is done, related to both processes and procurements, follows the principles and the strategy that the hospital has [developed]."	F-tb
Meso	MG2: "For me, [EA is] how processes are supported by solutions that are supported by technology in a way [that] everything is connected. That we make appropriate processes that do what we think they are going to do. When changes are made, it's very easy to leave some processes behind, having processes that are not updated. [...] The architecture and design group has a very important function to coordinate the architecture in different projects."	P-s I-I C-C Met
Meso	MG2: "We have a cross-function that aims to make the architects work similarly, documenting similarly [...]; it is a standard framework for architecture that has now [May 2017] been incorporated into the project methodology in SERHA. [...] With a common EA tool, we build in a way a big model together."	C-C Met
Micro	MG5: "When we are building new [extensions in the hospital], then the architect participates from the start, making sure we get the solutions that are forward-looking."	F-tb

Table 3. Sample quotes indicating how enterprise architects and managers perceive EA contributions

## 4.2 Tensions in the enterprise architects' work

We find no significant differences between the enterprise architects' and the managers' perspectives when considering the aimed contributions of EA ("why EA"). Nevertheless, the interviewed architects express several tensions when describing their work. These tensions indicate that at the operational level, the concerns of enterprise architects diverge from those of managerial and medical actors. We infer that although architects and managers have embraced the EA vision, their views vary regarding how this should be pursued (e.g., the speed, the priorities, the degree of standardization). The logics of different actors are not only manifested in the way that they provide meaning to concepts but also in their practices and assumptions when taking action. In the case studied, we find differences in how they take action despite the actors' similar reasoning for the introduction of EA. For instance, some tensions are related to balancing local and global needs, as well as short- and long-term gains and funding. Table 4 contains quotes that indicate tensions between enterprise architects and managerial actors. The architects also mention tensions in their relations with medical actors, which we present in Table 5.

Level	Quote that describes a tension
Macro	EA1: "We must in a way get the regions to agree on interregional themes."
Macro	EA1: "[The single RHF] has many pressing initiatives that have to be done; thus, the 'long-term' picture is a bit difficult."
Macro	EA3: "It's hard to get people in a busy operating organization to first, use a lot of time on IT without having short-term benefits. Sometimes the benefits come to others [stakeholders] or are diffused to many, but it takes some time."
Macro	EA3: "It can be a bit challenging for the head of the department to release someone as they do not have budgets to let go because that surgeon is generating revenue for the entire operation team."
Meso	EA8: "The hospital directors are the ones who decide, and they say that the EPR is the first priority. Otherwise, I do not get so many patients through [the system], and then I lose money."
Meso	EA9: "You have an implicit ground for conflict between the line and the programs, and it may also be within the RHF that lines look at the programs as competitors for their own work."
Meso	EA9: "At least, some [HTs] will actually have their [own] local systems and not have the hassle of regional ICT services. Because then, they [will] have complete control over their own ICT needs, in support of the work processes they have in their businesses, without interference."

Table 4. Tensions in the relationship between enterprise architects and managerial actors

Level	Quote that describes a tension
Macro	EA2: "And yet that's what it's all about, the desire to be able to keep the control. There are doctors who have had control over the years, and now they more and more have lost it, and they are not completely satisfied with the [situation]."
Macro	EA2: "Yes, but I also think that you must see it from their [clinical department managers'] perspective when they claim that when they do not accept something, it's not for inhibiting something; it's because they think it's the best for their department. It is only the understanding of the bigger picture that may be missing a bit, and they may actually have to listen to the enterprise architect and look a bit further."
Meso	EA8: "Doctors like to decide about their own equipment. [...] I do not think it's anything exorbitant, but you can solve it by saying that here we have these three variants and not 17."
Meso	EA7: "Some doctors who need to work with other hospitals, of course have it [a holistic view]. It is a concrete problem that they live with every day, while others only see their own subjects and are not so interested in looking beyond it. Nevertheless, it is natural [...]."

Table 5. Tensions in the relationship between enterprise architects and medical actors

### 4.3 Tracing the institutional logics of enterprise architects

We have collected multiple quotes that unfold key characteristics of the logics of enterprise architects at different levels. We have consolidated the quotes into concise statements. The statements are written in a condensed form to exemplify the logics and are used to illustrate the enterprise architect persona that emerges from our empirical material (Figure 2). In our study, we find that enterprise architects do not form a homogeneous group with a single underlying logic. Both their professional identity and the organizational positioning shape the logics of architects. Therefore, the architect's persona that we have constructed has different characteristics, depending on the institutional level where he or she is positioned.

