Institutionalizing Architectural Coordination in Organizations

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Karl Simon Weiß

from

Germany

Approved on the application of

Prof. Dr. Robert Winter

and

PD Dr. Joachim Schelp

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Prof. Dr. Thomas Bieger

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<div style="text-align: right;">Simon Weiß</div>

Dissertation Papers

Paper A: Weiss, Simon. forthcoming. "Institutionalization of Architectural Coordination – Need and Conceptual Foundations," in *Architectural Coordination of Enterprise Transformation*, E. Proper, R. Winter, S. Aier and S. de Kinderen (eds.). Springer.

Paper B: Aier, Stephan, and Weiss, Simon. 2012. "An Institutional Framework for Analyzing Organizational Responses to the Establishment of Architectural Transformation," *The 20th European Conference on Information Systems (ECIS 2012)*, Barcelona: Paper 228.

Paper C: Weiss, Simon; Aier, Stephan; and Winter, Robert. 2013. "Institutionalization and the Effectiveness of Enterprise Architecture Management," *International Conference on Information Systems (ICIS 2013)*, Milan: Association for Information Systems, Completed Research Paper.

Summary of Contents

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List of Abbreviations

AC	Architectural Coordination
ACET	Architectural Coordination of Enterprise Transformation
AK	Architektonische Koordination
AT	Architectural Thinking
AVE	Average Variance Extracted
CA	Cronbach's Alpha
CEO	Chief Executive Officer
CIO	Chief Information Officer
CR	Composite Reliability
DSR	Design Science Research
EA	Enterprise Architecture
EAM	Enterprise Architecture Management
ECIS	European Conference on Information Systems
EIS	Enterprise Information System
ERP	Enterprise Resource Planning
ET	Enterprise Transformation
HR	Human Resources
ICIS	International Conference on Information Systems
ICT	Information and Communication Technology
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IS	Information System(s)
ISO	International Organization for Standardization
IT	Information Technology
NEA	National Enterprise Architecture

OMB	Office of Management and Budget
PLS	Partial Least Squares
SEM	Structural Equation Model(ling)
SNSF	Swiss National Science Foundation
UAM	Unternehmensarchitekturmanagement
US	United States (of America)

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Abstract

Overseeing, developing and maintaining the information systems (IS) landscape is one of the major challenges for today's organizations. Enterprise architecture management (EAM) has become a prominent discipline to address this challenge. EAM models, plans and controls the development of organizational assets ranging from business processes to information technology (IT) infrastructure on a broad and aggregate level. In doing so, EAM promises organization-wide benefits (e.g. reduced IT costs and risks, better business-IT alignment, and strategic agility) and serves as a support function for decision-making, transformation management and strategy realization. However, to realize respective EAM benefits, EAM needs to successfully coordinate its stakeholders like IT, and project and line managers, and their individual projects from an architectural perspective. This architectural coordination (AC) is a crucial but challenging part of EAM. A decisive question is therefore how to institutionalize AC within the organization such that the aforementioned stakeholders participate in AC despite local (project) goals and a certain restriction of design freedom coming along with AC.

This cumulative dissertation contributes to answering this question by drawing on concepts from institutional theory that mirror the challenge of establishing AC as a rule-like practice in organizations. Throughout three individual papers, the dissertation develops and validates a theoretical model comprised of antecedents to AC's institutionalization and benefit realization. First, based on a review of extant literature, the 'wicked problem' area is explored and it is delineated how institutional concepts can contribute towards a solution to the problem. Second, antecedents for institutionalizing AC are derived based on institutional literature and multiple case study analyses. Third, a theoretical model is developed and tested employing a partial least squares approach to structural equation modelling. The findings confirm (1) seven institutional factors as important predictors for an institutionalization of AC; and (2) their impact on the realization of EAM benefits for the organization.

This research highlights factors of a less technical nature and provides respective insights for practice. Further, the work operationalizes institutional concepts outside their original domain to provide a deeper understanding of factors at play in AC and EAM, respectively, and hence contributes to theoretically grounded EAM research.

Keywords: Architectural coordination, enterprise architecture management, EAM, institutional theory, institutionalization, micro level, antecedents

Kurzfassung

Das Überblicken, Entwickeln und Instandhalten der Informationssystems (IS)-Landschaft ist eine grosse Herausforderung heutiger Organisationen. Unternehmensarchitekturmanagement (UAM) ist zu einer bedeutenden Disziplin avanciert, um dieser Herausforderung zu begegnen. UAM modelliert, plant und steuert die Entwicklung der Organisation von Geschäfsprozessen bis zur Informationstechnologie (IT)-Infrastruktur auf einer breiten und aggregierten Ebene. Dabei verspricht UAM unternehmensweiten Nutzen wie reduzierte IT-Kosten und -Risiken, besseres Business-IT-Alignment und strategische Agilität, und dient als Unterstützungsfunktion für die Entscheidungsfindung, das Transformationsmanagement und die Strategieumsetzung. Um jedoch entsprechenden Nutzen zu realisieren, muss das UAM seine Stakeholder, wie IT-, Projekt- und Linienmanager, sowie deren individuelle Projekte erfolgreich koordinieren. Diese architektonische Koordination (AK) ist ein wichtiger, aber schwieriger Teil des UAM. Eine entscheidende Frage ist daher, wie AK in der Organisation institutionalisiert werden kann, sodass sich die Stakeholder trotz lokaler (Projekt-) Ziele und einer gewissen Einschränkung der Gestaltungsfreiheit an AK beteiligen.

Diese kumulative Dissertation trägt zur Beantwortung dieser Frage bei, wobei sie auf Konzepte aus der institutionalistischen Organisationstheorie aufbaut. Über drei einzelne Beiträge hinweg wird ein theoretisches Modell, bestehend aus Einflussfaktoren auf die Institutionalisierung von AK und die UAM-Nutzenrealisierung, entwickelt und validiert. Zunächst wird auf Basis einer Literaturanalyse der Problembereich untersucht und es wird aufgezeigt, wie institutionelle Konzepte zu einer Problemlösung beitragen können. Als Zweites werden Einflussfaktoren für die Institutionalisierung von AK auf Basis der Literatur und mehrerer Fallstudien erarbeitet. Als Drittes wird ein theoretisches Modell entwickelt und unter Verwendung des Partial Least Squares-Ansatzes zur Strukturgleichungsmodellierung getestet. Die Ergebnisse bestätigen sieben institutionelle Faktoren als wichtige Prädiktoren für eine Institutionalisierung von AK sowie für die Realisierung von UAM-Nutzen für die Organisation. Die Arbeit hebt Faktoren weniger technischer Natur hervor, mit entsprechenden Erkenntnissen für die Praxis. Darüber hinaus adaptiert die Arbeit institutionelle Konzepte, um ein tieferes Verständnis der Faktoren zu erlangen, die bei UAM bzw. AK entscheidend sind, und trägt somit zur theoretisch fundierten UAM-Forschung bei.

Stichwörter: Architektonische Koordination, Unternehmensarchitekturmanagement, UAM, Institutionentheorie, Institutionalisierung, Mikroebene, Einflussfaktoren

Part A – Summary of the Dissertation

1 Introduction

1.1 Motivation

Overseeing, developing and maintaining the information systems (IS) landscape is one of the major challenges for organizations (Luftman et al. 2012). The growing volume, speed and complexity of information and communication technologies (ICT) penetrating today's businesses (Benamati and Lederer 2001) calls for a discipline that brings transparency to the IS landscape and support its development in a sustainable and purposeful manner. A discipline concerned with addressing these developments and challenges is referred to as enterprise architecture management (EAM), the need for which is emphasized by a wide range of scholars and recent works (e.g. Asfaw et al. 2009; Hoogervorst 2004; Radeke 2011; Ross et al. 2006; Simon et al. 2014; Winter et al. 2014).

EAM aims to support managing the complexity of the 'business-to-IT' stack and respective transformations (Harmsen et al. 2009). Enterprise architecture (EA) describes the fundamental structures of an organization (company, government agency etc.) by explicating the components as well as the interdependencies of the business-to-IT stack on a broad and aggregate level (Winter and Fischer 2007). The notion of EAM goes beyond EA and includes the management tasks of planning and controlling enterprise architecture developments sustainably over time (Aier et al. 2011c; see section 2.1). In doing so, EAM is understood as a support function for senior/top management decision-making, for transformation management and for strategy realization. Within organizations, EAM's role is often positioned "between IT and business strategy formulation on the one hand, and project-focused solution architecting […] on the other" (Tamm et al. 2011, p. 142).

The problems, mentioned above, that EAM aims to address are exacerbated in large organizations with many simultaneous projects across business units, and even more so, if these units possess a high degree of autonomy (DeSanctis and Jackson 1994). In such situations, business units often develop their IT individually. While this may provide flexibility, respective solutions often adopt incompatible standards and are not aligned with the organization's goals. This may lead to difficulties of integration and responsiveness to new business requirements, to higher system maintenance costs, to

lost economies of scale, and eventually to a decline in business profitability and customer experience (DeSanctis and Jackson 1994; Tanriverdi 2005).

