THE IMPACT OF CULTURAL DIFFERENCES ON ENTERPRISE ARCHITECTURE EFFECTIVENESS: A CASE STUDY

Complete Research

Faller, Hella, Public Research Centre Henri Tudor, Luxembourg, Luxembourg, Radboud University Nijmegen, Nijmegen, The Netherlands, EE-Team[1], Luxembourg, Luxembourg, hella.niemietz@tudor.lu

De Kinderen, Sybren, University of Luxembourg, Luxembourg, Luxembourg, EE-Team[1], Luxembourg, Luxembourg, sybren.dekinderen@uni.lu

Abstract

We study how differences between organizational subcultures influence the effectiveness of the Enterprise Architecture (EA) function for steering the enterprise. In this paper, we contribute findings from a case study in a governmental organization. We derive seven propositions concerning the relation between cultural differences and EA effectiveness. For one, we suggest that cultural differences among the architects have a negative impact on the architects' communication towards the management. In addition, our data suggest that the influence of cultural differences is indirect: communication defects and disagreement within the architecture board act as important intermediary factors.

Keywords: cultural differences, enterprise architecture effectiveness, case study, explanatory theory.

1 Introduction

In practice and in research enterprise architecture (EA) is increasingly considered as a suitable instrument to steer enterprises (Op't Land et al. 2009). However, in practice EA is often not as effective as desired (Van der Raadt et al. 2010). This may partly be due to the fact that most EA approaches are engineering oriented and downplay the role of soft aspects of steering enterprises (Wagter et al. 2011). Dealing with different organizational subcultures is one such aspect. As explained in more detail in section 2.1, organizational (sub)culture is considered an important factor of influence in the context of steering an enterprise (Detert et al. 2000, Lange 2012, Rouse and Baba 2006, Van Steenbergen 2011). For instance, Lange shows that organizational culture influences the use and the benefits of EA management. Moreover, our earlier research (Niemietz et al. 2013) shows first indication that cultural differences have an impact on EA. It suggests that differences between organizational subcultures cause communication defects, which result in struggles or failure of EA-guided enterprise transformations.

[1] The Enterprise Engineering Team (EE-Team) is a collaboration between Public Research Centre Henri Tudor, University of Luxembourg, Radboud University Nijmegen, HAN University of Applied Sciences, Maastricht University, Utrecht University of Applied Sciences and University of Antwerp. (www.ee-team.eu).

However, our earlier research does not show which cultural differences are relevant and how cultural differences influence EA. This study aims at filling this gap. Our research question is: *how do differences between organizational subcultures influence the effectiveness of the EA function?*

To answer this question we conduct a case study in a governmental agency from the Netherlands. In doing so, we mainly use qualitative semi-structured interviews. To conceptualize organizational subculture and EA effectiveness we use existing frameworks, namely Detert et al.'s (2000) culture framework and Van der Raadt et al.'s (2010) EA effectiveness measurement model. In this paper, we present initial results of the case study: we derive seven propositions concerning the influence of cultural differences on the effectiveness of the EA function. Our findings indicate that cultural differences can lower the EA effectiveness. We also find that the influence of organizational subcultures is indirect. Furthermore, our results support our earlier finding that communication defects are an important intermediary factor in the relation between cultural differences and the EA effectiveness (Niemietz et al. 2013).

The remainder of this paper is structured as follows. In section 2 we elaborate on the relevance of the study and introduce our main concepts. Section 3 presents the used research methods. In section 4 we briefly describe the case organization. Thereafter, we present our results (section 5) and discuss them (section 6). Section 7 concludes the paper.

2 Theoretical basis

2.1 Relevance of cultural aspects for the enterprise architecture function

EA research is predominantly *engineering oriented* and focuses on (meta-) modelling (Simon et al. 2013). Traditional EA approaches, such as TOGAF (The Open Group Architecture Framework) (The Open Group 2011), the Zachman framework (Sowa and Zachman 1992) or ARIS (Architecture of Integrated Information Systems) (Scheer and Schneider 2006) imply that by defining the desired state and the steps necessary to achieve this state enterprises are successfully steered (Wagter et al. 2011). In doing so, such approaches hardly consider the possibility that soft aspects, such as organizational (sub)culture, may influence the effectiveness of EA. Yet, in the context of steering enterprises organizational subculture is considered as an important factor of influence (Niemietz et al. 2013, Rouse and Baba 2006). Given that EA is used to steer enterprises, organizational subculture is likely to also have an impact on the EA effectiveness.

Indeed, experience shows that EA is not as effective as desired when used in practice. For instance, "technical architects […] often help solve short-term, practical problems with their technical knowledge. They are, however, unable to provide senior management with the overview of the organization and advise them on which long-term decisions to make" (Van der Raadt et al. 2010). To account for such practical challenges Simon et al. (2013) suggest conducting more research on EA management and on the integration of EA with related disciplines, such as mergers and acquisitions or outsourcing. We follow this suggestion by integrating EA and subcultural studies.

Despite the dominance of model related research in EA, a small number of management and/or culture oriented EA approaches have been added to the body of knowledge recently. Wagter (2013) and Lange (2012) identify organizational culture as one of multiple factors influencing the success of EA. However, in their studies, they do not investigate in detail how culture impacts EA. Van Steenbergen (2011) and Aier (2014) study the influence of culture on EA in more detail. Van Steenbergen (2011) focuses on the impact of organizational culture on the use of specific EA techniques. Similarly, Aier

(2014) addresses the role of organizational culture for grounding, management, guidance and effectiveness of EA principles[2]. All the presented studies address culture on an organizational level.

