

Enterprise Architecture Implementation and Management: A Case Study on Interoperability

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Abstract

The focus of this study is to explore why public agencies implement enterprise architecture programs and the interoperability challenges they are faced with when governing these programs at different levels (vertical) and different functions (horizontal) of government. With a theoretical lens based on institutional theory from the political science field, the analysis shows that interoperability is not just a technical issue and that economic and political factors are just as important when implementing enterprise architecture programs in government. The findings suggest that implementing enterprise architectures in government challenge the way information systems are organized and governed in public agencies and calls for a broader definition of interoperability.

The case study indicates that interoperability challenges arise because there is no overall coordination of different information systems initiatives in the health sector and because public hospitals have no economic and/or immediate political incentives to share data and business functionality with other organizations.

1. Introduction

In today's fast-paced, Internet enabled environment, interoperability and integration of public sector information systems (IS) have become an important vehicle for e-government success [11]. Public agencies are no longer simply making agency programs and information available online. Now, e-government is progressing towards the integration of new and existing application architectures to support different levels and functions of government services vertically and horizontally [13]. The e-government challenge is that many public agencies have a highly

fragmented IS portfolio [9]. Often, no generic architecture is available that enables communication between front-office and back-office applications, between back-office applications, nor with systems outside the organization.

The neglect of back-office developments integrated with front-office services leads to large investments that do not pay back and that get in the way of the overall vision of e-government [28]. Many public agencies have an IS-portfolio consisting of legacy systems for each product they offer [10]. These systems are often monolithic packages and thus extremely difficult to reconfigure and to integrate with applications developed by other vendors and to provide access to new distribution channels. In short, there are integration and interoperability problems between applications within many public agencies, but also between agencies.

From an e-government perspective it is ironic how the introduction of new public management (NPM) reforms [4], that seek to modernize government by breaking-down large organizations into networks of relatively autonomous agencies, has not improved this coordination. As a result, there is often a lack of central management and departments can buy their own applications for each process. Many policy processes are fragmented over several administrative agencies in "silos" which impede government ability to offer new, integrated products and services, or consolidate operations [28]. Introducing e-government means transforming the production processes of public services (not merely managing them as in NPM) and public agencies are therefore exploring new ways to manage their IS assets in a way that enables them to offer interoperable e-government services.

A popular approach for dealing with these interoperability issues is the implementation of

enterprise architecture (EA) programs in many public agencies [25]. Where commercial organizations are reengineering their respective enterprises to adjust to dynamically changing economic and market conditions, public agencies must adapt to support both business and civilian needs for improved services and the demands of the new e-economy [3]. The goal is the full articulation of all levels of an enterprise, integrating the strategic and business processes with the information, technology, and data systems that enable them [25]. The purpose of an EA program is to guide an enterprise's business processes and the associated IS towards a common goal and to integrate business, data, information, and technology [2],[3],[35]. The strength of an EA is that it embraces both the front and back-office focus along with a governance model that guides the use of IS from a business perspective. Thus, many public practitioners believe that EA is the solution to the integration and interoperability challenges that the public sector is facing today.

The current approach to EA in many public agencies is that EA is defined as the planning and management of IS in a single organization (see e.g. [2]). In reality, however, the management of e-government initiatives is only sparsely structured based on ad-hoc cooperation in many interorganizational settings. The principal obstacle in government is the high fragmentation, where many actors get involved when offering e-services. Having only a limited, single-organizational focus in EA projects in government agencies is a common problem of many running projects.

The development of EA management programs in public agencies is not sufficient in itself, since it is also essential to ensure implementation of the resultant EAs in government. Linking different public administrative services to provide quality and reliable e-government services requires that we understand the complex organizational cooperation – and conflicts – in public agencies [27]. History has shown that the organizational use of IS is complicated. Studies show that 53 percent of all information technology (IT) projects end up as failures and only 30 percent of the implementation projects, such as Management of IS (MIS), are successful [26]. Thus, the development and management of appropriate EA programs and its effective implementation should be viewed as interdependent critical elements of the success of many contemporary public agencies.