A core concern of EAM is therefore the *coordination* of changes to the EA, in particular in light of supporting transformations (Gardner et al. 2012). 'Architectural Coordination' (AC) represents a critical and difficult part of EAM's respectively architects' work, as it denotes the task of coordinating and mediating architectural concerns between different groups and individuals scattered over large parts of an organization. As part of this, AC requires its stakeholders to follow certain architecture-coordinating procedures, guidelines and mindsets to advance the EA in a more effective, sustainable and purposeful fashion for the benefit of the overall organization. However, despite a growing comprehension of AC (Aier et al. 2011a; Fischer et al. 2010; Gleichauf 2011; Pulkkinen 2006; Stelzer 2010; Winter and Aier 2011), it remains a demanding challenge for practitioners to effectively anchor, i.e. institutionalize, AC in an organization—in particular among the stakeholders being affected by AC (Richardson et al. 1990; Tamm et al. 2011). This challenge is also reflected in the recent finding of analyst company Gartner that most analysed organizations are still at an "initial" or "developing" EAM level rather than on a "defined", "managed" or "optimized" level (Gartner 2012). One of the reasons for the observed difficulties might be due to the fact that AC ultimately aims to utilize potential synergies in an organization by *restricting the design freedom* of affected stakeholders (Dietz 2008; Hoogervorst 2009). Indeed, while there are strong arguments to follow AC norms and guidelines—such as the pursuit of a global optimization (e.g. reducing functional redundancies on the overall application landscape) based on an enterprise-wide perspective instead of several only local optima found in the individual goals of projects or organizational units etc.—affected stakeholders are often reluctant to do so. One reason for this could be due to the fact that AC norms and guidelines may be beneficial to the organization as a whole, but not necessarily and immediately to one particular stakeholder, whose performance is usually measured in local terms like adherence to project schedules and budgets (Espinosa et al. 2010; Foorthuis 2012). However, unless AC is broadly supported in an organization, it is difficult to realize its potential.

In order to address that issue, this work goes beyond solely technical considerations of AC and reveals what can be done to institutionalize AC. Institutionalization means that AC obtains an established and embedded status in thought and action among stakeholders. In this respect, stakeholders are all individuals and groups in an organization that are subject to architectural restriction of design freedom and that are themselves

involved in changing the EA. Besides architects themselves, this includes for example IT and business development departments, project managers, line managers and requirements engineers. AC's institutionalization is presumed to require more than 'technical' definitions of, for example, an EA planning process and EA principles, but includes anchoring AC in an organization's norms and values and making AC more appealing at individual stakeholders' levels. While being acknowledged as important, such rather non-technical issues have thus far only rarely been taken into account in the area of AC research. The need for practical guidance on how to make existing EAM artefacts and procedures more effective, to leverage EAM investments, and to eventually achieve a higher utility for the organization through EAM, motivate this work.

1.2 Problem Statement

EAM's ability to provide value for both business and IT has been demonstrated and empirically proven in several studies (Ross 2006a; Schmidt and Buxmann 2011; Simon et al. 2014; Tamm et al. 2011). On the IT side, EAM promises higher flexibility, lower costs, reduced development time, and increased senior management satisfaction, to name but a few. Organizational (business) benefits include reduced costs, better decision-making and planning, improved communication and coordination, as well as overall improved performance.

However, in order to realize these benefits, EAM has to first of all be effectively integrated into an organization. As noted earlier, a core concern in this respect represents the institutionalization of AC, which becomes more important in realizing business benefits the further EA is developed, because at some point more mature architectures do not necessarily lead to more business value. To achieve additional business value, architectural practices need to spread throughout the enterprise so that people learn how to improve their platforms in ways that yield increased business value (Ross and Quaadgras 2012). However, setting up and sustaining effective AC presents itself as a complex and difficult topic for organizations. A core issue is that AC finds limited acceptance and application among EA stakeholders, which impedes its effectiveness. Besides AC's inherently abstract and to some extent design-restricting nature, this issue may be explained by the observation that until recently, EAM/AC research and practice has been primarily concerned with more technical and implementation-oriented business and IT issues resolving in particular around IT-related EA layers and EA modelling (Simon et al. 2013). Softer factors and the human side of EAM have

been less discussed so far. However, for AC to be effective, it is crucial that many stakeholders take part in and comply with it. Hence, softer and stakeholder-related factors appear likewise important. Other scholars also acknowledge this problem area: Asfaw et al. (2009, p. 20) for instance attest that "Enterprise architecture has an image problem." Winter and Aier (2011, p. 320) note that "only very few organizations consistently apply and manage EA principles" and that principle enforcement difficulties may be related to the way the principles are defined and justified. The research of Gregor et al. (2007, p. 115) "shows that a formal enterprise architecture does not singularly enable alignment." Their case analysis "highlights that from a social perspective, management and staff must support each other, work together in planning the business strategy and work program, and actively communicate if business and IS/IT is to succeed in delivering the business outcomes." Lastly, Ross and Quaadgras (2012, p. 1) find that "more mature architectures do not necessarily lead to business value. Rather, business value accrues through management practices that propagate architectural thinking throughout the enterprise." In line with these statements, guidance is needed on how to make regulations, norms and values pertaining to AC stick in an organization so as to give them "rulelike status in social thought and action"—something that can be described as "institutionalization" (Meyer and Rowan 1977, p. 341).

In contrast to the aforementioned studies analysing the benefits attainable through EAM, research on how to institutionalize AC is scarce. This dissertation narrows this gap. The work bridges concepts from abstract institutional theory to concrete application scenarios of AC, and evaluates factors relevant for institutionalizing AC in organizations. The theoretical underpinning provides a suitable lens for the understanding of the problem as well as for providing input towards its solution. Further, it is of value as EAM has been a very practice-driven discipline with only little theoretically grounded research and consideration so far (Winter et al. 2014).

1.3 Research Objective and Research Questions

The objectives of this dissertation are twofold. First, it intends to help in understanding the complex phenomenon and to conceptualize the problem area of institutionalizing AC in organizations from a more theoretical perspective. Secondly, the work intends to provide input for AC's institutionalization by testing antecedents that follow up from the conceptual work. In doing so, it provides a novel perspective, as well as evaluated factors for practitioners' consideration in their attempt to make EAM more ef-

fective overall. To achieve these objectives, the following research questions will be answered:

Table 1:   Research questions of the dissertation

Number	Question
RQ 1a	What constitutes the problem of institutionalizing architectural coordination?
RQ 1b	What can institutional theory contribute to inform the solution to the problem?
RQ 2	What are antecedents for institutionalizing architectural coordination?
RQ 3	How does the institutionalization of architectural coordination contribute to EAM's benefit realization?

As can be seen in Table 1, the research questions build upon each other. RQ 1a is concerned with an exploration and better understanding of the problem area. As part of this, it has to be discussed whether and how concepts from institutional theory are applicable to inform a solution to the problem (RQ 1b). Based on this conceptual analysis, RQs 2 and 3 go more into detail. Answering RQ 2 shall provide relevant factors that should be considered for institutionalizing AC in organizations. In the academic literature, the term 'antecedent' instead of 'factor' is often used when referring to preceding conditions or causes that are empirically tested as part of a theoretical model. The ambition to eventually test institutional factors as part of theoretical model is expressed in RQ 2, accordingly. However, the terms antecedent and factor will be widely used interchangeably in this work. Finally, RQ 3 deals with evaluating the concept. Besides an evaluation of identified antecedents to AC's institutionalization, RQ 3 in particular looks at the utility of the concept in terms of its contribution to the realization of business benefits attainable through AC's institutionalization. The research questions are addressed in a cumulative dissertation mode (cf. section 3).

As the research is conducted in a German-speaking region, empirical findings apply to organizations in that region and to organizations in a comparable (cultural) setting. This is due to the fact that the dissertation is based on and deals with socioeconomic issues as opposed to (solely) technical ones. Furthermore, the organizations under investigation in this work are predominantly large organizations, where the problem of IS complexity that AC is to address, applies.

1.4 Research Approach

The dissertation is anchored in the information systems discipline. "IS research is at the confluence of people, organizations, and technology" (Hevner et al. 2004, p. 77). The present dissertation can arguably be attributed to a wider view on IS research, as it does not directly focus on an "IT artefact" (Benbasat and Zmud 2003). Rather, this dissertation deals with EAM as an IT/IS management technique, and questions of how AC in particular can be more effectively established among people within organizations. As such, the dissertation addresses challenges arising from the transformation of IT's role from a back-office support role to strategic business partner. These challenges are of human and organizational nature rather than technical (Roepke et al. 2000). In a similar vein, DeSanctis (2003, p. 366) notes that "shifting boundaries of scholarly attention away from the IT artifact may be reflective of the field's maturing" and that respective research trends are what "make the [IS] community vibrant and lead it into new directions".