Yet, Rouse and Baba (2006) also point at the *importance of considering organizational subcultures* in the context of enterprise transformation. Also, our earlier findings (Niemietz et al. 2013) indicate that differences between organizational subcultures can have a negative impact on EA-guided enterprise transformations. Our earlier study focuses on the perspective of senior enterprise architects. The architects identify cultural differences as a potential factor hampering their work in enterprise transformations. More specifically, the influence of cultural differences on the architects' work is characterized as being indirect with *communication as an important intermediary factor* (Figure 1).

Figure 1. Cultural differences influence EA-guided enterprise transformations (adopted from Niemietz et al. 2013).

As our earlier research focuses on communication (defects), it remains on a general level regarding the role of cultural differences. It does not investigate in detail how cultural differences influence the architects' work. Neither organizational subculture nor struggles/failure of EA-guided enterprise transformations are operationalized, e.g. by using specific dimensions. Therefore, the study does not provide insights into which cultural differences are of importance and what their exact consequences are. This research aims at filling this gap by conducting an in-depth study focusing on the role of organizational subcultures in EA. In doing so, we use effectiveness of the EA function as dependent variable. Thus, our main research question (RQ) is: *how do differences between organizational subcultures influence the effectiveness of the EA function?* This question can be broken down in three subquestions:

RQ_1 *Which cultural differences influence which dimensions of the EA function's effectiveness?*

Following our earlier results (Niemietz et al. 2013), in our analysis we pay special attention to the role of communication defects. While in Niemietz et al. (2013) we provide a typology of communication defects occurring in EA-guided enterprise transformations, we do not address which of those defects can be traced back to cultural differences. Therefore, our second subquestion is:

RQ_2 *To what extent do communication defects, as presented in Niemietz et al. (2013), act as an intermediary factor in the relation of cultural differences and the EA function's effectiveness?*

Finally, during the data analysis we also pay attention to other factors that may emerge from the data:

RQ_3 *What are additional factors playing an important role in the relation between cultural differences and the effectiveness of the EA function?*

In the following sections we present the operationalization of our three main concepts (organizational subculture, effectiveness of the EA function, communication defects) as used in our study. Due to a lack of space we keep to the essential points when presenting the three frameworks.

[2] EA principles (EAP) are "a restriction of design freedom for projects transforming EA from an as-is state into a to-be state. An EAP should be based on corporate strategy. It does not include statements on particular business requirements but on the way these requirements are implemented" (Aier 2014).

2.2 Organizational subculture

Culture can be studied on different levels, e.g. the national level (Hofstede 2001), the organizational level (Detert et al. 2000, Hofstede et al. 2010, Schein 2004) or the organizational subgroup level (Detert et al. 2000, Hofstede 1998, Schein 2004). Our research focuses on the latter, i.e. on organizational subcultures. As a generic term culture has been defined in various ways by different authors (e.g. Hofstede 2001, Kraus et al. 2006, Schein 2004, Trompenaars and Hampden-Turner 2012). Their definitions apply for all culture levels. Solely the unit of analysis (e.g. nation, organization or organizational subgroup) needs to be adapted to the respective level. For our purposes we combine existing definitions: *organizational subculture is the sum of values, norms and attitudes, which are adopted consciously or unconsciously by the members of an organizational subgroup, and which distinguish the members of the subgroup from those of another subgroup in the same organization* (Hofstede et al. 2010, Kraus et al. 2006, Niemietz et al. 2013, Schein 2004).

Different frameworks exist to operationalize organizational (sub)culture (e.g. Detert et al. 2000, Hofstede 1998, Hofstede et al. 2010, Trompenaars and Hampden-Turner 2012). Most of them describe a (sub)culture according to dimensions, e.g. uncertainty avoidance or power distance (Hofstede et al. 2010), which represent specific values of a (sub)culture. Each dimension can be understood as an ordinal scale with dichotomous values. In the case of uncertainty avoidance, the two extreme values are ‘weak avoidance’ and ‘strong avoidance’ (Hofstede et al. 2010). In our study we use the framework of Detert et al. (2000). We choose this framework for three reasons: first, the framework presents a synthesis of multiple previously existing culture frameworks. Second, Detert et al. (2000) apply their framework in the context of total quality management (TQM), an area that, similar to EA, takes a holistic view on enterprises (Cua et al. 2001). Finally, Detert et al.’s (2000) framework has already been successfully applied in the context of EA (Van Steenbergen 2011). The framework comprises eight dimensions, which are described in Table 1. The descriptions and the values are adopted from Jones et al. (2006) who apply the framework in the context of knowledge sharing in ERP projects.

Culture dimension	**Description**	**Values**
Basis of truth and rationality	Extent to which organizational subgroups seek truth through systemic, scientific study using hard data or through personal experience and intuition.	Hard data vs. personal experience
Nature of time and time horizon	Extent to which organizational subgroups focus on the long term or the short term.	Short term vs. long term
Motivation	Extent to which organizational subgroups deem that individuals are motivated by an internal desire to perform well or by external rewards and encouragement.	External vs. internal motivation
Orientation to change	Extent to which organizational subgroups have a propensity to maintain a stable level of performance that is ‘good enough’ or a propensity to seek to always do better through innovation and change.	Stability vs. change
Orientation to work	Extent to which organizational subgroups focus on work as an end (results) or to which they focus on the process by which work is done as a means to achieve other ends.	Process vs. results
Orientation to collaboration	Extent to which organizational subgroups encourage collaboration among individuals and across tasks or encourage individual efforts over team-based efforts.	Isolation vs. collaboration
Control, coordination and responsibility	Extent to which organizational subgroups have decision making structures centered around a few vs. decision making structures centered around dissemination of decision making responsibilities throughout the group.	Concentrated vs. autonomous decision making
Orientation and focus	Extent to which organizational subgroup improvements are driven by a focus on internal process improvements or by external stakeholder desires.	Internal vs. external orientation

Table 1. Dimensions of organizational subculture (adopted from Detert et al. 2000 and Jones et al. 2006).