Focusing on the organizational micro and meso-level rather than national and international macro-level “interoperability frameworks”, this interpretive case study explores the adoption of an EA program at Denmark's largest hospital to answer the research

questions: 1) *why public organizations implement EA programs and 2) how interoperability is governed across different levels (vertical) and different functions (horizontal) of government in EA programs.*

In order to examine the research questions empirically, an in-depth case study of the implementation and management of an EA at Copenhagen University Hospital (CUH) was conducted. The analysis is supported by material from the Danish government health sector and interviews with the chief architect from the Copenhagen Hospital Cooperation (CHC) to gain an understanding of the interoperability considerations that span organizational levels in EA programs. The analysis is conducted through the lens of institutional theory from the political science discipline.

2. Interoperability in e-Government

Creating interoperability in government requires more than just having a common technical standard or using XML to create technical integration between two applications [11]. Therefore, interoperability must be defined broader as *the ability of information systems and the business processes they support, to exchange data and enable sharing of information* [20].

Based on the European Interoperability Framework, [7] has suggested that the solution to the interoperability problems in government is that all public organizations follow the same standardized framework for organizational, semantic and technical interoperability.

However, linking different administrative services to provide quality and reliable e-government services also require that we understand the complex linkages of cooperation – and conflicts – between government organizations [28]. The next paragraph briefly outlines the foundation for EA as the preferred tool by many public agencies to deal with interoperability issues. After this the theoretical lens based on institutional theory in the political science discipline is presented.

2.1. Enterprise Architecture

As an enterprise grows in size and complexity, there are several factors that impede its abilities to stay agile and to solve the problems that it faces [8]. The existence of isolated, overlapping, highly fragmented, and unrelated computerized applications within the same organization has resulted in major interoperability problems and ‘isolated islands of technology’ [22].

Historically, a large part of the traditional IS planning literature has been about producing a specific system's plan [23]. When working with complex systems, designers have typically dealt with this complexity by breaking them into subsets or domains that are less complex than the original system (see e.g. [34]).

With both new technologies and new ways to use IS in organizational activities, the area of IS management and planning has undergone a minor revolution during the last couple of years [16]. The new trends are often associated with either EA planning, development and management [23], or Information Management [16], and Information Technology Governance [31]. While the two later approaches take the viewpoint of the IT department and CIO in an enterprise, the EA approach stresses the planning and management of all IS assets and their architecture together with organizational structures and processes.

The challenge is that the concept of EA and IT architecture does not have a universally accepted definition in either the research or industry context [24]. In a recently published textbook [2] defines EA as *"the analysis and documentation of an enterprise in its current and future state from an integrated strategy, business and technology perspective"*.

The primary strength of the EA approach is that it has greatly defined its concepts and instruments to predict and control complex technical systems. While many of the current models and concepts for the planning and management of EA in government are one-dimensional and e-contextual in scope, there seems to be no other approach that can match EA in this regard and it is therefore not surprising that it is being used in most large IS projects in the private and public sector. The emphasis on preplanned and well-defined procedures in EA have the clear advantage that it offers high understandability and provides a good basis for teaching and knowledge transfer. EA encompasses a holistic approach to IS planning that provides an overview of the entire enterprise – from business to technology [12],[2],[25]. In this way, it is an easy approach to communicate for consultants and practitioners (as well as academics) and it gives users of IS the perception of control. Furthermore, EA is oriented towards efficiency and effectiveness in the management and implementation of IS which seeks to conserve valuable resources in government.

However, so far, little empirical evidence exists on the actual implementation and management of EA in government agencies. The EA literature is traditionally focused on one enterprise [7] and this paper therefore use institutional theory from political

science to capture the dynamic interaction between individual agencies in government.

2.2. Institutional Theory in e-Government

Institutional theory is a multidisciplinary field covering the fields of political science, economics, sociology, and organizational theory [5]. From a political science perspective, institutional theory is concerned with the organizational structure and behavior in public organizations [6]. The assumption in rational institutional theory is that the organizational structure can create certain incentive structures for individuals [19] while sociological institutional theory builds on the incorporation of bounded-rational and social aspects of decision-making such as concerns of legitimacy, stability and enhanced survival prospects, i.e. logic of appropriateness [17].

From an e-government perspective, rational choice inspired management reforms like New Public management (NPM), which break down large organizations into networks of relatively autonomous organizational units to create economic incentives, means that many processes are now fragmented over several administrative organizations in "silos".

These e-government challenges are further exacerbated by the complex goal structure and the strict legal norms that public agencies must work under, delivering services to business and citizens, securing transparency, etc. From a new institutional perspective, public agencies operate in a normative environment that constrains the choice of organizational actions and leads to organizational homogeneity within and, to some extent, across organizational boundaries.