At the macro level, the enterprise architects are more concerned about not only planning, but also being owners of national projects. The reason is that their main mandate is to facilitate coordination and collaboration among regional authorities. The RHAs receive their assignment documents from the Ministry of Health and Care Services two times a year, whereas the NICT obtains its assignment documents from the RHAs when they have decided where they can collaborate. Nevertheless, "we are going to be a strategic advisor for the RHAs, so we also independently think about what may be useful based on what the RHAs are assigned to" (EA5). "In addition, we get input for our work from [several] sources, [such] as hospitals, the eHealth directorate, and architectural forums and clinicians' forums" (EA4). These inputs go through a masterplan process, where EA is essential. Additionally, "the white paper "One Citizen – One Journal" describes the target image in a very good way. It [has] made a very good national picture from the architectural side [...], and I am very happy because it [provides] very good support [...], so we do not have discussions and conversations about the overall picture" (EA3).

The enterprise architects at the meso level are occupied with supporting the regional needs and plans that imply constructions to a larger degree than at the macro level. The enterprise architects are concerned about effective tools and the reuse of artefacts. Furthermore, they hold a holistic view; "we have an architectural and design group in the program [RCL] trying to look at issues that are across the projects and maybe [from] a slightly longer-term perspective" (EA6). The group also wants to contribute to strategic planning, "as the good counsellor, in relation to proceedings for the program board [...] and in relation to being a consultant and a common resource for project managers in a program" (EA9).

At the micro level, the enterprise architects work in the operational organizations and thus close to the actual users of the ICT systems. They experience EA as a helpful approach in their daily work and in support of the national goals. However, in comparison to the other levels, they are concerned with the negative side of being constrained by regional initiatives; for example, "doctors can no longer call me like they did before. They can call, but then, they will only be informed that we can describe this in writing, and then, we have to send it in as an idea [...] and get an answer in half a year" (EA10).

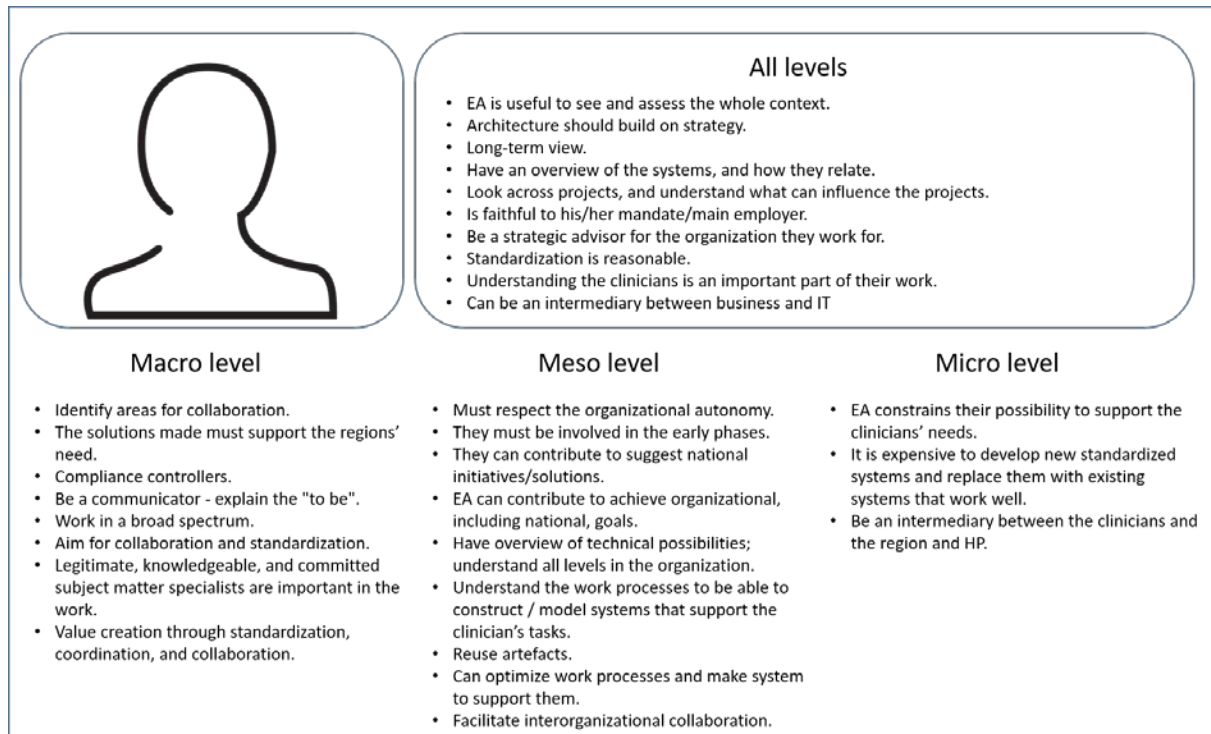


Figure 2. The enterprise architect persona

## 5 Discussion and Conclusion

In this paper, we have utilized the lens of institutional logics to explore the intricacies of introducing EA in the Norwegian hospital sector. Specifically, we have focused on the logics of the enterprise architects themselves. Prior research has pointed out the importance of different institutional logics, but the logic of enterprise architects has not been explicitly studied. Researchers have described the enterprise architect's multifaceted functions; for instance, a "unique role that the enterprise architect provides is aligning technology with the business goals and objectives by managing the complex set of interdependencies to communicate a common or shared vision of the strategic direction of the enterprise" (Strano and Rehmani, 2007, p. 386). Furthermore, Gøtze (2013) notes the importance of understanding the organization and the dialectical skills of the architect. Another stream of prior research revolves around the challenges met by enterprise architects, including unclear responsibilities and limited involvement in decision making (Bygstad and Pedersen, 2012, Nygård and Olsen, 2016). While previous research on enterprise architects provides normative and descriptive accounts of their roles, our study delivers a sociocultural account of enterprise architects' institutional logics in a hospital setting.