To answer RQs 1a and 1b, the practical problem is discussed against a review of theory candidates that help characterize the problem and provide insights towards its solution. As part of this, the concepts from institutional theory that represent a useful perspective for this work are identified. The methods used for answering these questions are the review of relevant literature and critical reflection vis-à-vis the problem at hand. Research question 2 is answered by developing a framework for analysing the institutionalization of AC. This is done by applying a general institutional framework (Oliver 1991) to the specific AC problem. The framework is adapted and its applicability demonstrated through an analysis of multiple EAM cases using polar sampling (Eisenhardt 1989; Yin 2003). RQ 3 is answered by testing a comprehensive theoretical model quantitatively. Based on the work conducted to answer the previous RQs, a theoretical model is developed (MacKenzie et al. 2011). In terms of constructs, the model comprises antecedents to AC's institutionalization, constructs where AC's institutionalization should manifest, and lastly a construct for measuring business benefits. The model is tested with collected questionnaire data using a partial least squares (PLS) approach to structural equation modelling (SEM) (Esposito Vinzi et al. 2010).

1.5 Structure of the Dissertation

The present cumulative dissertation is divided into two parts. Part A provides an overview of the whole dissertation, and part B is comprised of three scientific papers.

In the first section of part A, the dissertation is motivated (1.1), the research problem is described (1.2), and research questions (1.3) and the research approach (1.4) are discussed. Section 2 presents the conceptual foundations and related work. Concepts from EAM (2.1), AC (2.2), institutional theory (2.3), and related work at the confluence of institutional theory and EAM (2.4) are reviewed. Section 3 then provides an overview of the papers from part B (3.1), and portrays each paper briefly (3.2). Finally, section 4 wraps up the contributions made (4.1), critically appraises the work by discussing its limitations and assumptions (4.2), and closes part A by laying out avenues for future research (4.3).

Part B covers the individual papers contributing to the realization of the dissertation objective. The papers are marked from A to C. Paper A is accepted for publication, whereas papers B and C have been published at renowned international IS conferences. All papers are published in original format, except for minor adaptations such as the unification of font size and font type to enhance the reading experience of this dissertation. Further, the citation format is unified and all citations are included in a joint references section at the end of the dissertation. Figures and tables are continuously numbered and uniformly formatted across the whole dissertation. All abbreviations, figures and tables are included in the respective overarching list at the beginning of the dissertation. Lastly, each paper in part B is preceded with a table comprising its bibliographic information.

2 Conceptual Foundations

2.1 Enterprise Architecture Management

This work's conceptualization of EAM builds on the current ISO/IEC/IEEE Standard 42010 defining architecture as the "fundamental concepts or properties of a system in its environment embodied in its elements, relationships, and in the principles of its design and evolution" (ISO/IEC/IEEE 2011). The *system* in our case is the so called enterprise architecture in terms of the elements and relationships within the 'business-to-IT' stack. The business-to-IT stack refers to all architecture layers including strategic aspects, organizational structures, business processes, software and data, as well as IT infrastructure (Jonkers et al. 2006; Lankhorst 2013; Winter and Fischer 2007). *Fundamental* means that we are interested in the essential elements and relationships, embraced by an aggregate, cross-layer view into the business-to-IT stack. The word *enterprise* indicates that we pursue a holistic view on the organization or large parts thereof, hence spanning across organizational divisions or units and intending to break up silo thinking. Taken together, EA takes a broad and aggregate view into the business-to-IT stack while more detailed decompositions have to be covered by specialized architectures, such as process architectures, software architectures or technology architectures (Hoogervorst 2004; Winter and Fischer 2007).

Furthermore, the ISO/IEC/IEEE definition points at two major architecture topics: The first part ("fundamental concepts or properties of a system in its environment embodied in its elements, relationships") is of rather definitional, descriptive nature and points at the topic of representing an EA in terms of architecture descriptions, (meta) models and frameworks. The second part ("and the principles of its design and evolution") is of guiding, prescriptive nature, dealing with architecture rules and principles entailing a "qualitative statement of intent that should be met by the architecture" and by EA stakeholders, respectively (The Open Group 2011, p. 22). Furthermore, it gives rise to the dimension of time and the notion of EAM[1], which goes beyond EA and includes all tasks pertaining to the establishment and continuous development of enter-

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[1] Notably, the distinction between EA and EAM is rarely made in the literature and both terms are used interchangeably. In this work, we will primarily refer to EAM as we are interested in EA management issues as opposed to EA modelling/representation issues. The term EA is used when referring to a concrete architecture or its representation. For a discussion about used EA terminology, see Schelp and Winter (2009) and Schönherr (2009).

prise architectures in a holistic and purposeful manner (Aier et al. 2011c; Radeke 2011). This includes, for example, EA planning, controlling, governance and education activities. Altogether, EAM's holistic ((1) broad, (2) business-to-IT, (3) over time) perspective can be illustrated as shown in Figure 1.
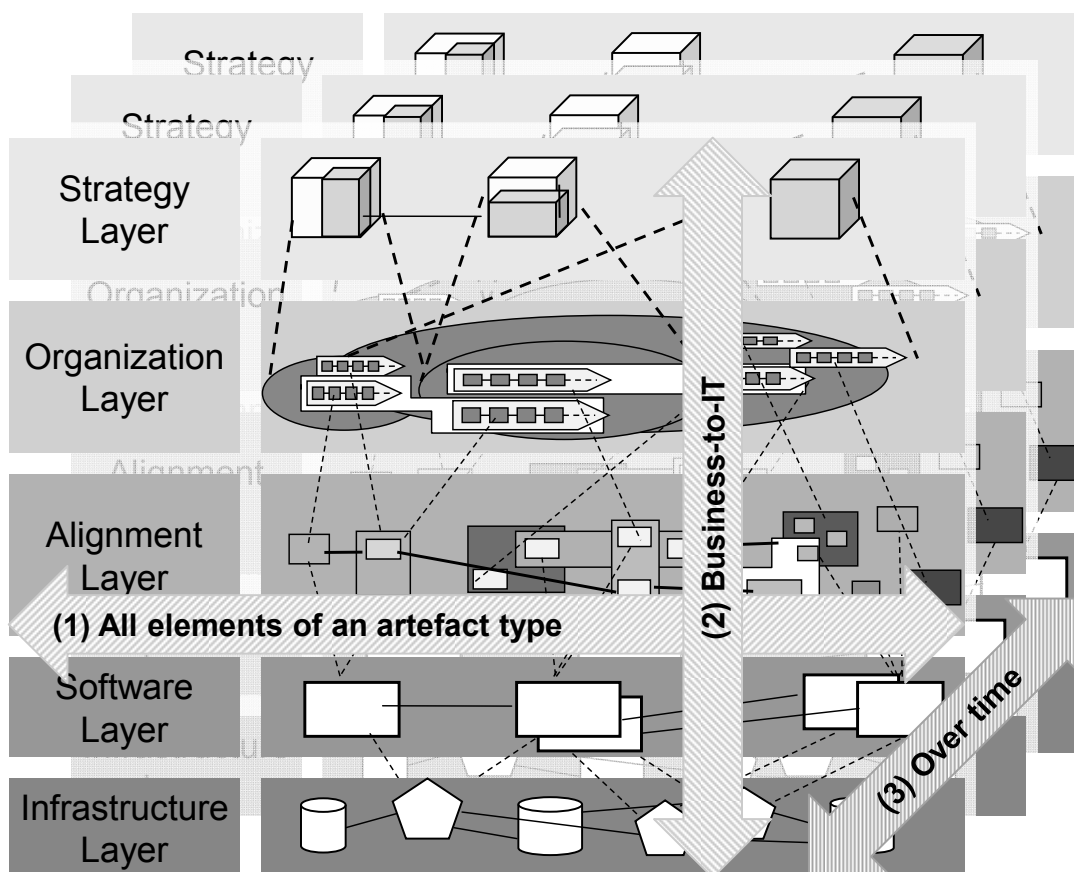
Figure 1:   EAM Perspective onto the Playing Field (based on Aier 2014a)

As a result of the challenges outlined in section 1.1, practice and academia have developed a fairly mature EAM toolbox comprising (1) artefacts such as models and meta models for structuring and communicating current and future states of the architecture as well as respective description languages (Aier and Gleichauf 2010; Lankhorst 2013; The Open Group 2012; Winter and Fischer 2006), principles for guiding architectural development (Aier 2014b; Greefhorst and Proper 2011), frameworks for overarching reference (IFIP-IFAC Task Force on Architectures for Enterprise Integration 2003; The Open Group 2011), general EAM approaches and good practices (Buckl and Schweda 2011; Ross et al. 2006), tools to support architects' work (Matthes et al. 2008), including (2) respective processes, structures and guidelines to develop these artefacts and eventually realize envisioned benefits for the management of IT and for the organization.