2.3 Effectiveness of the EA function

The effectiveness of the EA function can be defined as "the degree in which organizational objectives are attained through the outputs of the EA function" (Van der Raadt et al. 2010). Little literature exists on how to measure or evaluate the EA effectiveness. Kamogawa and Okada (2005) develop a framework for assessing the EA effectiveness in the context of e-business. In doing so, the authors focus on the effect of EA on four business values, namely business process excellence, customer orientation, innovation and strategic adaptability. However, Kamogawa and Okada (2005) do not justify why they choose those values to define EA effectiveness. Also, they do not make explicit how the EA function contributes to the four values. Therefore, this framework does not seem to be suitable for our study.

Another approach of measuring EA effectiveness is proposed by Van Steenbergen and Brinkkemper (2009). They argue that "the intended contribution of the architectural practice to the business goals" (Van Steenbergen and Brinkkemper 2009) is organization specific. Therefore, Van Steenbergen and Brinkkemper's (2009) architecture effectiveness model presents a structure that helps to model the contribution of EA to business goals. Because, according to the authors, EA effectiveness is organization specific, the model does not contain any specific dimensions that can be used to evaluate the effectiveness of the EA function. Therefore, this model does not fit our purposes.

	Dimension	**Contributing output of EA function**
Agility	External monitoring	Architects keep up with the social, market, technological and regulatory developments, and help management in identifying opportunities and required changes.
	Flexibility	Standardized organizational components (through EA products and EA governance) enable easy re-orchestration of components to implement change.
	Speed	Architects use their domain knowledge to help projects shorten their lead time by identifying and helping integrate the new solutions with the existing organizational components.
	Quality & customization	Architects use their domain knowledge to guide projects in making high quality designs, ensuring the quality requirements of the products and services are realized.
	Initiation of change	Architects help management in decision making about new business and IT ideas, by creating solution alternatives and analysing their profitability and feasibility.
Alignment	Internal monitoring	EA products describe the quality indicators of all organizational components, and thus provide input for the specification of performance indicators and service level agreements. Architects perform reviews of implemented solutions and changes.
	Communication & understanding	EA products contain explicit knowledge (descriptions) of business and IT components, which allows for knowledge sharing. Architects provide management with insight in, and advice about, the consequences of decision making on existing organizational components.
	Governance	Architects translate strategic objectives to an architectural blueprint and transformation roadmap. Architects ensure that solutions and operational changes conform to these EA products.
	Partnership	EA products link strategic plans and organizational components of the business (optimized for value creation) and IT (optimized for business support). By embracing and ratifying these EA products, business and IT management create a sense of partnership.
	Readiness for change	EA products provide insight in the consequences of, and the rationale for, organizational changes. By explaining the consequences and rationale, architects help changing the attitude, opinions, and behaviour of the employees impacted.
	Conformance & integration	EA products provide transparent and enterprise-wide coherent architecture and standards. They describe and prescribe the consolidation and integration of organizational components. Architects ensure that all changes and new solutions conform to these EA products.

Table 2. Effectiveness of the EA function (adopted from Van der Raadt et al. 2010).

A framework that suits our purposes is the EA effectiveness measurement model by Van der Raadt et al. (2010). This model is mainly developed based on two literature studies and has been assessed in a case study. The first literature study addresses the question which organizational objectives the EA function contributes to. The authors identify agility and alignment as the two main objectives. In a second literature study, Van der Raadt et al. (2010) investigate which EA objectives are likely to contribute to achieving agility and alignment. They identify 131 low level EA objectives and aggregate

them to 11 high level objectives (5 for agility and 6 for alignment). Table 2 presents the 11 EA objectives and explains how the output of the EA function contributes to achieving those objectives.

2.4 Communication defects

As stated in section 2.1, in Niemietz et al. (2013) we indicate that communication defects are an important intermediary factor in the relation between organizational subcultures and the effectiveness of the EA function. Also, Van der Raadt et al. (2010) argue that the lacking EA effectiveness is partly due to a problematic interaction between architects and stakeholders. Therefore, in our analysis the role of communication defects receives special attention.

Based on expert interviews with senior enterprise architects our earlier research (Niemietz et al. 2013) identifies three high level communication defects: (1) lack of communication, (2) inappropriate communication and (3) over-communication. Each high level defect comprises a number of low level communication defects (Table 3). We deem most of the defects self-explanatory, except for 'implicit and explicit communication not aligned': explicit communication relates to explicit statements, whereas implicit communication manifests itself through actions. These two types of communication may be misaligned. Such a misalignment may, for instance, be perceived if a company states that they want to improve the quality of its services (explicit) and, at the same time, introduces cost reduction as a new KPI (implicit) (Niemietz et al. 2013).

High level communication defects	**Low level communication defects**
Lack of communication	Not stating all requirements
	Not engaging stakeholders
	Not stating scope constraints
	Not listening to each other
	Not assigning responsibilities
	Not checking if people are in line with the goals
Inappropriate communication	Inappropriate means of communication
	Inappropriate communication style
	No shared frame of reference
	Communication against the transformation
	Implicit and explicit communication not aligned
	Dishonest communication
Over-communication	Communicate too much at a time
	Too much coordination

Table 3. Communication defects ocurring in EA-guided enterprise transformations (adopted from Niemietz et al. 2013).

3 Methodology

Our research aims at developing an *explanatory theory*, i.e. a theory that "provides an explanation of how, why, and when things happened, relying on varying views of causality and methods of argumentation" (Gregor 2006). According to our research question we conduct *qualitative case study research*: "case studies are the preferred strategy when 'how' or 'why' questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context" (Yin 2003).

