# Construction of Enterprise Architecture in Discourses Within the Public Sector

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**Abstract.** Enterprise Architecture (EA) has been employed in the public sector to improve efficiency and interoperability of information systems. Despite their daily use in the public sector, the concepts of Enterprise Architecture and efficiency are ambiguous and lack commonly accepted definitions. The benefits and outcomes of using EA in the public sector have been studied with mixed results. This study examined the use of EA in the Finnish basic education system using critical discourse analysis (CDA). The research revealed how the role and rationale of EA is constructed in the speech of public sector officials. Three orders of discourse, each having its own views on EA, were found. While there were commonly accepted functions for EA, there were also areas where the concepts were not mutually understood or accepted.

**Keywords:** Enterprise Architecture, public sector, efficiency, discourse analysis, CDA

## 1 Introduction

Improving public sector efficiency has attracted an enormous amount of management attention in western economies [24], especially since the introduction of New Public Management (NPM) [6]. NPM demands the public sector to operate in a more 'business-like' manner, stressing performance, reduction of costs, efficiency and audits [3]. While the term efficiency is widely used, it is often unclear what it means in the context of the public sector [24].

Regardless of whether a public sector official advocates NPM [3], the digitalization of services and the use of interoperable information systems reduces the need for workforce by automating tasks and creating new, easier means of service delivery [32]. However, public sector information systems have experienced problems with issues such as interoperability, information silos and systems that are not user friendly.

Enterprise Architecture (EA) has been seen as a promising tool for improving information systems interoperability, standardization and business-IT alignment in the rapidly changing world of public administration [5], [23]. However, experiences in using EA in the public sector are mixed [10], [13], [18].

adfa, p. 1, 2011.

EA was employed to improve interoperability of information systems and to help coordinate and develop new information systems and services for the Finnish public sector. The use of EA and the Finnish National Enterprise Architecture framework have been mandatory in the Finnish public sector since 2011. The performance audit done in 2015 revealed that EA work has 'not been integrated into existing management and planning processes and structures'.[1]

As EA generally has not fulfilled its expectations nationwide, a study was conducted to determine the reasons and rationale for using or not using EA in daily public sector activities. A critical research approach [28] using Fairclough's critical discourse analysis (CDA) [7] was chosen to gain insight into the use of EA in the public sector. As EA is meant to be used nationwide [15], [23], a series of interviews was conducted vertically in the Finnish public administration, from the ministry level to the municipal level. The case organization selected for the research was the Finnish basic education system. While Fairclough's view on CDA does not require a research question—the starting point should be a social problem—the following question was posed to research data: '*How are the terms Enterprise Architecture and efficiency constructed and linked in the speech of public sector officials?*'

## 2 Background

### 2.1 Efficiency in the public sector

The terms efficiency, productivity and effectiveness are often used interchangeably in political discourse. Pollitt and Bouckaert define efficiency as the ratio of *output* to *input*, and effectiveness as the ratio of *outcomes* to output: 'Efficiency increase (or productivity gain) is usually defined as an improvement in the ratio of outputs to inputs.' [24].

Improving efficiency has attracted an enormous amount of management attention in western countries. However, different ways of measuring performance and efficiency are met with 'conceptual mess' [4], [24], [31]. Sometimes the output and input are mixed, and sometimes the concepts are too vague to be used consistently across the public sector (see [31]).

With the education sector, the situation is, if possible, even worse. While it would be possible to measure the ratio of outputs to inputs—i.e., the ratio of pupils educated per a given amount of money—such measurement quickly proves itself inadequate. More important than the number of pupils is what they learn and how their education will help them later in life. Thus, the emphasis is on the outcomes of the education, not the outputs. With education, there also exist attribution problems [24]—how the effect of the school can be extracted, as research has shown that outcomes depend on the neighborhood [1] and parental involvement [9], just to name a few.

Regardless of the difficulties on measuring—or even defining—efficiency, the improvement of productivity and efficiency in the public sector is a popular topic in political speeches and documents. The improvement of efficiency can be seen in

[1] National Audit Office of Finland, Audit report 7/2015

Finnish Government Programmes since the 1990s. In the Government Programme of the current Finnish government (Sipilä I), *digitalization* is named as a way to improve the efficiency of the public sector.

### 2.2 Enterprise Architecture

Research on EA still lacks a common definition and common terminology [15], [28]. It can be viewed as an 'integrated representation of the business and information technology in past, current and future states' [28] or a 'coherent whole of principles, methods, and models that are used in design and realization of enterprise's organizational structure, business processes, information systems, and infrastructure' [16]. Several definitions present EA as linking business and IT, defining the key principles of organization while, on the other hand, acting as a normative restriction of design freedom [17].