Interestingly, we find no significant differences between the enterprise architects' and the managers' perspectives when considering the aimed contributions of EA ("why EA" in Table 2). This result is in noticeable contrast to Dang and Pekkola (2016b) findings that in two different organizations, EA was introduced with different aims (in a more planning-oriented way in one case, whereas in the other case, more to facilitate business-IT alignment and effective management). In our findings, the different informants express similar views on EA, irrespective of their institutional affiliations and roles. This indicates that to a significant extent, there is a shared understanding about EA in the Norwegian hospital sector.

The findings about the perceptions regarding EA contributions are organized under nine categories. In broad terms, EA covers high-level strategic planning and the operationalization of strategy through a framework for analyzing, planning, and improving the organization's ICT platform (Ross et al., 2006, Bernard, 2012). Previous research has identified that much time is spent on documentation of current architectures, and few organizations go further and develop the to-be architecture (Winter et al., 2010). In our case study, we find that more informants link EA with *future to-be* than with *overview as-is*. Especially, enterprise architects from the macro level do not mention the potential utility of EA for mapping the current state. The explanation for this is that the meso and the micro levels are operational entities, while the macro level is mostly concerned with planning.

EA in practice is mainly about selecting the most appropriate tools and methodologies that can support the introduction and the development of an organization's EA. *Methodology* has been identified as one of the EA contributions perceived by the informants. This finding is consistent with those of existing literature; good architectural practices, principles, and methods can support the organization to innovate and change by providing both stability and flexibility (Jonkers et al., 2006, p. 64). Furthermore, Ross and colleagues (2006) emphasize the importance of creating an IT engagement model to link the projects to the organizational objectives.

The three categories of *standardization*, *data management*, and *interoperability and integration* are more related to the IT aspects of EA and the improvement of the operating platform by moving between maturity stages (Ross et al., 2006). The category of *process support* focuses on how to utilize ICT to support organizational processes or activities. This also relates to the categories of *looking beyond* and *coordination and collaboration* as means to reach a consensus on how the processes shall be undertaken and how they should be supported. Our informants acknowledge that the EA concept signifies a holistic view that is useful in the heterogeneous context of hospitals (Jonkers et al., 2006).

Although we found no significant differences between the enterprise architects' and the managers' perspectives when considering the aimed contributions of EA, we identified tensions between enterprise architects and managers and between enterprise architects and medical actors, indicating the co-existence of multiple competing institutional logics. The stakeholders agree on their high-level EA reasoning for the introduction of EA, but, it can still be challenging to generate a shared understanding of how to operationalize EA principles into practical actions, especially when the effects become visible after a long time (Ross et al., 2006, Drews and Schirmer, 2015).

Both regional-level managers and medical professionals want systems that suit their local needs. This fact points to the tension between centralized and decentralized control, which has been documented in previous research as prevalent in the hospital sector (Bygstad and Hanseth, 2016, Boonstra et al., 2017) and as a general observation in other larger federated organizational contexts (Ross et al., 2006). Local preferences are shaped in the various hospitals by their organizational size; geographical locations; and differences in local processes, needs, and specializations. As prior literature has identified, EA management is difficult to institutionalize because instructions may restrict the local flexibility and autonomy of different stakeholders (e.g., enterprise architects and managers across different units), for example, through predefined rules and standardization mechanisms (e.g. Hoogervorst, 2004).

Furthermore, some short-term versus long-term tensions are related to the managers' dilemma of prioritizing long-term activities versus urgent needs (Bygstad and Hanseth, 2016). This relates to the fact that value may come at a later stage if it comes at all (Flak et al., 2012, Schmidt and Buxmann, 2011). These tensions are experienced differently at the different levels. At the macro level, architects are quite concerned about standardization and integration, while at the micro level, architects become stressed if they are unable to address the urgent needs of clinicians. Additionally, financial tensions among managers and enterprise architects are related to prioritizing non-revenue generating EA work versus loss of income (Ulriksen et al., 2017, Ajer and Olsen, 2018) and difficulties in estimating the costs of such large and complex endeavors (Ajer and Olsen, 2018).

The findings reported in this paper are based on empirical data, complemented by an extensive document review and analyzed in an iterative way. Nonetheless, our study has several limitations. We have only interviewed enterprise architects and managers, so medical actors' views and experiences are not included. Further research covering medical actors can provide additional insights on the role of architects in the institutional environment of Norwegian hospitals. More interviews with architects at all levels are also needed to go beyond indications and draw sound conclusions about the differences among enterprise architects across levels.

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