Last but not least, the questions arise as to whether EAM is actually worth the effort and yields adequate benefits. Despite the maturation of EAM and its practical relevance, measuring and explaining EAM benefits and justifying EAM investments remains difficult (Obitz and Babu 2009). However, research has *empirically* shown that EAM yields benefits for better managing IT heterogeneity, replication and integration (Boh and Yellin 2007), increased IT flexibility and efficiency (Schmidt and Buxmann 2011), reduced IT costs, risks and development times (Ross and Weill 2005), better business-IT alignment (Gregor et al. 2007; Strano and Rehmani 2007), (enterprise) transformation and decision support (Asfaw et al. 2009; Labusch et al. 2014; Simon et al. 2014), and increased business management satisfaction with IT, operational excellence and strategic agility (Ross and Weill 2005). Alongside this empirical work, several noteworthy conceptualizations and syntheses can be found in the literature. Niemi (2006) for example points at the issue that a lot benefits are either only weakly attributable to EAM, not quantifiable, or both. The author categorizes EAM benefits mentioned in the literature and by focus group participants according to the dimensions "Attributable to EA" and "Measurable". The four resulting EA benefits quadrants provide a helpful orientation for research and practice. Another practical approach is taken by Schelp and Stutz (2007), who developed an EA value measurement framework based on the balanced scorecard approach. Their EA scorecard enables the measurement of EA performance from a business perspective in the dimensions of EA services, processes, assets and finances. Lastly, Tamm et al. (2011) deal with the question of *how* EAM leads to organizational benefits. Based on a review and consolidation of literature, they present the "EA Benefits Model", which proposes that EAM leads to organizational benefits through its impact on organizational alignment, information availability, resource portfolio optimisation, and resource complementarity.

2.2 Architectural Coordination

According to Williams and Karahanna's (2013) review of coordination literature and definitions, coordination deals with three major themes: First, the interdependence of tasks; second, the relation to outcome achievement; and third, the concept of process. While coordination may also be seen as a state or condition, "that state can be maintained only to the extent that the environment is stable, participation is continuous, work tasks and activities are stable, products and services do not change, and the means of coordination are maintained" (Williams and Karahanna 2013, p. 935). In line with these three themes, coordination can be defined as "the process of managing de-

pendencies among activities" (Malone and Crowston 1994, p. 87) to achieve larger, purposeful wholes (Holt 1988). Coordination can be achieved through a variety of mechanisms. Martinez and Jarillo (1989) synthesize existing mechanisms of coordination through an exhaustive literature review. They arrive at eight coordination mechanisms that they divide into two groups: structural and formal mechanisms, and more informal and subtle mechanisms.

The concept of coordination is central to organizational design in general and has been discussed in many respective fields. The penetration of organizations with IT, new possibilities to design cooperative work systems, and the need for business-IT alignment made coordination a current and vivid topic in the IS discipline (Malone and Crowston 1990; Malone and Crowston 1994; Williams and Karahanna 2013). Malone and Crowston (1990; 1994) coined the term "coordination theory" to refer to the interdisciplinary study of coordination with theories about how coordination can occur in diverse kinds of systems.

Architectural Coordination (AC) builds upon the concept of coordination and asks how EAM can help coordinate changes in the organization. Consequently, AC is seen as the aspect of EAM that is concerned with coordinating stakeholders and their respective concerns, projects and transformations from an architectural perspective. EAM appears particularly suitable as a coordination approach, as it a) can make valuable contributions to project portfolio management, b) is intended to guide the continuous and sustainable development and transformation of an enterprise (time dimension), and c) is targeted at multiple levels and units of an organization (business-to-IT and broad perspective). EAM's suitability for coordination is also explicitly acknowledged by several scholars. For example, Pulkkinen et al. (2007, p. 1607) propose EAM "as a means for comprehensive and coordinated planning and management of corporate ICT and the security infrastructure" and Schmidt and Buxmann (2011, p. 182) characterize EAM "as an enterprise-level coordination function that is employed to govern the multi-polar EIS evolution process and to align it with global corporate objectives."

Informed by coordination theory and based on empirical data, Abraham et al. (2013) investigate whether and how EA is coordinated in organizations. They identify three major types of EA coordination (coordination by all-embracing decision making, coordination by vertical structure, and coordination by horizontal structure), and show that the application of a certain coordination type depends upon certain contingencies such as national culture or project phase. They come to the conclusion that EAM can indeed support coordination in enterprises. As part of their study of EA coordination

challenges and approaches, Espinosa et al. (2011; 2012) found that cognitive coordination plays a critical role for architecture effectiveness. Cognitive coordination takes place when AC is internalized and stakeholders coordinate implicitly through shared mental models and team awareness. However, as of yet, most research attributable to EA coordination deals with the more formal mechanisms of EA governance, EA planning and EA principles. EA planning is concerned with the construction of a plan of moving from an 'as-is' state to a 'to-be' state of the EA under consideration of various goals, requirements and alternatives for realization (Gleichauf 2011). EA principles provide guidelines and rationales for designing and evaluating architectural development (Aier et al. 2011b; Winter and Aier 2011). In this work, AC is treated as the joint sum of AC measures and activities.

The challenge AC faces is that its success is dependent upon stakeholders' widespread acceptance of and conformance to AC (Foorthuis 2012). For example, it may be decisive that stakeholders actually follow architecture principles and procedures in order to achieve AC goals. As noted earlier, this does not go without saying as AC may also result in additional work and a restriction of design freedom, which is usually condemned by certain stakeholders (Dietz 2008). Finding ways and concepts that foster acceptance and organizational anchoring of AC (including a certain restriction of design freedom) is therefore critical for realizing AC's and EAM's overall benefits. To address this challenge, this dissertation invokes concepts from institutional theory, which will be presented in the next section.

2.3 Institutional Theory[2]

According to Jepperson (1991), an *institution* "represents a social order or pattern that has attained a certain state or property", which Meyer and Rowan (1977) refer to as "a rulelike status in social thought and action." *Institutionalization* "denotes the process of such attainment" (Jepperson 1991), or put differently, institutionalization is concerned with "stickiness, or how things become permanent" (Colyvas and Jonsson 2011, p. 30). Institutions coordinate interactions, distribute tasks and roles, and define relationships among actors (Walgenbach and Meyer 2008). As such, institutions provide stability and meaning to social life (Scott 2013), and they enable ordered thought,

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[2] As all dissertation papers cover in detail the way institutional theory is adopted, this section will only provide a brief overview of the theory and the specific concepts used. In particular, section A.3 from paper A, sections B.2 and B.3.2 from paper B, and sections C.2 and C.3 from paper C detail, which and how institutional theory concepts are used.

expectations and behaviour. However, they may also hinder critical reflection and the detection of more efficient ways of organizing (Zucker 1987). Consequently, institutions also influence division of labour, specialization and productivity, and determine how efficient commercial activity may take place. The configuration and efficacy of institutions are therefore decisive factors for hampering or facilitating economic performance, prosperity and social development (Zucker 1987). Institutional theory then deals with questions of how and why institutions get adopted, refused and changed over space and time.

Based on a literature analysis, section A.3.1 discusses four features that characterize a practice as an institution or as an institutionalizing practice, respectively.

- The practice is not a "fad", but something that exists for a prolonged period of time and becomes entrenched (Zeitz et al. 1999).
- Practices and structures manifest both across and within organizations (Colyvas and Jonsson 2011). Put another way, institutionalization takes place on the macro and micro level and respective forces come from both levels (Currie 2009; Davis and Greve 1997; Walgenbach and Meyer 2008; Zeitz et al. 1999).
- The practice is enacted and shaped through social systems, and hence inherently linked to "boundedly" rational actors (Greenwood et al. 2008; Greenwood et al. 2011).
- The practice is legitimated through norms, values and beliefs, which may ultimately lead to the practice's self-sustainment and taken-for-grantedness when fully institutionalized (Colyvas and Jonsson 2011; Suchman 1995).

We argue that these attributes apply to EAM (including AC), while acknowledging that in practice EAM is oftentimes still at a pre-institutionalized stage with respect to a single organization (Gartner 2012). At this stage, new structures "appear in response to existing problems" and provoke change, but are still far from being taken for granted (Mignerat and Rivard 2009, p. 271; Tolbert and Zucker 1996). However, research has shown that EAM is a growing and legitimate practice manifesting on multiple levels (Mykhashchuk et al. 2011; Simon et al. 2013), with seminal academic literature dating back to the early 1990s (Richardson et al. 1990; Tamm et al. 2011; Zachman 1987).

From the wide body of knowledge of organizational institutionalism (cf. Greenwood et al. 2008; Scott 2013), this work, in particular, is inspired by work from Oliver (1991), while focusing on a micro level (Powell and Colyvas 2008) view. Oliver (1991) developed a typology of strategic responses that organizations employ in direct response to

institutional pressures for conformity. The five response strategies range from acced-ing acquiescence to active forms of resistance like defiance and manipulation. Further, Oliver presents ten institutional factors determining the choice of a response strategy. Similar mechanisms are observable for AC: affected stakeholders respond differently to AC—while some may follow immediately and dedicatedly, others will perceive it as constraining (Dietz 2007) and unnecessary, and therefore try to defy and manipulate respective endeavours. Considering these similar mechanisms, this work invokes Oli-ver's (1991) typology as a foundation for developing an AC-specific analysis frame-work (paper B) and for discussing institutional factors relevant for AC's institutionali-zation and benefit realization (paper C).