Use of EA in the public sector has been researched widely [30], and it has been seen to improve the interoperability of Information Systems (IS) and the efficiency of operations [5], [12], [15], or even reduce failure in development projects [14]. EA is being used in many roles and for many purposes [21].

There have been attempts to clarify the concept of EA in the context of public administration. Janssen et al. conceptualized Government Architecture (GA), saying that 'GA consists of frameworks, principles, guidelines and standards to guide design projects and deal with complexity. These elements are used to direct and guide initiatives occurring at all levels of government.' [15]. Gregor et al. saw Enterprise Architecture as a tool for 'business' and IS/IT alignment within organizational units [5]. Larsson researched a case involving multiple organizations within the Swedish healthcare sector [18]. The case studies have shown that there are benefits to be gained through use of EA, but also that many ambiguities, problems and open questions exist [5], [12,13], [18,19], [31].

### 2.3 Critical Discourse Analysis

A critical approach is not common in information systems research [20], [25], although it is regarded as a third alternative to positivistic and interpretive research [22]. What differentiates a critical approach from an interpretive approach is its focus on '*critiquing existing social systems and revealing any contradictions and conflicts that may inhere within their structures*' [ibid.]. Critical discourse analysis (CDA) studies texts—written or spoken—as social events that are governed by underlying social structures. These social structures are in constant dialogue with social events—on one hand, the structures govern the ways the events may take place, and on the other hand, the events are constantly reiterating and recreating social structures. [7]

CDA has been used in IS research, e.g., [2], [11]. CDA methodology of Norman Fairclough was chosen because it stresses both the careful study of texts and linking them to their social context. The starting point of the research is 'social problem which has semiotic aspect' [7]. The difference between CDA methodology and interpretive linguistic research approaches and methodologies is that the actions and actual

practices of the informants are not under study. Instead, the structures and truths governing the speech are the focal points of the research.

This research addresses two concepts—Enterprise Architecture and efficiency—that both lack a clear definition and are used ambiguously. In this research, these concepts are viewed as *socially constructed*, and the way in which they are rationalized and situated in the speech of public sector officials is examined. In terms of CDA, assumed background knowledge that governs the use of the concepts was sought. As an alternative to using only the interview texts as data, external sources were used to position the texts in their context.

# 3 Research Setting

## 3.1 Finnish Basic Education System

The structure of the Finnish public sector relevant to the basic education consists of two bodies—the state's central administration and local administration.[2] The highest central body in the hierarchy is the Ministry of Education and Culture. The Finnish National Board for Education operates under the Ministry's supervision. The local administration consists of 313 municipalities that are self-governing entities. Local self-government is based on the constitution of Finland. Thus, the central bodies have no direct authority over the municipalities. Their authority relies on the power to adopt acts that are decided by the Finnish Parliament, or give decrees and other binding instructions.

The Finnish basic education system consists of nine-year compulsory schooling that starts in the year when a child turns seven. Basic education is funded by municipalities, and 97% of the schools are public.

Basic education is regulated by the central administration. The most important guideline is the national core curriculum determined by the Finnish National Board of Education.[3] On the municipal level, Finnish basic education is one of the largest responsibilities of the municipalities, typically the biggest after social welfare and healthcare expenses. Therefore, the schools in Finland are part of the organization of the municipality in which they operate. Each municipality has some kind of organization for governing its schools. As the population of a municipality in Finland ranges from under 1,000 to over 600,000, municipalities have devised various ways to organize their basic education.

The Finnish basic education system has been widely regarded as an exemplary way of organizing public education [26, 27]. Finland has been at the top of OECD Programme for International Student Assessment (PISA) rankings.

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2 http://vm.fi/en/administrative-structures

3 http://www.oph.fi/english/curricula_and_qualifications/basic_education

### 3.2 Enterprise Architecture in Finland

Enterprise Architecture was introduced to the Finnish public sector through the Act on Information Management Governance in Public Administration in 2011. Since then, all public organizations have been instructed to describe their operations according to the national EA framework, although it is not yet strictly mandatory [19].

Finland has created its own EA framework, called JHS-179. It is a simplified version of TOGAF. As suggested by [23], Finland has chosen a top-down approach for EA. While few national-level architectures exist to date, the design principles have been given and the responsible ministries have been named. A 2015 report of the National Audit Office of Finland states that 'The terminology used in the materials (of Finnish National Enterprise Architecture) is open to interpretation. The language used in the materials and the manner in which the information is presented are very difficult to understand and seem only to be intended for technical experts.'