Debates over where (e.g. at state, regional or local level) and what public agencies should do and how they should do it are continuous, and the maintenance of support is a never-ending, time-consuming process [32]. Sociological institutionalism has claimed that it is possible that public agencies implement policy programs in their operations and management because of pressures of symbolic meanings (social legitimacy) and pressures to conform to commonly adopted, action-generating properties such as efficiency and productivity gains [17]. This "institutional environment" both supports and produces normative pressures on an organization to perform in a legitimate fashion. In other words, public sector leaders operating in a highly uncertain environment may decide that the best response is to mimic a peer that they perceive to be an appropriate model. This, of course, has serious implications for the management

and implementation of EA programs in public agencies.

3. Research Method

Given the exploratory research question, an interpretive case study approach was selected [29]. Case studies can achieve a holistic understanding of cultural systems of action, and facilitate multi-perspective analyses, encompassing not just the voice and perspective of the actors, but also those of the relevant groups of actors and the interaction between them [33].

As an active member of the EA community in Denmark, the author was invited to observe the local implementation of an EA program at CUH in the summer of 2004. The objective was to learn more about the process of implementing and managing EA programs at the organizational level and the interoperability challenges in this connection.

In total, eleven interviews were conducted in 2004 and 2005. Five interviews with the chief architect at CUH were supplemented with two interview sessions with the CUH IT management and three of five system category owners. Furthermore, one interview was conducted with the chief architect from CHC to supplement what was learned from the CUH interview persons and to understand the EA governance challenge in the Copenhagen hospital region better.

The interviewees were asked to reflect on their experiences with implementing the EA program and the interoperability and coordination challenges faced in the management of the program. Interviews were further supplemented by examining artifacts – documents, presentations, and newspaper clippings. During the interviews the author concentrated on having a good dialogue and making sure that all the issues in the semi-structured interview guide were covered. In some of the interviews or meetings with the senior management and the chief architect the author was not allowed to tape the interviews and intensive notes were then taken. These diverse data sources allowed for data triangulation [33].

In the analytical phase of this work the interview notes including transcribed parts were analyzed in an iterative process. Based on the theoretical understanding, the empirical data was analyzed by coding and systematically searching data to identify and/or categorize specific observable issues, processes and key events using the Thematic network analysis methodology [1]. In this way, the analysis of the data collected from the various sources reflected the analytical framework in trying to identify

important content, context, and process elements of the EA implementation process as perceived by the different individuals interviewed at different times in the process. However, the data also informed the framework as presented earlier, since an iterative process took place throughout the data collection and analysis phases. This qualitative research design supported the study of a complex, dynamic social phenomena that where ‘both context and time dependent’ [18].

4. Case: Copenhagen University Hospital

Copenhagen University Hospital (CUH) is Denmark’s largest and leading hospital for patients needing highly specialized treatment and care. The IT-department currently employs 110 IT-professionals, supporting more than 300 applications besides the central Electronic Patient Record (EPR) system. The IS spans laboratory analysis applications, X-ray systems and content management systems. These systems have been developed in almost every programming language in use over the last 20 years and the same level of heterogeneity applies for API’s and databases.

Since 1995, CUH has been part of the Copenhagen Hospital Corporation (CHC) where six hospitals in the Copenhagen area are working together in a loosely coupled structure. As the largest hospital in CHC, the hospital not only plays a prominent role when it comes to patient treatment but also as the primary hub for many shared IT-services within CHC. This development is likely to continue because the CHC is expected to grow within 2-3 years as part of a large structural reform in Denmark.

Since 2002, CHC had been working on an EA and early in 2004 they delivered a descriptive EA blueprint for EPR-systems – called ‘‘The reference architecture for EPR’’ – based on the national EPR process model (G-EPR) for clinical data. This architecture describes the semantic and technical requirements for the six hospitals in the Copenhagen region. The CHC architecture does not focus on other relating applications besides the core modules of the EPR-system and CUH therefore decided that they needed their own EA.

The process of implementing an EA program at CUH started in the summer of 2004. The CUH CIO and his chief architect initiated the work, while other parts of the IT-organization and an external IT architect acted as reviewers. The first version of the reference architecture was completed in the first quarter of 2005. In figure 1, the three political

domains that CUH must work with in their EA program are outlined.