In the case study we use multiple sources of data (Yin 2003), namely internal documents, a focus group and qualitative interviews. We start our study by conducting a context analysis. To this end, we analyse internal documents, e.g. strategic documents, organizational charts or project plans. To triangulate the data gathered from the document analysis (Yin 2003) we conduct a focus group meeting

with the architecture board. In doing so, we collect information about the organizational structures, objectives, history, etc. Furthermore, the focus group meeting provides first insights into the challenges the EA function encounters. In the focus group meeting we also address the EA objectives. In doing so, we present Van der Raadt et al.'s (2010) dimensions (Table 2) and verify to what extent further objectives need to be added to the list.

The main part of the case study consists of semi-structured interviews. We interview members of the transformation project team and an architect. Semi-structured interviews help the researchers to concentrate on specific topics and, at the same time, offer the possibility to improvise and explore emerging subjects of interest (Corbetta 2003, Runeson and Höst 2009). As we focus on the role of organizational subcultures our interview guide is structured according to Detert et al.'s (2000) culture dimensions. Each 'culture section' addresses three different contents: (1) the interviewee's attitude towards the respective dimension, (2) the key stakeholders' attitude towards the respective dimension, and (3) the impact on the EA effectiveness. In total, we conduct four semi-structured interviews. The interviewees are chosen by one of the architects who is our contact person in the case organization. The interviewees' characteristics are shown in Table 4 (#1-4). The duration of the interviews varies from 30 minutes to 3 hours depending on the person's availability. Every interview is recorded and transcribed. We adapt the transcription's level of detail to our purposes (Kvale 2007).

In addition to the four semi-structured interviews we conduct an unstructured interview with another architect (interviewee #5, Table 4). This interview emerges spontaneously during our stay at the organization's premises. It takes approximately 30 minutes. This interview is not recorded. However, notes are taken during the interview.

#	Position	Department	Sex	In the organization	Work experience
1	Former project leader	Innovation	male	0.17 years	15 years
2	Architect	Innovation	male	5.33 years	38 years
3	Senior project employee	Relationship management	male	12 years	45 years
4	Departement head/ project responsible	Relationship management	female	1.5 years	12 years
5	Architect	Business control	male	6.5 years	25 years

Table 4. Characteristics of interviewees.

To analyse the interviews we code the transcripts of the semi-structured interviews as well as the notes taken during the unstructured interview. As our study has a clear focus, most of the codes we use are predefined. However, we also include open coding to account for emerging subjects (Flick 2009). The predefined codes comprise Detert et al.'s (2000) culture dimensions (Table 1), Van der Raadt et al.'s (2010) dimensions of EA effectiveness (Table 2) and Niemietz et al.'s (2013) communication defects (Table 3). Furthermore, to account for context information we add context related codes. As an additional code 'disagreement within the architecture board' emerges from the open coding. Where possible we triangulate the insights from the interviews with insights gained from the document analysis (Yin 2003).

4 Case description

We conduct our case study in a governmental agency in the Netherlands (in the following called GovNed). The core business of GovNed is maintaining different data systems: GovNed "wants to be an excellent execution organization. The agency maintains its core tasks (system management) and wants to execute them in a way that guarantees a reliable registration and delivery of data, now and in the future" (quote from internal strategic document – translated from Dutch). The data systems GovNed maintains are used by national and local governmental institutions and by selected non-governmental

parties, such as insurance companies or the police. As stated in the quote, GovNed is an execution organization getting their assignments from other organizations. The majority of their assignments come from a governmental agency responsible for developing new legislation and regulations. This agency is GovNed's sponsor.

GovNed's EA function (Van der Raadt and Van Vliet 2008) comprises the management team (MT) and the architecture board. The MT consists of GovNed's director and the heads of the different departments. The architecture board consists of three architects. The members of the architecture board belong to different departments. While the *architecture board is responsible for EA delivery and EA conformance*, it has no decision making power. The *EA decision making is done by the MT*. Thus, the architecture board has an advisory role towards the MT. An internal rule of GovNed stipulates that every new project plan, change request, etc. (mostly coming from their sponsor) has to be approved by the architecture board before the MT will decide about it.

According to our focus group the objectives of GovNed's EA function match with Van der Raadt et al.'s (2010) dimensions (section 2.3). None of the dimensions is eliminated by the architecture board. Also, no additional objective is identified. This is in line with our analysis of internal documents.

Our study concentrates on a specific transformation project, namely the *introduction of a new organizational function*. This function's task is to advise citizens. The communication with citizens is new to GovNed. Before, the organization had solely organizations as stakeholders. Focusing the study on one project has two advantages: (1) it helps to select relevant interviewees; and (2) during the interviews we can refer to a specific example, which helps the interviewees understand and answer the questions.

5 Results

Based on the interviews and internal documents we identify two different kinds of cultural differences having a negative influence on the effectiveness of the EA function: (1) *cultural differences between the architects and their stakeholders* (section 5.1) and (2) *cultural differences within the architecture board* (section 5.2). For both cases we find support for Niemietz et al.'s (2013) suggestion that this influence is indirect. Moreover, we find evidence for communication defects acting as an important intermediary factor.

In our case study, four of the culture dimensions presented in section 2.2 (Table 1) have an impact on the effectiveness of the EA function: 'basis of truth and rationality', 'nature of time and time horizon', 'orientation to change' and 'orientation and focus'. The *EA effectiveness is most often influenced concerning its alignment dimensions* (Table 2), more specifically 'communication and understanding', 'governance', 'partnership' and 'conformance and integration'. From the agility dimensions only 'initiation of change' is negatively influenced by cultural differences in our study.

In the following sections we explain in further detail which cultural differences lower the effectiveness of the EA function, and how this happens. From our explanations we derive seven propositions concerning the influence of cultural differences on the EA effectiveness. These propositions are summarized in Figure 2, which shows the links between the different concepts and refers to the different propositions made in sections 5.1 and 5.2.