The term National Enterprise Architecture (NEA) was chosen in this paper to refer to Enterprise Architecture in the Finnish Public sector, as mandated by the Act.

### 3.3 Research Data

The data used in this research comprised interviews conducted with public sector officials in touch with basic education. The officials had backgrounds in educative sciences, information and computer sciences, and in fields such as administrative sciences. A total of 12 interviews were conducted with officials in the Ministry of Education and Culture, the Finnish National Board of Education and two municipalities. The officials interviewed in the central administration were selected because of their knowledge of NEA in the basic education sector—typically, they were responsible for NEA in their sector or were participating in work on NEA. The officials at the municipal level were chosen so that their knowledge of both basic education and IT architecture were represented in the interviews.

The topic of the interview presented to the informants was "EA in the Finnish Public Sector." The letter inviting them to participate in the interview stated that the interview was not meant to be a measure of EA knowledge, a measure of EA maturity level, or a comparison to any given EA framework. No other background information about the research were given to the informants. The same letter was sent to all informants.

It was promised that the names and titles of the informants would be kept confidential. This was important in order to get the informants to speak freely about their impressions. The subjective estimate of the interviewer was that the interviews were open, and the informants gave their honest opinions about the state of EA work. In order to maintain the confidentiality of the interviews, the quotes used in this paper are anonymous.

### 3.4 Analytical Framework

In Fairclough's CDA methodology, discourse is defined as ways of representing [7]. From the interviews, words and concepts that were used to describe the work related to EA were identified as well as results of such work and rationale given for such work. In addition to the transcribed and recorded interviews, the ways in which the text was connected to discourses in the media and in research literature were investigated.

Discourses are constantly evolving and are constantly in dialogue with other discourses. Recontextualization is the process of internalizing ideas and concepts from other discourses. Recontextualization is not merely a borrowing—the actors actively appropriate the new concepts, and this process may lead to unpredictable transformations and outcomes [8]. In the research, concepts and parts of text that were 'borrowed' from other sources were analyzed.

The ways in which the informants differentiated themselves from other parties in their speech were also analyzed in the texts. As each discourse offers a representation of the world, it also conveys direct or subtle ways to differentiate between the speaker and others, or 'us' and 'them.' Often in these cases, the speaker uses generalization—i.e., a single individual or single act is generalized to represent a group of people. While generalization is used to describe the properties of 'others,' it also highlights the speaker's views on the 'normal' and 'desired' properties or ways of working.

Thus, a three-dimensional framework was used in the analysis. For the parts of the interviews discussing Enterprise Architecture, the ways used to *represent* EA, concepts and items that were *recontextualized*, and words with which the informants *differentiated* their positions from others were studied.

## 4 Findings

### 4.1 Discourses Found in the Interviews

In Fairclough's CDA, discourse is a way of representing aspects of the world [7]. The interviews described the use of Enterprise Architecture from multiple angles. The informants used different words, and all had various experiences with EA. When all three dimensions of the analysis framework were used, there were three groups of discourses that stood out from the data (see *orders of discourse* in [7]). The groups found were not homogenous—within one group, there were multiple conflicting opinions and ways of describing EA. Still, within the group, the extracts from the interview revealed common beliefs, values and ways of legitimation. The orders are summarized in Table 1 and explained below.

The first such group of discourses was named the *Information and Communications Technology (ICT) discourse.* In this discourse, the use of EA is legitimated by the fact that there exists room for improvement in current ICT systems. EA is seen as a way to combine the needs of 'function' and 'operation' in ICT systems. The discourses carry the rational view used in engineering sciences—that EA is a way to achieve 'better' systems. The resulting architecture is a *contract* or a *blueprint* [29].

**Table 1.** The main three orders of discourse found in the interviews.

| | ICT | Educational | Administrative |
|---|---|---|---|
| Representation | EA is a tool for rational decision-making. | EA is a tool for communication and mutual understanding. | EA is a tool for 'architectural steering' and governance. |
| Recontextualization | Efficiency comes from well-designed information systems. | Emphasis is on *digitalization.* | Efficiency means that administration must use less money. |
| Differentiation | Emphasis on knowledge, especially ICT-related skills | ICT is 'one requirement among hundreds.' | Parties 'cling on to old habits and ways of working.' |

One informant stated this as follows: '*We are missing the connection from architecture work to project management, which would bring the concreteness to this. Without it, it is just paper*.'[4] The informant went on to describe how new projects should always be checked against EA descriptions.