The National Board of Health represents the government health sector level. This level broadly defines how IS in the healthcare sector should operate through legislation and models of clinical processes, e.g. a national EPR process model (G-EPR) for clinical data. The community body of the hospitals in Copenhagen defines the common EA in compliance with government regulations and IT-architecture best practices. Finally, CUH defines their EA, taking into account the framework of architectures from both government and the community body.

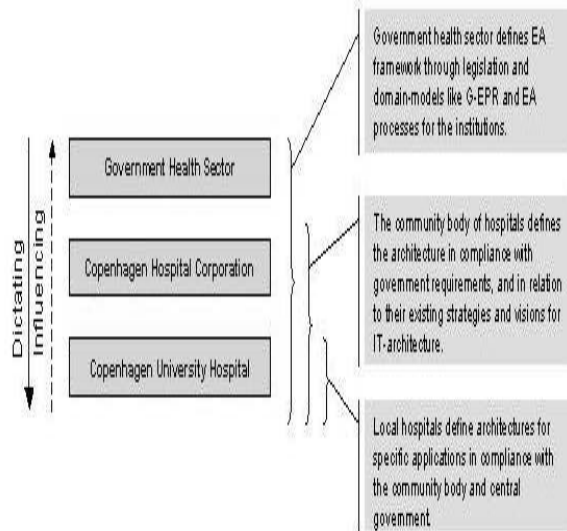


Figure 1: Governance levels and functions from an EA perspective

The arrows in figure 1 show how the government health sector and the community body can, in theory, dictate the EA programs at the lower level domains while CUH at the local level only has limited influence on the national and sector architectures. However, the analysis reveals that in practice there is no clear mandate from CHC or the government health sector for the EA interoperability requirements at the local level. In other words, the institutional structure does not dictate a clear distribution of power between the different levels and functions of the Danish health sector.

5. Analysis: Implementing and Managing the Enterprise Architecture Program

The initiation of the EA program at CUH was no straightforward process. EA was a new concept to both the chief architects and the top management and

defining the objectives and the scope of the project was therefore difficult. From the beginning the chief architect said:

“For us, the primary challenge is to relate it [EA] to our strategic goals, which includes establishing and maintaining a homogeneous IT-environment that works - including EPR. Therefore finding time and necessary resources and skills for this [EA] project is a challenge”.

But why then implement an EA program in the first place? The next sections analyze this why part of the research question while the subsequent section answers the how part by describing the practical interoperability coordination challenges that CUH was faced with.

5.1. Strategic Drives for Implementing Enterprise Architecture

Identifying the benefits and effects of having an EA program at CUH was difficult to envision at the outset of the program. While the IT-management wanted a set of descriptive EA blueprints describing CUH’s technical and organizational requirements for every employee to use in their daily work, the system owners interviewed at the initiation of the EA program did not believe that the program would have any impact on their work. As one system owner interviewee said:

“To me the enterprise architecture will probably not mean much for my choice of application, or how the application will fit into the overall architecture”.

At first, the most obvious reason for implementing the EA program at CUH seemed to be the technical interoperability challenges inferred by the new EPR systems. But analyzing the collected data through the theoretical lens of institutional theory, it becomes clear that economic, political and institutional arguments for implementing the program were just as important. In the analysis phase of the research program three strategic drivers were identified using the Thematic network analysis methodology. The three drivers identified help us explain why public organizations implement EA programs:

1) Increased interoperability and integration requirements: The most obvious argument for implementing the EA program was an increased demand for interoperability and integration. Over time, several layers of historically separate IT-artifacts have accumulated internally. With the EA

program CUH hopes to tie the existing applications, data and infrastructure technologies together to increase the technical interoperability internally.

Externally, the need for interoperability has grown due to increased environmental complexity and instability surrounding CUH. The structural reforms in Denmark will influence the Copenhagen hospital region, resulting in reorganizations and an increasing need for data to be exchanged in a network of private and public hospitals, medical practitioners and specialists all over Denmark. This increases the demands for external interoperability and requires a high level of agility in the way that IS in the health sector are organized. Thus, the EA program is aimed at improving both the internal integration and the horizontal interoperability that enables an agile external collaboration.