As in Oliver's (1991) work, the bulk of institutional research has focused on the sec-toral, field or global level, i.e. on the macro level of analysis (Powell and Colyvas 2008). On this level of analysis, how ideas and practices span across organizations, industries and nations, is studied. Most significantly, how organizations as a whole adapt, change and respond to institutional pressures coming from the broader institu-tional environment is assessed. This dissertation focuses on the micro level. In doing so, AC is regarded as the pressure exerting entity, embedded in the intra-organizational environment, with AC stakeholders as responding actors to AC demands and ideas. Recently, the micro level has been called increased attention to (Powell and Colyvas 2008). In their profound review, Greenwood et al. (2008, p. 29) see this level as one direction for future research, stating that other levels of analysis aside from the organi-zational field or environment level "have been rarely considered. For example, few studies treat the organization as the level of analysis […] or examine how the organi-zation might be treated as an institutional context for understanding *intra*organization-al behaviour." The approach taken in this dissertation connects with the recent work by Pache and Santos (2013) who, on a micro level and likewise building upon Oliver's (1991) work, conceptualize how individuals in organizations respond to competing institutional logics.

2.4 Related Work

Extant literature employing an explicit institutional perspective on enterprise architec-ture is scarce. Hjort-Madsen's work stands out, investigating EA adoption in the public sector (Hjort-Madsen 2006; Hjort-Madsen 2007; Hjort-Madsen and Pries-Heje 2009; Janssen and Hjort-Madsen 2007). In general, he points out that an adoption of EA practices and frameworks by public organizations is strongly influenced by the institu-

tions—in this case policymakers and ministries—surrounding the public organizations. Hjort-Madsen emphasizes that the private sector is qualitatively different from the public sector where, e.g. market forces and the ambition for efficiency are oftentimes lacking, and individual agencies are highly regulated and possess a high degree of autonomy. In consequence, despite EAM's general necessity and usefulness, the findings show, for example, that (1) "top managers in government agencies are rarely interested in organizational change, and the EA planning innovation thus gets adopted to underpin the existing organizational structures." (Hjort-Madsen and Pries-Heje 2009, p. 8); and (2) it is difficult to sincerely introduce EAM, as it "challenges the [prevailing] institutional structures by promoting a *new* line of thinking for the IS planning routines and values" (Hjort-Madsen 2007, p. 343; italics added). More specifically, Hjort-Madsen draws the following conclusions: Investigating the adoption of EAM in the largest Danish hospital (Hjort-Madsen 2006), he finds that interoperability and integration are not the only arguments for implementing EAM; government pressures for consolidation and value preservation and political motives also drive the EAM development. Reviewing the case and the institutional setting, he concludes that the "public sector is not creating the desired incentives for developing interoperable e-government services." (Hjort-Madsen 2006, p. 9) In his study of US federal agencies adopting federal enterprise architecture (FEA) IS planning guidelines due to a mandate of the US Office of Management and Budget (OMB), Hjort-Madsen advances the institutional perspective (Hjort-Madsen 2007): He identifies three types of EA planning adopters, i.e. "Accepters", "Improvers", and "Transformers". The adopter types illustrate that a certain level of compliance to national EA planning requirements does not necessarily lead to sincere administrative reform. The latter is only achieved, if institutional forces from both micro and macro level promote transformation. Otherwise, agencies may solely superficially conform to FEA guidelines for the attainment of required external social legitimacy. In a complementing study of national enterprise architecture (NEA) adoption in Denmark and the Netherlands, Janssen and Hjort-Madsen (2007) find that in particular adequate governance mechanisms are necessary for fostering NEA adoption and implementation in government agencies, and to ensure "that NEA becomes more than just a paper exercise." (Janssen and Hjort-Madsen 2007, p. 9) In consequence of the comparably strong dependence of EA programs upon institutional pressures and political determination, Hjort-Madsen and Pries-Heje (2009) speculate whether EA in government is a fad or has a future. While not being able to answer this question conclusively, they note that (1) EA in government is largely driven by fashion, i.e. as a complying and imitating response to certain ministry recommendations;

(2) EA cannot transform government by itself; but that (3) institutional force needs to promote the actual transformation; and that (4) IT-architecture elements are more stable than fashion-driven business architecture elements.

In conclusion, Hjort-Madsen's work provides an elaborate picture of institutional, macro level influences onto EAM adoption in government agencies. However, as he points out himself, the public sector is special—as noted before, competition and profit-orientation can be expected to drive EAM quite differently in the private sector. It could be interesting to investigate the differences between EAM's institutionalization in the public and in the private sector, and to which extent and with which implications certain issues EAM is confronted with (e.g. autonomy of business units, political will, and a certain amount of required governance) apply to private organizations, too.

Iyamu (2009, p. 221), similar to the perspective of this work, focuses on the intra-organizational level of EAM's institutionalization, noting that "the design and development of EA has proven to be easier than its institutionalization." Based on two case studies, he presents six internal barriers to the institutionalization of EAM and relates them to four elements of the EAM development and implementation process. However, while the identified barriers are informative to management, his overall propositions remain to be rigorously evaluated.

Overall, institutional analyses in the domain of EAM research is still very limited, albeit promising to advance EAM knowledge and practice. This dissertation complements the institutional perspective for EAM by investigating institutional factors at the intra-organizational level. While these factors prove to be of general importance, an institutionalization of EAM can be expected to be additionally dependent on the intra-organizational EA context, i.e., for example pursued EA goals, EA maturity, and EA management. Such a case-dependent analysis taking details about the EA context into account is not part of this work, but may be a valuable contribution of future research.

3 Summary of Dissertation Papers

3.1 Overview

The core of the dissertation presents itself in the form of three distinct scientific papers, referred to as papers A, B and C. Each paper answers one or more research questions that have been derived as manageable chunks to address the research objective. Table 2 illustrates the associations between papers and research questions. It can be seen that the papers build upon each other from left to right in answering the RQs from Table 1.

Table 2:   Addressing of research questions in the dissertation papers

Paper and Title		RQ 1a	RQ 1b	RQ 2	RQ 3
A	Institutionalization of Architectural Coordination – Need and Conceptual Foundations	●	◑	○	○
B	An Institutional Framework for Analyzing Organizational Responses to the Establishment of Architectural Transformation	◕	◕	●	◔
C	Institutionalization and the Effectiveness of Enterprise Architecture Management	◔	◔	◑	●
	Part A of the dissertation	◔	◔	◔	◔

The Harvey Balls indicate the way and degree a paper covers and contributes to answering a research question. They can be described as follows:

- ○ No coverage.
- ◔ Basic, foundational or summarizing coverage. Minor contribution.
- ◑ Partial coverage, building foundations or making additions. Medium contribution.
- ◕ Major coverage, covers certain aspects in great detail. Major contribution.
- ● Full coverage, core focus of the paper. Major contribution.

The core of the dissertation represents papers B and C. Due to the cumulative dissertation mode and the fact that each paper has to be able to stand for itself as part of scientific publishing, papers B and C also include aspects of RQs preceding the core RQ addressed in the respective paper. To that end, the most comprehensive paper can be regarded to be paper C. In the following section, each paper will be presented briefly.

3.2 Papers

3.2.1 Paper A: Institutionalization of Architectural Coordination – Need and Conceptual Foundations

Purpose:

When going beyond solely technical issues and incorporating socio-economic aspects into the area of interest as done in this dissertation, one faces the tremendously increased problem complexity. The purpose of paper A is therefore to increase the problem understanding of institutionalizing architectural coordination. A better problem understanding is necessary in order to comprehend the problem's complexity, its facets, and to be able to derive paths towards its solution. By illuminating the problem, paper A lays the ground work for subsequent research steps.

Research Method and Content:

As a first step, paper A motivates the problem, i.e. it is discussed what the practical problem is, why it is of relevance, and why dealing with it (scientifically) appears worthwhile. Based on this motivation, the paper sheds light on the problem's complexity by looking at it from several selected theoretical perspectives. These include the issue of 'wicked problems', game theory, organizational culture, diffusion of innovation, change management, IS success models and institutional theory. Following this screening of the problem's playing field, the paper argues why concepts from institutional theory are a suitable foundation to inform the problem and its solution. The paper then discusses in detail the value and the prospective usage of institutional theory concepts by providing a review of institutional theory in general, related institutional work in the IS domain, and how institutional concepts may contribute to a solution to the problem. The employed research method is the review of extant literature.

Results:

Paper A contributes to the so far lacking theoretical grounding (Goldkuhl 2004; Winter et al. 2014) of EAM in general by pointing at several theoretical lenses that are informative to EAM research. Specifically, paper A (1) contributes to an explanation for the observable challenges of embedding AC in organizations, and (2) provides reference on how to approach this problem. In particular, the paper lays the conceptual foundations for subsequent research by thoroughly reviewing institutional theory vis-à-vis the problem at hand. Based thereon, the paper closes with a roadmap of research

questions culminating in a design-oriented solution for institutionalizing AC in organizations (Table 6).

