IT Governance in Organizations Facing Decentralization – Case Study in Higher Education

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Abstract. Decentralization of organizations and subsequent change of their management and operation styles requires changes in organization's processes and heavily involves the IT. A case study in the Higher Education sector in Sweden has shown that Enterprise Architecture (EA) frameworks fit to primarily centralized organizational structures, and as such have shortcomings when used in decentralized organizations. Overcoming these deficiencies requires some new principles to be introduced and incorporated into the EA knowledge. In particular for IT governance, the case study showed that the peer-to-peer principles, such as peer production, can offer more suitable governance over current EA frameworks as they are able to better match the decentralized components of the university's organizational structure.

Keywords: Enterprise Modeling, Enterprise Architecture, IT Governance.

1 Introduction

Enterprises have traditionally implemented formal, centralized forms of organizational structure [1], such as hierarchical or matrix structures. In these structures, communication patterns, roles and decision rights are strictly defined. This allows for management to have a high degree of control over the enterprise and therefore enforce compliance with standards, procedures and policies which results in a highly stable enterprise. However, this comes at the expense of agility; it is difficult for these organizations to quickly adapt to a changing environment. While centralized structures were appropriate for the business environments of the past, modern business environments demand a high level of agility.

Common components of modern business environments include cooperation with different organizations, rapidly changing business activities and processes, and a rapidly changing competitive landscape [2]. In order to properly handle these components, a high level of enterprise agility is necessary. In centralized organizations, decisions need to be discussed at all levels of the hierarchy in order to

obtain the appropriate justification and approval. This takes time; by the time a decision is made, it is often too late for it to be effective. In contrast, having decision making on the operational level allows for quick decisions enabling an organization to take advantage of opportunities quickly. More decentralized structures, such as networked organizations [1], are examples of this. It is important to note that a lack of rigidity and formal structure does not mean a lack of organization. It is still important for a decentralized enterprise to maintain order in its activities; the governance (and IT governance) just needs to be based on an underlying decentralized structure instead of centralized one [3, 4].

Consequently, decentralized organizations need solutions to the same problems faced by centralized organizations – such as business-IT alignment – but the solutions need to be supportive of decentralization over centralization. This can be addressed by the practice of Enterprise Architecture (EA) [5].

Today's EA frameworks and methodologies need hence to be able to handle these environments, where rapidly changing business conditions have been identified as an important problem in EA in this context [6, 7]. For these reasons, ensuring the suitability of modern EA frameworks for decentralized organizational structures and governance which are highly dynamic, is becoming increasingly relevant.

This study reports the alignment between a decentralized organizational structure and an EA in use in a real organization; elicited problems are further analysis in respect to the support from current EA frameworks, as well as from other architectural principles that were considered to be able to solve the problems.

The paper is organized as follows: Section 2 reports a summary from a case study research in a Higher Education organization, in the requested STARR form: situation – task – approach – result – reflection. Section 3 provides conclusions and the directions of future work.

2 Case Study

The organizational structure defines the rules according to which allocation of responsibilities and resources, coordination and supervision, is made for an organization. Three key organizational properties differentiate between centralized and decentralized organizations: *geographical dispersion*, *coordination* (authority, decision rights, standards and regulations), and *communication patterns*. These properties were used as the base knowledge to assess the style of the case organization, and further to analyze the IT governance rules in place.

2.1 Situation

We have analyzed a prominent university for higher education in Sweden. As common, the university includes a number of units - faculties, and faculty departments. Nowadays, the units are becoming more independent than before, due to several factors:

- Geographical dislocation. Some faculty departments have been moved out of the main university campus. An example is the Computer and Systems Sciences department located in Kista, the leading Swedish IT cluster. This proximity enables cooperation between IT companies and students through mentoring programs, internships, graduate work opportunities, guest lectures, etc.
- Decentralization of management. Decision rights are of the type "push-down" delegated by the principal to the faculty boards and deans, and some to the faculty departments and their groups.
- Both formal and informal communication patterns. Formal hierarchical communication from the faculty to its departments and informal direct communication between and within the departments are present. For example, the administrative tasks (e.g. registration for graduate courses, or postgraduate research etc.) is primarily formal, whereas the course curriculum can be established between departments cooperatively, using informal communication links.

Hence, the organization is seen having high decentralization structure tendencies.

2.2 Task

The notions of *organizational structure*, *IT governance*, and *EA* are interrelated: EA principles should reflect the style of IT organizational structure; IT governance follows the organizational structure, and at the same time has to comply with the architecture to-be and the adopted EA principles.