5.1 Cultural differences between the architects and their stakeholders

Basis of truth and rationality. The architects at GovNed are more oriented towards hard data than towards personal experience. They use written documents to inform about existing dependencies between projects and/or systems. Also, they sometimes request written information, such as project plans, from their stakeholders to ensure that the projects conform to the EA. In contrast to the architects, one of our interviewees is more oriented towards personal experience. As a consequence he is

not interested in the provided documents: "I don't look at those documents too much, no. I'm more of a talkative person than of a reading person" (interview #1). Furthermore, this stakeholder does not produce detailed documents: "when it comes to the project work, I'm the guy who does not have it on paper" (interview #1). The quotes indicate that the different attitude regarding the basis of truth and rationality lead to the use of *inappropriate communication means* (Table 3) by the architects. In this particular case this has an impact on three effectiveness dimensions. (1) *Partnership*: as the stakeholder does not consult the documents, he is not informed about potential dependencies of different projects and/or systems. (2) *Governance* and (3) *conformance and integration*: to ensure that projects, changes or solutions are in line with the EA, the architects consult written documents produced by the stakeholders. Thus, the unavailability of those documents lowers the EA effectiveness (Figure 2).

Proposition 1. *If the architects are hard data oriented and one or more stakeholder(s) is/are oriented towards personal experience, this leads to the use of inappropriate communication means, which has a negative impact on the effectiveness dimensions 'partnership', 'governance' and 'conformance and integration'.*

Nature of time and time horizon. While the architecture board is long term oriented, there are also short term oriented subcultures at GovNed: "the architecture board is focused on long-term efficiency and results. And the project leader or head of department has short term results" (interview #2). One architect expresses his opinion that this short term orientation causes difficulties in understanding the strategic and holistic orientation of the architecture board: "and I think [it] was not clear enough for him to understand the role of the architecture board" (interview #2). This is supported by a member of the relationship management department: "I don't really see what the work of the architects is. We get mails: 'we do this, we do that'. Fine, I read it but after a couple of months I forgot what was in it" (interview #3). This leads to a low involvement of the architects ('not engaging stakeholders', Table 3): "we had contact with him but he didn't understand or grasp the notion that he should work together with us" (interview #2). If the architects are not involved in the project planning and are not consulted concerning important changes or solutions, they cannot "ensure that all changes and new solutions conform to [the] EA products" (Van der Raadt et al. 2010). Thus, a subculture's short term orientation eventually influences the effectiveness dimensions '*governance*' and '*conformance and integration*' (Figure 2).

Propsition 2. *If a subculture is short term oriented, it is likely not to engage the enterprise architects, which has a negative impact on the effectiveness dimensions 'governance' and 'conformance and integration'.*

Orientation to change. As stated in section 4, GovNed's core business is maintaining and managing data systems. However, the organization also has an innovation department. Our interviews indicate that in line with the focus of their tasks, the members of the innovation department are change oriented: "the people working on innovation say: 'we must think how we can make it work in the future and look further'" (interview #3). Our insights from the focus group meeting show that the architecture board is also open to change, even though their orientation towards change is not as strong as the orientation of the innovation department. Since GovNed is focused on maintenance ("people who work on maintenance […] have more borders than people who are busy with innovation", interview #3), the systems that need to be maintained by GovNed are usually developed outside the organization. This leads to the challenge of integrating the externally developed systems into GovNed's landscape. As the architecture board is responsible for integrating organizational components and is open to change, they would like to develop (at least) some of the systems in-house. Yet, "it is impossible with the people who are involved in maintenance" (interview #2) because "that's *a different world*. […] Doing something about it is a different role than just keeping the systems running" (interview #1). Therefore, development continues to be done by external companies, which leads to a lack of involvement of the architects ('not engaging stakeholders', Table 3). Eventually, this results in a negative impact on the effectiveness dimensions '*governance*' and '*conformance and integration*' (Figure 2).

Proposition 3. *The stability orientation of subcultures results in a lack of involvement of the architects, which has a negative influence on the effectiveness dimensions 'governance' and 'conformance and integration'.*

Orientation and focus. Our focus group meeting indicates that the architecture board is predominantly internally oriented: "it is important to focus on internal optimisation" (quote of an architect). In contrast, the relationship management department and the MT are more externally oriented. This can be concluded from both internal documents and our interviews. An internal document concerning GovNed's strategy emphasizes the important role of the external environment by mentioning seven (external) perspectives to take into account. The strategy description does not include an internal perspective. Furthermore, our interviews indicate that the MT and the head of the relationship management department value advice and/or project plans coming from outside the organization higher than those coming from inside the organization. This is illustrated in the following example: the project plan for the transformation project is written by an external advisor. The head of the relationship management department is responsible for the project. She wants the architects to be involved from the start in writing the project plan. Therefore, she tells the external advisor to involve the architects. However, she does not tell the architects themselves that she wants them to be involved ('not engaging stakeholders', Table 3). This behaviour shows that she is more externally oriented than internally. As she has a high level of trust in the external advisor, she does not follow up if eventually the architects are involved, which corresponds to the communication defect 'not checking if people are in line with goals' (Table 3). If the head of department checked whether the external advisor was involving the architects, she would be able to intervene and make sure the architects are sufficiently involved. In the end, the architects are not (sufficiently) involved in the development of the project plan. Thus, they cannot ensure the fulfilment of '*governance*' and '*conformance and integration*' with regard to the planning of this project (Figure 2).