3.2.2 Paper B: An Institutional Framework for Analyzing Organizational Responses to the Establishment of Architectural Transformation

Purpose:

In paper B, AC is regarded as means for supporting transformations. In such a context, understanding potential sources of resistances and support is particularly valuable. Indeed, some institutional scholars argue that being able to cope with and manage the institutional (legitimating) environment is a key success factor of business endeavours (cf. Oliver 1997). With respect to AC, this poses a particular challenge for several reasons: (1) AC ultimately aims at utilising potential synergies by restricting the design freedom of various stakeholders (Dietz 2008); (2) the institutional context of AC is only little understood, that is, the interplay between the pressures AC exerts on the organisation and the response strategies of this organisation; (3) due to its intra-organizational nature, AC itself is subject to pressures flowing back from its stakeholders inside the organization; and (4) AC is concerned with overarching transformation affecting the organization as a whole, or large parts of it (Harmsen et al. 2009). As such, one can expect (and observe) a wide range of different stakeholder responses towards AC. However, in order to institutionalize AC, respective pressures and stakeholder response strategies have to be understood and explicitly dealt with. The purpose of paper B is to conceptualize institutional antecedents and stakeholder responses in the context of AC.

Research Method and Content:

Paper B reviews in detail the institutional work from Oliver (1991) and discusses how her *institutional factors* are relevant for the choice of *response strategies* taken by stakeholders towards the AC approach. Based on four case studies, the paper adapts and extends the existing work towards a more AC-specific analysis framework. Each of the cases is archetypical in a certain way. Data for the case studies have been collected with three of these companies since 2006 and with the remaining since 2008. Key stakeholders in IT management, EAM, and business-IT relationship management have been interviewed. In addition to the interviews, regular review meetings have

been set up to observe state, development, and architectural issues in the companies involved.

Results:

Paper B contributes an analysis framework comprising institutional antecedents that should be considered in order to build and anchor an effective AC approach in organizations. The resulting framework allows for analysing and shaping the so far often neglected intuitional factors for more successfully implementing AC in an organization. The case study demonstration suggests that the framework's perspective is worth considering and that the influencing factors are able to provide a fitting picture of stakeholders' response strategies towards AC. In concrete terms, the framework arrives at the factors of cause, constituents, content, control, context, trust and participation which are consistently linked to AC stakeholder response strategies of acquiesce, compromise, avoid, defy, and manipulate.

3.2.3 Paper C: Institutionalization and the Effectiveness of Enterprise Architecture Management

Purpose:

Building upon the results from paper B, the purpose of paper C is to verify proposed antecedents for an institutionalization of AC and to quantify its contribution to realizing EAM benefits. Specifically, paper C is to put the overall institutional perspective with the discussed concepts and antecedents that were proposed to be relevant for higher EAM benefits achievement onto solid quantitative-empirical grounds.

Research Method and Content:

Paper C develops a research model (Figure 2) comprised of antecedents for institutionalizing AC and realizing EAM benefits. Seven exogenous constructs are hypothesized to foster positive stakeholder responses (RES) and EA consistency (CON), which represent the constructs where AC's institutionalization should manifest. RES and CON are hypothesized prerequisites for realizing the benefits (BEN) attainable by the organization through EAM. In the paper, all relations are first developed and substantiated with extant literature. The resulting nine testable research hypotheses are tested employing a PLS approach to structural equation modelling (SEM). Data was collected by means of a questionnaire that was distributed in the German language at one major and three minor practitioner events in Switzerland, Germany and Austria between April and October 2012. 112 responses were collected.

Method-wise, the development of the inner and outer model follows recommendations from MacKenzie et al. (2011) and Ajzen and Fishbein (1980). The testing and evaluation of the model is done according to the PLS-SEM procedures from Chin (2010) and Götz et al (2010).

Results:

The paper findings confirm (1) seven institutional factors as important predictors for an institutionalization of AC and (2) that this institutionalization contributes to the realization of EAM benefits for the organization (Figure 3). All tested relations were statistically significant—most of them highly significant. Thus, all nine research hypotheses can be supported (Table 16). The findings are discussed from a theoretical and a practical perspective including recommendations for action. For researchers concerned with EAM, the paper provides an instrument to observe and analyse the organizational empowerment of their artefacts. Given the level of maturity of the core EAM artefacts like models, tools, or planning approaches, the work should represent a valuable step to make these artefacts more effective. Furthermore, the paper contributes to the limited amount of research that explains, supported by empirical evidence, how EAM benefits come about (Tamm et al. 2011).

4 Discussion and Outlook

4.1 Contribution

AC is an important aspect of EAM, as it is concerned with managing dependencies among organizational change activities (e.g. projects, transformations) from an architectural perspective for the end of better overall business performance. The conducted work was motivated by the practical problem that it is difficult to institutionalize architectural coordination in organizations.

To address this problem, the dissertation pursued two objectives. On the one hand, it intended to first of all create a better understanding of the nature and complexity of the problem based on theoretical accounts. Using solid theory foundations is, besides its general problem and solution informing utility, motivated by the fact that theoretically grounded EAM research is limited so far (Winter et al. 2014). On the other hand, the dissertation intended to verify antecedents for institutionalizing AC and assess their contribution to EAM benefit realization.

Table 3:   Research results in relation to research questions and dissertation papers

RQ No.	Research Question/Results	Reference
RQ 1a	What constitutes the problem of institutionalizing architectural coordination?	
	Fostering the institutionalization of AC in organizations is a 'wicked problem'. The particular challenge lies in overcoming stakeholder resistances to AC, which exist due to naturally occurring local goal systems and interests. Looking at the problem from different angles (e.g. game theory, organizational culture, diffusion of innovation, change management, IS success models and institutional theory) aids in conceiving the problem. These theoretical perspectives provide insights on how social systems behave and which factors should be considered when intending to establish new practices in organizations.	A.1, A.2

RQ 1b	What can institutional theory contribute to inform the solution to the problem?	
	Institutional theory deals with questions of how and why institutions get adopted, refused and changed over space and time. As such, institutional theory contributes conceptualizations and factors how practices and beliefs may spread and stick on a long-term basis. The dissertation has reviewed institutional theory and provided well-founded arguments for its applicability to the AC/EAM context.	A.3
	In this work in particular, institutional concepts were adopted that explain how stakeholders may respond to experienced pressures, and which factors determine the type of response chosen. To that end, the work from Oliver (1991) stands out in the institutional theory body of knowledge. As her framework mirrors AC challenges, it was reviewed in detail and used as a foundation for a solution to the problem.	B.3
RQ 2	What are antecedents for institutionalizing architectural coordination?	
	After reflecting and adapting Oliver's (1991) framework to the AC context based on an analysis of multiple case studies, 14 antecedents in seven groups are proposed: Cause (Legitimacy & Efficiency), Constituents (Multiplicity & Dependence), Content (Consistency & Constraint), Control (Coercion & Diffusion), Context (Uncertainty & Interconnectedness), Trust (Utility & Qualification), and Participation (Stakeholder Views & Dogmatism).	B.5
	The proposed antecedents above have been further refined and quantitatively tested in a structural equation model. In conclusion, the following seven antecedents could be empirically confirmed: Social Legitimacy, Efficiency, Organizational Grounding, Trust, Governance, Goal Alignment, and Enforcement.	C.3
RQ 3	How does the institutionalization of architectural coordination contribute to EAM's benefit realization?	
	The seven antecedents have a significant impact onto positive stakeholder response (RES) and EA consistency (CON), which are the two constructs that were conceptualized as manifestations of AC's institutionalization. In the model, they serve as intermediate constructs that eventually influence EAM benefit realization (BEN). Both RES and CON significantly contribute to the realization of EAM benefits, explaining 57.8% of BEN's variance. Due to the interrelatedness of the model, this also means that the seven antecedents are significantly relevant for achieving BEN. However, CON's impact on BEN is stronger than RES'.	C.5, C.6

Based on the rigorous research methods of literature review, case study and structural equation modelling, a contribution could be made to answering all four research questions. Two of the three dissertation papers were double-blind reviewed and published

and presented at the two most prestigious IS conferences, accordingly (paper B at ECIS 2012, paper C at ICIS 2013).