EA includes governance processes such as IT principles regarding operations, data, architecture, infrastructure etc. They are to an extent similar to the processes of IT governance. However, EA governs the development and implementation throughout the organization directing the evolution of the IT and business environment towards a desired design of a future (i.e. primary strategic), while IT governance handles the everyday IT operations within the organization (i.e. primary operational).

The study was to analyze the aspects of university's EA in order to assess the decentralization support provided, in contrast with what is needed; to elicit conflicts between the architecture's principles in use, and the organizational structure and the governance rules, and thus provide a basis for the guidelines for an EA that can provide the needed support.

2.3 Approach

Four separate interviews were conducted in one of university's departments in order to get a holistic view of the way of work across the whole university. The roles of the interviewees were: vice division lead, head of postgraduate studies, head of undergraduate studies, and head of IT. The interviews were conducted in a semi-structured manner, starting with a set of open-ended questions that promote the interviewees to elaborate on their views to organization's processes, decision making, coordination, etc. In addition, many official documents are available on the

organizational structure, thus making a document study viable. The documents that formed this study are described in Table 1:

Table 1. Documents used in the documentation study

Document	Description
Institution's homepage	Contains descriptions of the different organizational areas of the institution as well its organizational structure
Authority delegation documents	Publicly available documents specify authority and delegations of said authority of the insinuation's organizational units
Rule book	The official rule book of the institution detailing the rules and decisions that must be followed by the institution

2.4 Results

According to the EA related literature, enterprise architectural principles are established to define the general rules and guidelines for the use of assets across the enterprise. For the purpose of this study, we have chosen to concentrate on the following adopted EA principle:

– Integrated IT systems across the university.

Owing to a decentralized organizational structure described in 2.1 and as in more details uncovered during the interviews, some decision rights are pushed down to the operational level, which for the IT-related organizational structure has resulted in a highly *decentralized* governance:

Table 2. In-place IT governance framework

Name	Org. Property / Centralization	Description
Authority structure	Coordination / Decentralized	The department and the university have separate IT and the departmental IT does not report to the university
IT adoption (department)	Coordination / Decentralized	Department IT does not dictate all IT used in the department; research projects and centers; for example, groups can develop and use their own IT systems should they desire
Approval (department)	Coordination / Mixed	IT projects are run by independently by groups, though they sometimes need approval from the department if they are expensive

IT collaboration	Coordination / Decentralized	Any decision to cooperate with other departments or with the university IT is made by the departmental IT itself and is based on cooperation resulting on mutual benefit
Management of "essential" central IT systems	Coordination / Centralized	"Essential" systems (e.g. administrative systems such as HR) for the whole university are controlled by the university board. The department is required to pay for and use these systems.
Management of "non-essential" central IT systems	Coordination / Mixed	"Non-essential" systems (e.g. course portals and schedules) are centrally budgeted, but departments are not required to use them.
Use of IT systems (department)	Communication / Decentralized	Informal communication patterns are used, i.e. when changes are performed on systems, they are informally spread to those who use those systems.

In the practice, the governance structure described in the table has become in the mismatch with the settled EA principle to integrate IS systems. This mismatch has resulted in wasted financial resources. For example, we consider a situation outlined in the interview with the vice-head of the department which concerned the acquisition of a software system with the objective of integrated facility management across departments (i.e. "integrated systems" principle). Following the principle, a software system has been bought for university-wide use; since the principle holds for the whole enterprise, the purchase was the decision of the university-board, i.e. the departments were not involved in the decision making process. In contrast, following the decentralized IT governance in place for the use of "non-essential" software systems (Table 2), a subset of them consequently refused to shut down their local systems and switch to the global one. As a consequence, the principle of integration failed; the departments were able to protect their interests (local, decentralized systems tailored for their needs), but were still charged for the acquired system they never used.

Another important mismatch comes from the fact that the centralized decision making (i.e. faculty level) uses formal, hierarchical communication patterns, while decentralized, such as in case of IT governance relies on informal communication (see Table 2) which in practice has no supporting mechanisms. Hence, important decisions on changes in IT are not well communicated (not on time, or not at all) having severe working consequences for employees and students using it.

2.5 Reflections

The case has many of the properties of a decentralized organization and therefore needs an EA supportive of this decentralization. Currently this is not the case because:

- The EA is implicit and does not elaborate in details the adopted principles,
- The EA maintains some centralized principles and is therefore not fully supportive of the decentralization in place.

As a consequence, IT governance initiatives fail, and decisions in IT become inefficient.

Hence it has been relevant to investigate how existing EA frameworks are supportive for decentralized organizations. This question was systematically addressed in [8] where the three key organizational properties – a) geographical dispersion, b) coordination (authority, decision rights, standards and regulations), and c) communication patterns, were used to assess three wide-know frameworks - TOGAF [9], FEA [10], and Zachman Framework [11].