Proposition 4. *The external orientation of a subculture leads to a lack of engaging the architects. Furthermore, the subculture is likely not to check if an external party is in line with the (internal) goals, which again leads to a lack of engaging the architects. As a consequence, the effectiveness of the EA function is lowered through the dimensions 'governance' and 'conformance and integration'.*

Our interviews indicate that also GovNed's MT is externally oriented: at GovNed there is an internal rule stating that each project plan, change request, etc. has to be approved by the architecture board before it is sent to the MT. However, in the example above this does not happen. Instead, the finished project plan is directly sent to the MT. The usual reaction of the MT should be to first forward the plan to the architecture board. Yet, as the project plan has been developed by an external advisor, the MT accepts the plan without involving the architects. In this example we identify two of Niemietz et al.'s (2013) communication defects (Table 3): the lack of asking the architects for approval refers to 'not engaging stakeholders'; the second communication defect is 'implicit and explicit communication not aligned', where the explicit communication is the rule of having the architects approval and the implicit communication is the MT's behaviour. Regarding the influence on the EA function's effectiveness, our interviews indicate that not engaging the architects has a negative impact on '*communication and understanding*' as the architects cannot "provide management with insight in, and advice about, the consequences of decision making" (Van der Raadt et al. 2010). Furthermore the dimensions '*governance*' and '*conformance and integration*' are negatively influenced (Figure 2).

Proposition 5. *The external orientation of the management leads to a lack of engaging the architects, which has a negative impact on the effectiveness dimensions 'communication and understanding', 'governance' and 'conformance and integration'.*

According to our interviews the same behaviour of not asking the architects for their advice sometimes happens when the MT receives change requests from their external client. On some occasions the MT consults the architecture board, on other occasions they do not. The latter case is an example of not engaging stakeholders. When the architects are not involved, they cannot "help management in deci-

sion making about new business and IT ideas" (Van der Raadt et al. 2010), which refers to the effectiveness dimension '*initiation of change*' (Table 2). Furthermore, the dimension '*communication and understanding*' is negatively influenced because the architects cannot help the MT to understand the consequences of their decision making (Figure 2).

Proposition 6. *As a consequence of the external orientation of the management, the architects are likely not to be engaged regarding change requests from outside the organization. This has a negative impact on the effectiveness dimensions 'initiation of change' and 'communication and understanding'.*

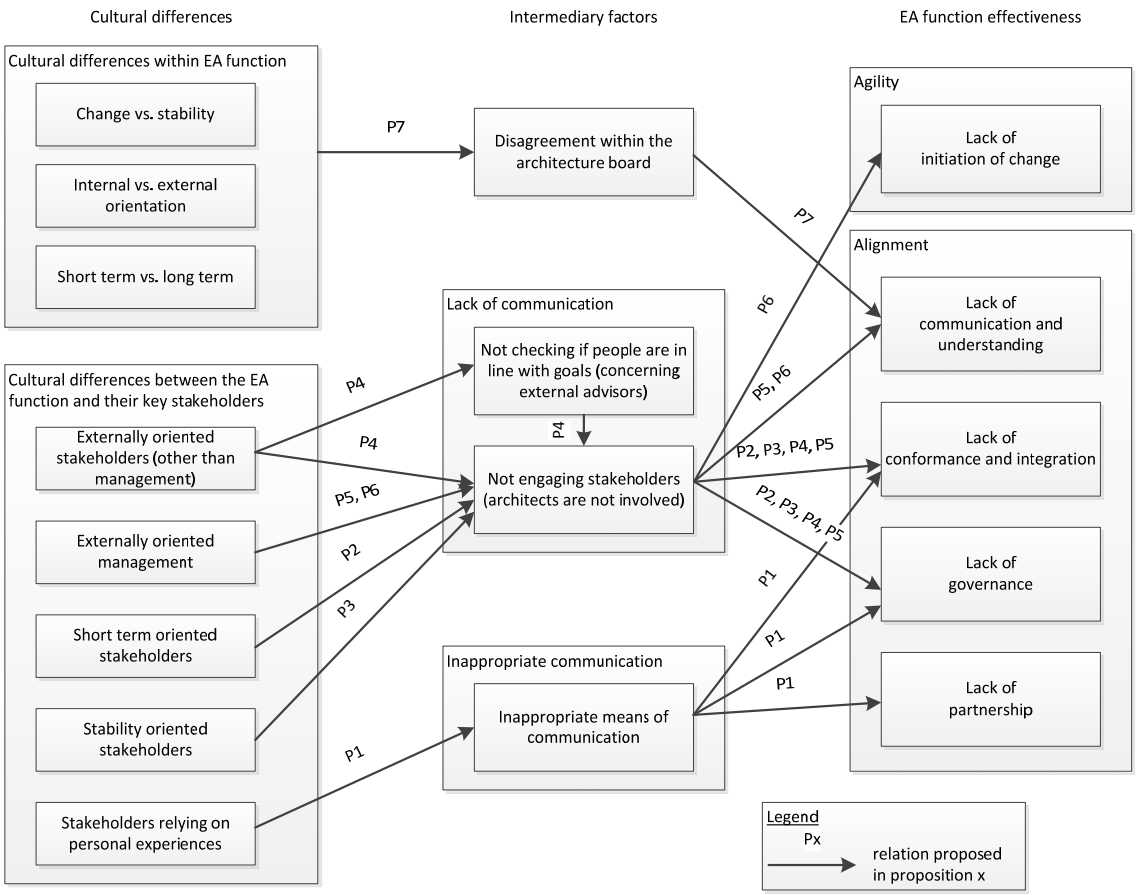

Figure 2. The negative influence of cultural differences on the effectiveness of the EA function.

5.2 Cultural differences within the architecture board

At GovNed the members of the architecture board belong to different departments, which have different cultural profiles (Table 5). One of our interviewees provides an example scenario, in which the cultural differences within the architecture board result in a lack of agreement among the members of the board: GovNed receives a change request from their external client. Unlike the example in section 5.1 the MT asks the architecture board for advice. While the members #2-3 (Table 5) are against the acceptance of the request, the member from the innovation department is strongly in favour of accepting: "I stood alone against the others in defending the issues of the client. This discussion in the architecture board resulted in a memo to the MT. And in the memo, I thought, the view of the innovation department was not enough elaborated. So, when I saw that memo, I immediately informed the head of my department. And he asked me to also make a memo, in which I stated his point of view. And that was sent to the MT as well" (interview #2). Thus, the MT receives two different advice docu-

ments from members of the architecture board. This means that there is no clear communication coming from the architecture board. In the described scenario we find strong hints for the cultural differences existing within the architecture board having a negative impact on the effectiveness dimension '*communication and understanding*' (Figure 2).