The research provides insights and implications for practice and academia alike. By invoking concepts from institutional theory, the work contributes to an improved understanding of EAM phenomena and provides a largely novel perspective. As part of this, papers B and C bring awareness to factors of less technical nature that were only little dealt with so far. The research revealed that these institutional factors are indeed significant antecedents for bringing AC into more effective operation and realizing respective benefits. For practitioners, this means that the discussed factors should be considered and addressed as discussed in section C.6.2. Also, the measurement items used for operationalizing the constructs in the model from paper C represent good starting points for what to improve in detail (see Table 14). Furthermore, the work can be used as an instrument to observe and analyse the organizational empowerment of AC and EAM artefacts. As pointed out in paper B, the framework can be used as a (self-) assessment tool by looking at the way stakeholders react to AC and what the reasons for this might be in terms of the institutional factors. In terms of contribution to research, the work operationalizes theoretical institutional concepts outside their original domain to provide a deeper understanding of factors and behaviours at play in AC and EAM, respectively. Specifically, the work shows how the rather abstract, field-level framework from Oliver (1991) can contribute to inform a concrete problem at the micro, intra-organizational level. Hence the work also provides a contribution to the body of knowledge of institutional theory.

This being said, it is acknowledged that further analysis and perspectives are conceivable to both answer this dissertation's research questions as well as advancing the research based on the contributions made. Limitations of this work and prospects for future research are therefore discussed in the next two sections.

4.2 Critical Appraisal

As with any scientific work, this work has limitations. The most fundamental limitation can be regarded to be the theoretical lens chosen for this work, i.e. institutional theory. Even though institutional theory has been selected based on a broader review of potential candidates to inform this work (A.2), it has been argued why it is applicable (A.3.2), and its utility has been demonstrated, it nevertheless limits the view onto the problem and solution space. In general, the organizational institutionalism describes, on a rather high level of abstraction, which and how collective developments

take, or took, place in the organizational world. As such, institutional theory is primarily of analytic and explanatory nature, with only very few components that can, for example, be attributed to design and action (Gregor 2006). Depending on one's point of view, this can be regarded to be a major limitation of the theory: it struggles (i) to provide clear guidance on how to institutionalize a practice; (ii) to explain how ideas and schemes from the institutional environment actually translate into the specific practices encountered in particular organizations; and (iii) to give an account of the techniques and operations by which practices are constructed and sustained (Hasselbladh and Kallinikos 2000). These limitations may be due to the fact that each practice is unique and subject to many influences and arbitrary individual decisions (e.g. by politicians or senior managers) that determine a practice's institutionalization. Furthermore, institutional theory has a pro-institutionalization bias, as most studies investigate current or former institutions. However, a lot of practices and even worthwhile innovations that did not become institutionalized are much less studied, which may contribute to issue of not being able to explain why certain practices institutionalize and other do not. In conclusion, despite institutional theory's generality and its ability to provide valuable insights and concepts, its immediate utility for informing concrete problem-solutions is limited and can be questioned. Hence, it requires a considerable amount of work to translate and learn from these institutional concepts for a specific context of application, in particular if this context is located at the less observed intra-organizational level. Obviously, the way such translation is conducted may be subject to discussion, which applies to this work. On the one hand, this work claims that institutional theory is suitable for the specific AC problem and context, but it is acknowledged that other theoretical lenses exist, which may just as well be applicable. Other lenses include the ones regularly used in IS research as reviewed in section A.2, but may also include theories from politics, psychology and other more distant disciplines. On the other hand, this work abstracts from specific organizational conditions, i.e. the EA context (c.f. section 2.4). Future research may increasingly tailor AC institutionalization concepts by differentiating the organizational context EA operates in, which may include an organization's pursued EA goals, EA maturity, EA management approach, and other organizational characteristics. Such an EA context-dependent model for institutionalizing AC could be valuable for practical applications. Hence, this issue essentially also applies to all future research prospects outlined in section 4.3.

With respect to this work's use of institutional theory, each paper has its limitations and assumptions, with some of them propagating to succeeding papers. Paper A, building the conceptual foundations, makes three propositions that also represent limitations: First, EAM (including AC) is an institutionalizing management practice that is regarded as an institution, albeit at an pre-institutionalized level. While arguments are presented why EAM may regarded in this way, this view may be contested at this point in time as EAM is still far from being taken for granted, and public opinion or the force of law are present in an indirect manner only. Second, this work focuses on issues occurring within organizations, i.e. on the micro level. EAM developments at the macro level, how EAM diffuses across organizations and organizational fields, and which forces and carriers exert pressure for an adoption of EAM have not been surveyed in detail. However, from an institutional theory perspective, these issues are very relevant. Furthermore, they can be expected to have implications for this work's understanding of the problem and its solution. Third, the paper posits that AC should be institutionalized to be able to realize synergies and global optima as opposed to local optimizations. While indeed many studies exist that underscore the benefits attainable through EAM, it remains unclear, which systems should be coordinated, and in which cases local optimizations should be granted and appreciated in the modern light of apps, cloud, mobile and bring-your-own-device. Such AC case differentiations, i.e. the boundaries of what should be coordinated, are not included in this work. Notably, such considerations are not limited to IT solutions, but may include several more (business-related) aspects like sourcing strategies, business units's and individuals' autonomies, or the deliberate prevalence of decentralized solutions, where AC cannot or does not have to become effective.

Paper B emphasizes the adoption of Oliver's (1991) framework to this work's problem area. In doing so, this work also inherits the assumptions of her work originating from institutional and resource dependence perspectives (cf. Oliver 1991, p. 147), and assumes their adaptability to the AC problem. Adapted, these assumptions read as follows:

- Stakeholder choice is constrained by multiple external pressures.
- Stakeholder environments are collective and interconnected.
- Stakeholder survival depends on responsiveness to external demands and expectations.
- Stakeholders seek stability and predictability.
- Stakeholders seek legitimacy.

- Stakeholders are interest driven.

Besides these fundamental assumptions pertaining to the theoretical lens chosen, paper B has further limitations. First, the two added factors (trust and participation) require further evaluation. While they have emerged from the case analysis and are supported by EAM literature, the paper does not evaluate them quantitatively. Furthermore, the paper lacks in assuring that these two factors are the only two additional ones that are relevant and that they fit to the remainder of the institutional framework. Concerning the latter issue, a detailed analysis of the factors from an institutional point of view would be necessary. Second, the trust factor may require additional dedicated analysis, because currently it may be contested that trust actually is the result of adequately addressing the other factors. Third, all factors lack concrete operationalization to be able to measure them rigorously. Respective operationalization would allow objectifying the case assessments and increasing the utility of the framework. Fourth, the whole framework has not been evaluated. While a certain amount of validity can be assumed as the framework has been deduced from the literature and extended using inductive reasoning, its utility has to be proven. To that end, new case work or a quantitative evaluation would be advisable.

Lastly, paper C has its limitations primarily in issues typical for quantitative papers. First, the theoretical model can only depict a small portion of actually existing constructs and relations. A model can point at certain constructs that are hypothesized to be particularly important, but after all many more constructs and relations exist that are not part of the model. This includes the issue that in complex models such as in paper C, even among the constructs modelled, further and/or other relations are perceivable. However, paper C focuses on presenting the relations that are statistically significant and supported by the data, respectively. Other perceivable model variations were either nonsensical due to the way the study was conceived (the theoretical model development), or prone of statistically insignificant relations. Concerning the latter issue, one could only speculate whether this was due to the way the model has been conceived upfront, whether the relation would indeed not exist, whether the gathered data was not sufficient, or whether respective relations would simply be too distant from each other in the nomological net. In conclusion, paper C can make validated statements about the way the constructs and relations are present in the model, but it cannot make statements beyond that. Second, it should be noted that the present constructs are partially measured on an aggregate and compact level due to the overall model complexity. While the essence of each construct has been captured, more detailed and

elaborate measurement scales could be compiled for most constructs. Respective, more detailed scales could be used in separate studies to elaborate the decomposed properties of certain constructs. Third, the data collection did not yield a representative sample. Although the paper can attest a fit between the respondents' knowledgeability and the research issue in questions, it can be criticized that using the same respondents to provide data for the independent, intermediate, and dependent variables during the same session, using the same instrument, is troubling. The paper discusses this issue and its implications briefly (section C.6.3). Fourth and last, it should be noted that the intermediate constructs RES and CON, as well as the final construct BEN, are domain-oriented. This means that they are primarily tailored to the AC problem, with RES being informed by institutional theory literature. However, as stated in the paper, all three constructs represent proposed observable results of institutionalizing AC, but they do not represent established measures of institutionalization in the literature. A detailed review and incorporation of the latter might improve the model conclusiveness from an institutional theory point of view.

All in all, many issues have been addressed throughout the development of the research and paper revisions. However, the mentioned assumptions and limitations remain and must be kept in mind when interpreting the results of this work. They further provide reasons for future research, which will be discussed in detail in the following section.

4.3 Prospects for Future Research

With the limitations discussed in the previous section, two streams for future research can be discerned. In the first stream, research may address the aforementioned limitations of this work. This research would directly build on the results of this work, and the necessary research steps follow from the previous discussion. In the second stream, future research goes beyond addressing this work's limitations, asking how other ambitious researchers may continue from here in elaborating the chosen institutional lens further and advancing the knowledge of institutionalizing architectural coordination. In this stream, other institutional concepts may be invoked. Accordingly, the conceptual foundations contributed by this work are relevant here, but the degree to which the future research may build on the details of paper B (analysis framework) and paper C (antecedents/model) varies. As the first stream for future research is more straightforward and has been outlined in the previous section, this section will discuss prospects of the second stream. The first two of the five following points are related to research

questions formulated in paper A (Table 6) as part of a roadmap towards a solution to the problem.