While the analysis revealed some support for decentralization, the main conclusion drawn is that the EA frameworks of TOGAF, Zachman, and FEA are primarily supportive of centralized (and federated) organizational structures, and therefore fail to address the demands of decentralized organizations. Zachman is unable to support any significant aspect of decentralization due to its reliance on traditional organizational roles and structures on the high centralization end. TOGAF does provide some basic support through its ability to have a different architecture for organizational units and by providing space for new methods for the architecture development; it however still mainly relies on hierarchy and central roles responsible for overall coordination and approval. In FEA, the conclusions are similar as it primarily supports federated organizational structures where individual units have their own architectures that are coordinated through centralized standards that must be followed. As shown earlier, an important property of a decentralized business environment that needs to be supported by EA is horizontal coordination (recall the IT governance from Table 2). However, the three EA frameworks primarily support vertical coordination in their governance styles. Therefore, the addition of specific guidelines to these frameworks that are supportive of decentralization would improve their support of decentralized organizations.

Drawing parallels between the domains of *peer-to-peer systems* used to provide a mechanism and architecture for organizing the peers in such a way so that they can cooperate to provide a useful service to the community of users [12] and decentralized organizations, we think that the peer-to-peer concept may be a source of principles that could form the basis for evolving current centralization-focused EA frameworks into ones that are supportive of decentralization.

- *Peer Production*: we view enterprises as being composed of peers (a peer could be individual or an organizational unit), For example, TOGAF relies on an Architecture Board responsible for high-level decisions and governance. Instead of a central board responsible for making decisions, a model based on the principle of peer production [13] for creation and evaluation of EA artifacts could be used instead. This would better support decentralization as decision making would then be distributed amongst the peers that make the organization. In the university case, the department members could produce strategy, or

budget, using peer production (such as for use of information systems). Eventually, faculty or university boards could have control/advisory roles.

- *Peer trust management*: TOGAF employs the idea of an approval process grounded on the presence of centralized authority. This is to ensure that the presented architectural material is in fact valid for the enterprise. According to peer trust management [14], whether some content proposed by a peer is of sufficient quality to be included in the overall architecture, is determined by other peers. In the studied case, this principle could provide a formal mechanism for communication among peers when needed, hence avoid the situations when other peers are not informed about a new proposal (such as a change in IS use).

The suggested peer-to-peer principles will seek to maintain the departmental-independence becoming prevalent at the university, while addressing the incompatible architecture components this results in. This would be accomplished through a cooperative classification of essential and non-essential systems by the departments, for example by giving each department a vote. Systems classified as essential are required to be used or integrated by the departments, while departments have the option to choose if they want to utilize systems classified as non-essential. These changes would help at reconciling differences between the architecture principle emphasized in the case without actually changing it. Decision rights are still pushed down, and IT systems are still integrated throughout the organization, but this change in IT governance at the university level addresses the conflict that can arise when a decision is made to use a decentralized system that the rest of the organization is integrating (as occurred in the current situation).

3 Conclusion and Future Work

While technology serves as a catalyst for organizational transformations, it is important to utilize the right IT resources in a manner that is supportive for the organization. To accomplish this in decentralized organizations, adequate EA processes, principles and concepts are needed to be employed to both handle the IT resources and to foster business/IT co-evolution in decentralized environments.

Current EA frameworks rely on organizational properties that are becoming less useful with progressive decentralization. Due to this, implementation of these frameworks in decentralized organizations becomes difficult and inefficient, and the role of EA as a driver for IT transformations is becoming compromised. In order to deal with decentralization, some changes, or additions to these EA frameworks are necessary in order to improve their support for decentralized business environments, to reflect the style of organizational structure and operational IT governance rules in place Two specific principles of peer-to-peer architectures were outlined, peer production and peer-to-peer trust management; and indicated how they could be used as potential principles for an EA that is supportive of decentralization.

The reflections of this study may be of interest to three groups: the case organization, researchers in the field of EA, and, potentially, other organizations with decentralized structures interested in implementing some form of EA. For the case

organization, the proposed EA principle of peer-to-peer might be of interest, as the application of this principle could offer some improvements to their governance structure. For researchers, this study work might be of interest as it highlights some potential issues with traditional EA knowledge, while giving some initial insights into how they could be solved. These insights are not conclusive; this research should be positioned as a starting point for future research in the topic of decentralization in EA. This work may be of interest to organizations that have adopted, or are interested in adopting a decentralized structure and are looking for the insights into how governance can be successfully done in this environment.

For the future work, we envisage to propose the concrete mechanisms and patterns for communication, coordination and decision making in centralized, decentralized and mixed (federated) organizations, and to see how they can be transformed into concrete EA principles, or explicitly integrated into EA methodologies.

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