The second group was named the *educational discourse*. In this discourse, legitimacy comes from providing education to children. In the educational discourse, the role of EA was as a collaborative tool for education and IT professionals. The benefit of EA is that it increases mutual understanding: "*We have been happy to have this holistic (shared) view, with people with backgrounds from systems, machines, function, leadership, and even customers.*" The term *shared view* was used in many interviews in one form or another. Whereas in the ICT discourse the EA descriptions were seen as 'complete' descriptions, the educational discourse saw this in another light: '*If we have new development (projects), we have to somehow decide which are regarded as pilot projects and which go to the EA process*.' Thus, EA will not contain all ICT-related development within the basic education sector, but only those projects that require cooperation from IT departments.

In the educational discourse, EA was linked to the concept of digitalization. The concept of digitalization has a broader meaning than, for example, in the Government Programme. Digitalization in educational discourse is seen as the general increase of digital appliances, digital systems, Internet and connectivity. It is not something that can be controlled—it is an emergent and contingent phenomenon that teachers have to cope with. When considered from this perspective, EA is a tool for gaining insight into and knowledge of the issues concerning the information systems used in education. EA is a way to communicate—to share needs and plans with the IT department.

The third discourse was named the *administrative discourse.* This discourse is linked to public administration and to the way public administration is constructed. EA is shown as a means of *governance* and *steering*. The resulting documents of EA work are documents to which lower levels of administration must adhere. EA work is similar to all other administrative work.

All three groups of discourses could exist in a single interview. Thus, the informant could change his or her position in the interview. It was interesting to see that the

[4] The quotes from the interviews are translated by the author(s).

discourses prominent in the interviews were not dependent on the informants' education. The informants typically came from the education sector or had background in ICT. However, the informants used mostly the discourse prominent in their job role, not their background.

### 4.2 Recontextualization in the Discourses

Recontextualization and intertextuality were present in all discourses—different discourses used the concepts from other discourses to legitimize their work and give rationale for the use of EA in their operation.

In the ICT discourse, the concept of *efficiency* was often discussed. Efficiency is recontextualized from the administrative discourse to the ICT discourse to mean more efficient information systems—not to mean layoffs and cuts to employee benefits. Inefficiency is seen in overlapping information systems, in systems that do not have proper interfaces, and in tasks that could or should be done digitally. Thus, efficiency is achieved by spending more money for the development of information systems—which will, in turn, save money in the long run. Information systems are seen as an investment, and increased efficiency is seen as a rationale for funding.

The link between information systems and efficiency was seen also in the administrative discourse. However, in this discourse, efficiency meant that the administration must operate literally with less money. Information systems are not seen as an investment, as in the ICT discourse. EA should be key to this by removing the need of simultaneous information system development in different municipalities. The information systems and interfaces should be developed once, and they should be usable nationwide.

The word efficiency was used hardly ever in the educational discourse. It was replaced by such concepts as *development, cooperation, mutual understanding* and *keeping up with digitalization*. This may be because the word efficiency is extensively used in neo-liberal discourses in the education sector, which are in conflict with the traditional view on independent teachers and quality of education. The educational discourse borrowed many terms and concepts from the ICT discourse, but generally the view was that of the school and the pupils. For example, it was suggested that digital technologies will put pupils in different situations based on their socio-economic background.

### 4.3 Ways of Differentiation

The ICT discourse emphasizes ICT skills and knowledge. For example, it can be seen that the ability to make informed decisions comes from knowledge about the subject, as evidenced in a quote from an informant: "*They are experts in their own domain (education) that have drifted to (ICT sector). If you have to explain the very basics of information systems design to them, how could they make informed decisions?*" While the expertise in the other domains is respected *per se*, it does not provide the authority to make decisions in IT systems.

In the educational discourse, the providing of education is seen as the essential value. EA is seen as 'one of the many' requirements posed to teachers and organizers of education. Thus, the value of EA is instrumental, whereas the value of education is intrinsic. The authority to make decisions that affect the education sector should rest solely in the educative sector. While instructions from IT departments are mandating, they can be regarded with comments such as '*Yes, from time to time there are new instructions from IT. I have such e-mails coming daily from more than a hundred different sources.*' So, while the speaker acknowledges the importance of the instructions, (s)he appeals to the fact that strictly abiding by all rules is not possible. In different levels of government, the same thing is said in different words, but the message is the same: The IT department does not have the authority to tell us how to conduct our work.