2) Pressure for economic and operational efficiency: The analysis showed that trends from the NPM tradition like strategic planning, incentive pay, performance appraisal and contracting out were high on the CUH CIOs agenda. The EA program was seen as a tool that could consolidate the IS infrastructure. The long-term goal of this consolidation is to limit both the heterogeneity of technological platforms and the diversity in products to reduce IT-costs. As the CIO said in one of the interviews:

“This project is not only about technology and further integration. We want to save money by making our IT more simple with less vendors, less diverse applications and reduced maintainers costs in general. We must think about the future and this [EA] is a good tool for doing that.”

In regards to the coming expansion of the Copenhagen health region, and the on-going process of pulling the hospitals in the existing region closer together, it was important that specific systems were assimilated along with their knowledge into the new hospital region and/or allowed to co-exist alongside until they can be replaced without destroying valuable knowledge. The current heterogeneity amongst the systems makes it impossible to migrate or rebuild systems at once, therefore leaving CUH no choice but to create interoperable services that are available to the healthcare region hospitals. The EA define such common services needed and guides the acquiring, outsourcing, integrating, operating and retiring of the IT-infrastructure.

3) The political agenda: An interesting finding in the data analysis was the consistent emphasis on political motives for implementing the EA program.

In the interviews with the chief architect, it is evident that there was an external pressure of symbolic meaning (or social legitimacy) to conform to commonly adopted practices in the Danish public sector. The chief architect often referred to the national work with EA. In one of the interviews he said:

“We need to follow the recommendations in the national enterprise architecture work. This is the foundation for our understanding of government architecture and by complying with these guidelines we secure interoperability. Also, we want to be taken seriously in our work with IT-management and this is a way to achieve that.”

Also, interviews with the IT-management revealed that the national EA work and CHCs EA blueprint for EPR-systems played a role for implementing an independent EA program at CUH. As the largest hospital in Denmark, CUH has always been very independent. And with the structural reforms underway in the Danish health sector, CUH again needs to position themselves in a new organizational setting.

Institutional theory emphasizes how public institutions are often judged and rewarded on the basis of appearance of success. Hence, the EA program at CUH can be viewed as an attempt to keeping up with the national recommendations, the EA work at CHC and other hospitals as much as “rational” motives such as increasing interoperability, consolidation and value preservation.

5.2. Governing Interoperability Across Institutional Levels and Functions

Defining how interoperability was to be governed across the institutional levels in CUHs EA programs was a difficult and time consuming task. After a couple of months working with the EA program, the chief architect said:

“The largest problem for me is to define where to stop and where to start in regards to the enterprise architecture program at Copenhagen Hospital Corporation. Should I only focus on the 300 applications outside the central EPR-systems or do I include this in my program? And what does the national enterprise architecture program mean to me – if anything?”

Both the CIO and the chief architect at CUH were aware of the EA work conducted by CHC and the national health sector with regards to EPR. As noted

by [7] government cannot always be viewed as *one* enterprise across horizontal and vertical functions. In an interviews with the CIO this was also emphasized:

“You need to understand the work with EA at CHC much better, because that is where 90% of the real EA work is being defined – and we just need to have that in mind all the time. We can develop applications outside the EPR-domain independently, but when they create modules for EPR we need to be compliant all the time.”

In executing the EA work, the chief architect therefore found it challenging to define where the two EA program domains supplemented each other and where CUH needed their own architecture. CUH is part of CHC and the national health sector, but they make many independent IS-decisions. While EPR-systems are patient and treatment centric, many of the applications surrounding the EPR-system has specific functionalities (e.g. X-ray), or are not related to the EPR at the clinical level of operations (e.g. financial system). The EPR-system architecture defined by CHC is connected to some of the 300 in-house applications at CUH and it was therefore difficult to make a clear distinction between the CUH domain and the EA for EPR-systems defined by CHC.

In the practical implementation of the EA program at CUH, many of the principles from the CHC reference architecture could be reused. But to secure the local long-term consolidation of the 300 in-house applications, the CUH EA needed to be broad enough to engulf the functional heterogeneity of the systems. Because of this need and the institutional structure, CUH decided to focus their EA program primarily on technical aspects in their EA, being applications and data.