Member #	Department	Orientation & focus	Nature of time	Orientation to change
1	Innovation	External	Short term	Change
2	Business control	Internal	Long term	Preferrably stability
3	ICT	Internal	Long term	Stability

Table 5. Culture profiles of the GovNed architecture board.

Proposition 7. *Differences within the architecture board regarding the dimensions 'orientation and focus', 'nature of time and time horizon' and 'orientation to change' lead to disagreement within the architecture board, which has a negative impact on the effectiveness dimension 'communication and understanding'.*

6 Discussion

Our study shows that differences between organizational subcultures can have a negative impact on the effectiveness of the EA function. At GovNed relevant cultural differences exist between the architects and their stakeholders as well as within the architecture board. This is an interesting finding as it shows that the architects are not necessarily homogeneous regarding their cultural profiles.

Concerning RQ_1. Regarding the culture dimensions, we have found that differences regarding the dimensions 'orientation to change', 'basis of truth and rationality', 'nature of time and time horizon' and 'orientation and focus' decrease the EA effectiveness. Our interviews indicate that, out of these four dimensions, *'orientation and focus' has the largest negative impact* on the EA function's effectiveness at GovNed: the external orientation of the management and other stakeholders leads to a high acceptance rate regarding externally developed systems and external requests. This, in turn, makes it difficult for the architects to keep GovNed's organizational components coherent. The strong external orientation can partly be explained by the fact that GovNed is financed by an external organization (section 4).

Figure 2 shows that the *EA function's effectiveness is often decreased regarding the alignment* dimensions. Within the category of alignment the dimensions 'communication and understanding', 'conformance and integration', 'governance' and 'partnership' are impacted due to cultural differences. Out of those dimensions, 'governance' and 'conformance and integration' are influenced the most (Figure 2). This means that the main challenge GovNed's architects are facing is ensuring coherence between the different organizational components. Furthermore, concerning the agility dimensions we have found support for 'initiation of change' being influenced by cultural differences.

Concerning RQ_2. Our study supports our earlier finding that cultural differences influence the effectiveness of the EA function indirectly (Niemietz et al. 2013). We have not identified any example of cultural differences directly impacting the EA effectiveness. Furthermore, our results support that communication defects are an important intermediary factor in the relation between cultural differences and the effectiveness of the EA function. Most cultural differences lead to one (or more) communication defect(s), which, in turn, lower(s) the effectiveness of the EA function. Based on our interviews, we have identified the following communication defects as intermediary factors: 'not checking if people are in line with goals', 'not engaging stakeholders' and 'inappropriate means of communication'. Figure 2 shows which of those defects is caused by which cultural differences. Furthermore, Figure 2 illustrates which communication defects influence which effectiveness dimension. The main communication defect resulting from cultural differences is 'not engaging stakeholders'. Regarding

this defect in Niemietz et al. (2013) we do not specify any particular stakeholder group. However, given that those findings reflect the perspective of enterprise architects, in Niemietz et al. (2013) we mainly refer to stakeholders other than enterprise architects. Yet, based on this study we strongly suggest renaming this communication defect into 'not involving architects' as most of the ineffectiveness of GovNed's EA function results from a lack of involving the architects.

The fact that in many cases the architects are not involved indicates that at GovNed EA is not sufficiently institutionalized. Based on our study we argue that the institutionalisation of EA is hampered by cultural differences. Also, Lange (2012) states that the success of EA management is dependent on the cultural environment. This raises the question: what kind of cultural environment is benefitial for the institutionalisation of EA? We suggest addressing this question in future research.

Concerning RQ_3. In addition to the three communication defects we have identified a fourth intermediary factor that is caused by cultural differences, which we call 'disagreement within the EA function'. In earlier research (Niemietz et al. 2013) we classify disagreement as a consequence of communication defects, e.g. as a consequence of not listening to each other. However, our case study does not allow us to relate the disagreement in the EA function to any specific communication defect. Therefore, we have decided to introduce *'disagreement in the EA function' as an additional factor* that is influenced by cultural differences existing in the EA function and influences the effectiveness dimension 'communication and understanding'.

7 Conclusion

This paper presents a case study investigating the influence of cultural differences on the effectiveness of the EA function. As initial results we derive seven propositions suggesting how specific cultural differences lower the EA effectiveness. For instance, we propose that externally oriented stakeholders are likely not to involve the architects sufficiently, which hinders the architects in ensuring coherence with regard to products and solutions. Furthermore, we find that cultural differences can exist within the architecture board, which can have an impact on the communication towards the management.

Our findings provide part of the reasons for the challenges GovNed is facing regarding working under architecture. The results can be used to create understanding for each other's position and behaviour among the different subcultures. Based on this understanding, GovNed should develop strategies of how to address their challenges. One strategy could for example be that, if an external request is not feasible according to the architecture board, the architects and the externally oriented subcultures try to find a compromise, which fits the EA landscape and helps pleasing GovNed's sponsor.

Our findings are based on a single case study that combines different methods of data collection. This approach allows us to gain *in-depth understanding* of the influence of cultural differences on the EA effectiveness. To assess and elaborate on the developed model we suggest conducting further case studies. Furthermore, we suggest that after having conducted additional case studies, the propositions can be formulated as hypotheses, which can then be tested in a quantitative study. Finally, we suggest that future research addresses the role of organizational subculture as factor of success or failure in the context of EA institutionalization.