In the administrative discourse, education providers and IT staff of municipalities are seen as parties that '*cling on to their customary ways of working*.' The operations could be streamlined by standardizing different ways of working. The ICT discourse shares this view, but it is again recontextualized in the ICT discourse. Whereas the administrative discourse recognizes the autonomous nature of the municipalities, the ICT discourse carries the notion of mandated compliance to common norms. It was also noted that conditional clauses regarding EA were often used in the administrative discourse: '*The EA would be a great tool to achieve interoperability*.' Sometimes the 'but' was left out, and sometimes it was directly stated that it is not possible to achieve with current administrative structures.

# 5 Discussion

## 5.1 EA as Government Architecture

The role of EA as a resulting architecture, a blueprint that governs future operations, is highly contested. The ICT discourse relies on the fact that the IT department 'has a say' about new projects and pilots in the education sector. The educational discourse opposes the role of the architecture as a guiding tool. The education professionals have their own development methodologies, and EA is not seen as a replacement for them. However, also in the educational discourse, the need to link EA to an organization's strategy was seen as important. The administrative discourse acknowledges the difficulty related to putting EA into practice, as the independent organizations currently have no need to comply with national standards.

While the educational discourse effectively rejects the concept of efficiency, digitalization provides a rationale for EA usage. The informants see the effects of digitalization in the problems caused by the unprecedented and uncontrolled increase in the number of smartphones and other personal appliances. They demand training on how to use the new digital learning environments, and EA is seen as a way to put things 'under control.' However, EA is kept strictly out of the development of other educational activities.

The administrative discourse sees EA as a promising tool, but asserts that it should bring about tangible benefits—i.e., reduction of costs in the public administration.

While the efficiency of the teaching itself is not at stake, there are several systems, like payroll and student registration, that are handled differently in each municipality. This causes overlap of IT development and is a waste of resources. However, the educational discourse sees this as 'operational agility'—when the processes are not fixed nationwide, there is room for pilot development and new innovations. ICT discourse sees these pilots mainly as nuisances, as they often come as a surprise and are not discussed with IT beforehand.

### 5.2 EA as Common Language

The educational discourse sees the role of the National Enterprise Architecture as a common language between educational staff and IT staff. It is a tool that can be used to describe and visualize IT systems and the desired future state. The ICT discourse recognizes this from its own standpoint. The EA can help to agree on the current state and the target state. The administrative discourse shares this view, but the context is in the organization between autonomous parties, while the educational and ICT discourses look at the situation within one organization.

This role of EA is uncontested in the interviews—the need for mutual understanding and common language is recognized in all discourses, but only in educational discourse does this arise as the most important function of EA. From the viewpoint of educational discourse, IT is just one of the requirements imposed on the school system. Other requirements and instructions come from all directions, and the schools have to balance them. Increasing common understanding so that IT departments can help them is an understandable wish.

On the other hand, the ICT discourse and administrative discourse simplify complex operations in the basic education sector as 'function' or 'special knowledge.' While the ICT discourse expresses the desire that EA acts more as a coordinating element, the accountability of the actions remains on the educational side.

## 6 Conclusion

The object of the research was to determine different ways of constructing Enterprise Architecture and efficiency in the speech of public sector officials. Three orders of discourse were found: ICT discourse, educational discourse and administrative discourse. While the ICT and administrative discourses had differing views of the concept of efficiency, the educational discourse did not see EA an as agent for improving efficiency.

The ambiguity of EA's role in practical work has also been noted in other research, such as [18]. The same ambiguity can be seen in this study, but due to the CDA methodology used, the ambiguity was seen to arise from different background knowledge and assumptions embedded in social structures. Hjort-Madsen studied the implementation of EA in the US government using an institutional lens, and found three strategies to cope with the mandated use of EA: accepters, improvers and transformers [13]. Here we see that the Finnish basic education sector has long traditions and is

capable of 'defending itself' against requests from other sources—in fact, it is battling them constantly. However, digitalization in schools provides such an external shock to the system that it is seen as necessary to find new ways to cooperate with IT departments.

CDA was determined a suitable methodology for conducting research on a subject with so many 'free-floating' concepts, such as efficiency and newly introduced Finnish national enterprise architecture. By investigating the text and the social structures and practices regulating the speech simultaneously, the contradictions between different orders of discourse can be revealed.

This research focused on the construction of concepts. The discourses are in constant flux, and a single informant may use different—even conflicting—discourses in the course of an interview. Further research is needed on the power structures behind these discourses [11] —it is clear that the ICT discourse and the educational discourse must align themselves with the administrative discourse when they are applying for funding, but it is not yet clear what effects this has on discourses and daily operations.

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