Figure 2 illustrates how government has decentralized technical interoperability issues in the health sector and how the institutional setting determines the focus of EA programs in government. The figure makes a theoretical distinction between organizational, semantic and technical interoperability based on [7]. The data analysis showed that the interviewees at CUH and CHC also perceived interoperability much broader than common standards for data sharing. So, the chief architect from CHC said:

“This is not only about technical standard setting. We want to make business process and information available across the entire Copenhagen Hospital Region – and we need a broader perspective that builds a bridge between business and technology for that”

To understand the dynamics of interorganizational interoperability it was therefore necessary to expand their (and eventually the authors’) view of interoperability to include the organizational processes, common semantics and technical requirements. Based on the theoretical distinction between different interoperability types, the figure illustrates how CUH is part of higher-level enterprises and how different levels of government have different interoperability concerns related to their specific functions.

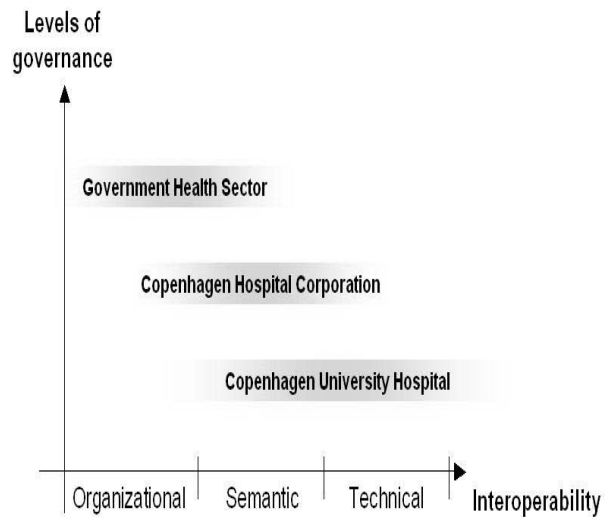


Figure 2: Governing interoperability domains in the public sector

At the government level, the processes that enable specific health care “life-events” [14] (e.g. cancer treatment) to span organizational boundaries are key, while technical aspects of actually implementing these are left to the hospital corporations and/or the individual hospitals. The high-level semantic interoperability requirements are outlined in the national EPR process model (G-EPR) for clinical data, but the practical implementation of the semantic guidelines is left to the hospital corporations and individual hospitals. Or in the words of the chief architect from CHC:

“G-EPR is a model - a kind of recipe - while EPRs are the IT-systems at the hospitals. The recipe defines health care specific terms and their relationships. The recipe should help to ensure that data can be exchanged via EPR-systems where the G-EPR is used.”

As a consequence of this decentralization of semantic and technical responsibilities, the analysis illustrated that CHC primarily focuses on a successful implementation of the EPR-systems. This was clear in the interview with the chief architect from the Copenhagen Hospital Cooperation:

“We focus on data modeling. We need to speak the same language across the Copenhagen Hospital Cooperation and a standardized language for EPR therefore seemed like the job for us.” And later in the interview he says: *“We comply to the G-EPR – for practical interoperability reasons – but we must define much of the stuff ourselves.”*

Concentrating on semantic interoperability issues through data standardization in their EA program, CHC seeks to ensure that the precise meaning of exchanged information is understandable in and by any application or person receiving the EPR-data across the six hospitals. The EA program includes part of the organizational and technical interoperability requirements when it comes to defining the common strategic goals for EPR-systems at the six hospitals and the technical standards used in the EPR-systems. But in general, the hospitals in CHC are free to define their own strategic goals and the practical implementation of the IT-infrastructure.

As we have seen, CUH primarily focuses on technical interoperability issues to enable operational efficiency and external integration. This means that different levels of government have different interoperability concerns.

5.2. Discussion

The analysis clearly illustrates that there is little coordination between the different levels and functions of the Danish health sector. The implementation and management of IS has been decentralized as part of the NPM reforms, and while CUH is a part of CHC and the national health sector at large, in reality the individual hospitals work as independent actors that can manage IS the way they want – across the different levels and types of interoperability.

For CUH, creating interoperability internally and externally is important. But the economic and political arguments for implementing the program proved to be just as important in a situation with large structural changes around the corner creates an uncertain environment where it is difficult for the hospital to justify investments that are not directly related to the day to day business.

Because there is no overall coordination of the different e-government initiatives in the health sector there are no direct economic and/or immediate political incentives for CUH to share data and business functionality with other health care organizations. Hence, the EA program at CUH can be viewed as an attempt to keeping up with the national recommendations, the EA work at CHC and other hospitals as much as “rational” motives such as increasing interoperability, consolidation and value preservation.