Acknowledgement

The authors wish to thank the case study partner GovNed for their commitment to interviewing, doing focus groups and providing documentation.

This work has been partially sponsored by the Fonds National de la Recherche Luxembourg (www.fnr.lu), via the PEARL and CORE programmes.

References

Aier, S. (2014). The role of organizational culture for grounding, management, guidance and effectiveness of enterprise architecture principles. Information Systems and e-Business Management, 12, 43–70.

Corbetta, P. (2003). Social Research: Theory, Methods and Techniques. SAGE Publications, London, Thousand Oaks, New Delhi.

Cua, K.O. et al. (2001). Relationships between implementation of TQM, JIT, and TPM and manufacturing performance. Journal of Operations Management, 19 (6), 675-694.

Detert, J.R., et al. (2000). A Framework for Linking Culture and Improvement Initiatives in Organizations. Academy of Management Review, 25 (4), 850–863.

Flick, U. (2009). An Introduction to Qualitative Research. 4th Edition. SAGE Publications, Los Angeles et al.

Glaser, B.G. (1999). The Discovery of Grounded Theory: Strategies for Qualitative Research. Aldine Transaction, New Brunswick, London.

Gregor, S. (2006). The Nature of Theory in Information Systems. MIS Quarterly, 30 (3), 611–642.

Hofstede, G. (1998). Identifying Organizational Subcultures: an Empirical Approach. Journal of Management Studies, 35 (1), 1–12.

Hofstede, G.H. (2001). Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations. 2nd Edition. SAGE Publications, Thousand Oaks, London, New Delhi.

Hofstede, G.H., et al. (2010). Cultures and organizations: Software of the mind : intercultural cooperation and its importance for survival. 3rd Edition. McGraw-Hill, New York.

Jones, M.C., et al. (2006). Exploring knowledge sharing in ERP implementation: an organizational culture framework. Descision Support System, 41 (2), 411–434.

Kamogawa, T. and Okada, H. (2005). A framework for enterprise architecture effectiveness. In Proceedings of the International Conference on Services Systems and Services Management, 740–745.

Kraus, G., et al. (2006). Handbuch Change-Management: Steuerung von Veränderungsprozessen in Organisationen. Einflussfaktoren und Beteiligte. Konzepte, Instrumente und Methoden. 2nd Edition. Cornelsen, Berlin. (in German)

Kvale, S. (2007). Doing interviews. SAGE Publications, Los Angeles et al.

Lange, M. (2012). Evaluating the Realization of Benefits from Enterprise Architecture Management: Construction and Validation of a Theoretical Model. PhD thesis. Verlag Dr. Hut, München.

Niemietz, H., et al. (2013). Understanding the role of subcultures in the enterprise architecture process. In Proceedings of the 21st European Conference on Information Systems, Utrecht, The Netherlands.

Op’t Land, M., et al. (2009). Enterprise Architecture. Creating Value by Informed Governance. Springer, Berlin, Heidelberg.

Rouse, W.B. and Baba, M.B. (2006). Enterprise Transformation: Fundamental enterprise changes begin by looking at the challenges from technical, behavioral, and social perspectives. Communications of the ACM, 49 (7), 67–72.

Runeson, P. and Höst, M. (2009). Guidelines for Conducting and Reporting Case Study Research in Software Engineering. Empirical Software Engineering, 14 (2), 131–164.

Scheer, A.-W. and Schneider, K. (2006). ARIS - Architecture of Integrated Information Systems, in Bernus, P., et al. (eds.): Handbook on Architectures of Information Systems. Springer, Berlin, Heidelberg, New York, 605–623.

Schein, E.H. (2004). Organizational Culture and Leadership. 3rd Edition. Jossey-Bass, San Francisco.

Simon, D., et al. (2013). An Exploration of Enterprise Architecture Research. Communications of the Association for Information Systems, 32, 1–72.

Sowa, J.F. and Zachman, J.A. (1992). Extending and Formalizing the Framework for Information Systems Architecture. IBM Systems Journal, 31 (3), 590–616.

The Open Group (2011). TOGAF Version 9.1. Van Haren Publishing, Zaltbommel.

Trompenaars, A. and Hampden-Turner, C. (2012). Riding the waves of culture: Understanding diversity in global business. 3rd Edition. Nicholas Brealey, London.

Van der Raadt, B. and Van Vliet, H. (2008). Designing the enterprise architecture function, in Becker, S., et al. (eds.): Proceedings of the 4th International Conference on the Quality of Software Architectures, Karlsruhe, Germany, Springer, Berlin, Heidelberg, 103-118.

Van der Raadt, B., et al. (2010). The relation between EA effectiveness and stakeholder satisfaction. The Journal of Systems and Software, 83 (10), 1954–1969.

Van Steenbergen, M. (2011). Maturity and Effectiveness of Enterprise Architecture. PhD thesis. Universiteit Utrecht, Department of Information and Computing Sciences.

Van Steenbergen, M. and Brinkkemper, S. (2009). Modeling the Contribution of Enterprise Architecture Practice to the Achievement of Business Goals, in Papadopoulos, G.A., et al. (eds.): Information systems development: Towards a service provision society. Springer, New York, Dordrecht, 609–618.

Wagter, R. (2013). Enterprise Coherence Governance. PhD thesis. Uitgeverij Boxpress, 's-Hertogenbosch.

Wagter, R., et al. (2011). Enterprise Coherence Assessment, in Harmsen, F., et al. (eds.): Practice-driven research on enterprise transformation: Third Working Conference, PRET 2011, Luxembourg. Springer, Berlin, London, 28–52.

Yin, R.K. (2003). Case Study Research: Design and Methods. 3rd Edition. SAGE Publications, Thousand Oaks, London, New Delhi.