One could ask why there is no overall coordination of this kind of e-government initiatives in the Danish health sector. One answer could be that EA is not the right tool for creating interoperability in government at large. The EA frameworks and models that we use in the public sector (e.g [35]) were built for private companies and have a limited organizational focus, while e-government is about seeing the “big picture” [28]. The interviews revealed that some of the system owners at CUH did not believe that EA would have any impact on their daily business, and we must therefore question the value of EA programs at this point.

The primary strength of the EA approach is that it has greatly defined its concepts and instruments to predict and control complex technical systems. But, EA programs might demand so much rigor and organizational coherence that it impairs organizational agility. The question is whether EA is the right medicine for public organizations. Rigorous EA frameworks, vague definitions and organizational adoption are some of the largest challenges. Tomorrow’s EA programs in government must therefore encompass public sector dynamics (and limitations) as well as being agile in the application of interoperable e-government services.

Along this argument, another answer could be that the context of government is simply very different from the context in which the general EA discipline originally was developed. The institutional perspective alerts us to the fact that government is likely to use IS differently than private firms would use it. Institutional theory offers insight by conceiving EA programs as having institutional elements of their own, while also being subject to institutional pressures from public organizations. As noted by [5] it is not likely that the development in the public sector will resemble the extreme growth in electronic commerce. Public sector reforms are qualitatively different from restructuring private enterprises or industries. While dramatic higher profits, promotions, stock price increases, and market shares are drivers for reform in the private sector, this can be a showstopper in the public sector where effective IS

use most often will be rewarded with budget cuts, staff reductions, loss of resources, and consolidation of programs [5]. My claim is that this will be even more noticeable when government processes are automated in the vertical and horizontal integration stages. Here lies the real cost savings and efficiency gains for governments worldwide. However, here government decision makers will also rapidly experience the perversity of incentives for institutional reform in government.

The reality in most e-government settings is that there is a complex goal structure and strict legal norms [28], while interoperable services must still be delivered in a secure and transparent way. Narrowly defined, EA is about implementing IS architectures and interfaces, and this might not be sufficient to capture the complex dynamics in e-government systems development and management. The a-contextual attitude in many public sector EA programs is effective in spreading powerful messages about the benefits of using strategic IS planning as a tool to create interoperability and integration in government. But, they also entail a high risk of misguiding and frustrating local efforts to make sense and appropriate the new phenomena.

As noted by [7] government can not be seen as *one* enterprise and this case study therefore calls for a broader definition of interoperability in networks of cooperation where information and business processes are governed more rigorously across different levels (vertical) and functions (horizontal) of government.

7. Conclusion

This case study illustrates how public sector IS initiatives can no longer be developed in “silos” with no regards to other parts of government. Interoperability and integration is becoming increasingly important when public organizations implement and manage EA programs because technical and organizational processes now span different organizations at different interdependent levels (vertical) and different functions (horizontal) of government.

Governing interoperability across organizational domains in EA programs require that public agencies constitute their EA programs with regard to other parts of the public sector. The analysis revealed different interoperability concerns at different levels of government and we therefore need to expand the traditional understanding of interoperability in public sector EA programs to embrace organizational, semantic and technical issues.

Interestingly, the analysis found that interoperability and integration was not the only argument for implementing the EA program at CUH. Government pressures for consolidation and value preservation and political motives also drive the EA development.

Many of the interoperability challenges arise because the management of IS has been decentralized in the health sector. The analysis of the case study illustrates that public organizations are very autonomous in the management of EA programs and that there is no overall coordination of the different initiatives. This reveals a gap - and even possible counter productive elements - in what the NPM reforms of the public sector are doing and it questions the effects of current approaches to implementing and managing EA programs in public agencies.

The analysis implies that we must reconsider the way that IS is organized and governed in an e-government context. Taking into account the single case focus, CUH’s EA implementation and management implies that the current institutional structures in the public sector is not creating the desired incentives for developing interoperable e-government services. The findings call for a broader definition of interoperability in government EA programs that embraces organizational, semantic and technical issues to incorporate the interoperability concerns at different levels and functions of government. The question is whether our traditional EA frameworks can overcome this challenge when we strive to develop interoperability in networks of cooperation where information and business processes are governed across autonomous organizational levels and functions in government.

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