- *Carriers of AC's institutionalization.* The last research question of more explanatory character formulated in paper A reads "What are the carriers of AC's institutionalization (inside and outside the focal organization)?" (Table 6) Answering this question should provide a more complete picture of the way institutionalization of AC takes place. "Carriers" are the vehicles conveying an institutionalization (Jepperson 1991, p. 150; Scott 2013). They describe who and what bear and transport an institution's elements (e.g. ideas, objects, activities) through space and time. Scott (2013) delimits four types of carriers, namely symbolic systems, relational systems, activities, and artefacts. He positions these types of carriers orthogonal to the three institutional pillars (regulative, normative, cultural-cognitive; see section A.3.1), leading to a matrix that allows for cross-classifying institutional elements. According to this matrix, AC/EAM elements could be analysed to account for "how ideas move through space and time, who or what is transporting them, and how they may be transformed by their journey." (Scott 2013, p. 95) If filled with data from different EAM case organizations or other management disciplines, one could build a portfolio of elements for institutionalizing AC, analyse why certain organizations are more successful with EAM than others, compare EAM in general with institutional elements present in other disciplines (e.g. total quality management (Zeitz et al. 1999)), and derive respective recommendations (e.g. design principles) and fields of action. Elements embodied in the factors from this work (papers B and C) could be a starting point for filling the matrix. However, the matrix may in particular take cultural and macro level conditions into account, which were not explicitly dealt with in this work.

- *Design principles for institutionalizing AC.* Developing prescriptive design principles to foster an institutionalization of AC in organizations has likewise been put forward in paper A (Table 6). Borrowing from what van Aken (2004, p. 228) called a technological rule, a design principle (DP) can be understood as "a chunk of general knowledge, linking an intervention or artifact with a desired outcome or performance in a certain field of application." Consequently, a design principle embodies practical means-ends relationships that give instructions on *how* to achieve a design goal. Concerning the structure of a design principle, no common model exists. However, drawing on related work (Aier et

al. 2011b; Fischer et al. 2010; Gregor et al. 2013; Legner and Löhe 2012; Markus et al. 2002), a design principle could consist of a *name* representing the essence of the principle and being easy to remember, a *statement* about the goal that is pursued with the DP, a *rationale* motivating and explaining the DP's necessity, *implications* describing what to do and how to achieve the DP goal, *key actions* prescribing on a company-specific level how to implement the DP, and *measures* for evaluating the fulfilment of actions and expected effects (the goal statement).

Design principles are recognized as design science research (DSR) contribution type (Gregor and Hevner 2013). Therefore, to develop design principles, it would be appropriate to generally follow the DSR methodology process from Peffers et al. (2007). To arrive at an initial set of principles, two exemplary approaches can be envisioned. On the one hand, the validated antecedents from paper C, in combination with the findings from the case work from paper B, could be formulated as design principles. On the other hand, successful institutionalization practices could be gathered from practitioners using focus group and/or case studies. Respective means at the instance level could then be aggregated to design principles through abstraction/reflection activities (Gregor et al. 2013). Of course, both approaches could also be used in conjunction. When developing the design principles, it is important to take care that they are on an adequate level of abstraction. The decisive criteria for the right level can be seen to be applicability, i.e. it should be possible to realize the artefact in a way such that it is controllable (countable, measurable) in an organization. An example of an AC institutionalizing principle that follows up in particular from the factors Trust, Governance and Efficiency (see Paper C), may look as follows:

Table 4:   Example of a design principle for institutionalizing AC

Name	Enablement as opposed to restriction
Statement	Architects act as supporters and partners, not as "architecture police".

Rationale	Some scholars see architecture as restriction of design freedom. Others counter this rather pessimistic view and see architecture as helpful-constructive support for project and business managers when intending to design sustainable IS solutions. While generally both aspects are present, we found that EA approaches that primarily try to control, audit and sanction EA guidelines are prone to resistance and lacking effectiveness. Hence, architects should try to be supporter, enabler and solution-guide first for increased trust and impact.
Implications	• Conduct a fair amount of project work with direct benefits for respective stakeholders (e.g. min. 50% for each architect) • Stay pragmatic, constructive and solution-oriented even if architecture guidelines are violated from time to time – it is better to be part of a violation, to document and to resolve it later than not being consulted at all • Differentiate between 'quick project help' and thorough EA analysis – both is needed • Take care to have AC perceived as efficient and helping within projects • Establish and make use of boundary objects effectively
Measures	• Ratio of architects' conducted project work • Distribution of project involvement across the organization • Ratio of architecturally conforming projects • Number of architectural exceptions granted and denied • Amount and quality of accompanied solutions; reduced decision time

Finally, the principles should be evaluated (Sonnenberg and vom Brocke 2012). From a more theoretical point of view, the evaluated design principles could then be developed into a design theory (Gregor and Jones 2007).

• *AC institutionalization process.* "Institutionalization is both a process and a property variable." (Zucker 1977, p. 728) While this work and in particular the aforementioned design principles may give insights on how to institutionalize AC, they do not quite provide an understanding (or guidance) of what the AC institutionalization process looks like, and in which order certain institutional factors should be addressed or DPs applied. Several abstract models exist that describe the institutionalization process (Mignerat and Rivard 2009; Tolbert and Zucker 1996). Tolbert and Zucker (1996), for example, theorize how an organizational innovation may move through the stages of habitualization, objectification and sedimentation. While such models can be used as a blueprint to

investigate AC institutionalization processes, they are too abstract and must be concretized, and ideally built up from empirical data. A keen example of how to do so is represented in the study by Maheshwari et al. (2010), who delineate the institutionalization process of enterprise resource planning (ERP) systems in organizations. Based on multiple case studies with primarily retrospective interview data, they draw an institutionalization process and provide key activities and challenges that may help managers in successfully institutionalizing ERP systems. As an alternative to this approach, a longitudinal multiple case study method is perceivable. In this case, several organizations would be accompanied by the researchers throughout a prolonged period of time of institutionalizing AC. Occurring events, activities, as well as regulatory, normative and cultural shifts could then be observed live for the development of an AC institutionalization process. As with the DPs, resulting processes should keep the condition of being applicable. The ERP example from Maheshwari et al. (2010) can be regarded to fulfil this condition, as for each identified institutionalization phase, the authors delineate key activities, major challenges, and key coping strategies, thus providing concrete and hands-on guidance for an application of their process model.

- *AC stakeholder logics.* As another promising avenue for future research to advance the institutional lens onto AC/EAM, we see the opportunity to adopt an institutional logics perspective based on the framework from Pache and Santos (2013). Pache and Santos advance the micro-foundations of institutional theory by exploring how individuals within organizations experience and respond to competing institutional logics. Similar to this work, Pache and Santos build upon the foundations of Oliver (1991). Institutional logics can be defined as "patterns of beliefs, practices, values, assumptions, and rules that structure cognition and guide decision making in a given field" (Pache and Santos 2013, p. 6; Thornton and Ocasio 1999). The logic of individuals is strongly influenced by their respective education and professional experience. Obviously, individuals are exposed to many competing institutional logics that exist within an organization. Pache and Santos (2013) developed a model of individual-level responses to (two) competing logics, where the response to the competing logics is determined by the degree of familiarity with both logics.

  Using this model as a conceptual foundation, AC/EAM researchers could investigate what the prevailing logics among the various AC stakeholders are and how they respond to the logic underlying AC. Such work also sheds light onto

the actual value and goal systems of AC stakeholders. These are only briefly discussed so far, but they must be better understood in order to comprehensively address stakeholder needs as part of AC/EAM endeavours. Such research would complement this work and may provide an indication as to when and for whom certain institutional antecedents or principles are relevant for mobilizing and sustaining certain responses. Finally, the institutional logics perspective should well connect to the concept of architectural thinking (Winter 2014). Architectural thinking (AT) deals with the way of thinking and acting throughout an organization that takes holistic, long-term, and fundamental system design considerations into account in the daily business. Fostering AT is argued to increase the benefit and impact attainable through architecture management efforts (Winter 2014).

- *Deinstitutionalization of AC*. So far, this work as well as the outlook was essentially concerned with institutionalization, i.e. the formation of AC as a prevalent and legitimate practice in organizations. However, it may be valuable to also take the opposite perspective: Deinstitutionalization can be defined as the process "by which institutions weaken and disappear" (Scott 2013, p. 166), or as "the process by which the legitimacy of an established or institutionalized organizational practice erodes or discontinues." (Oliver 1992, p. 564) The EAM discipline may learn much from failures and cases where, for example, the EAM function has been dissolved again or has never reached an established status in the first place. Hence, AC/EAM deinstitutionalization studies can be seen as complements to aforementioned research points, for example in terms of identifying respective antecedents or investigating AC deinstitutionalization processes. From an institutional theory point of view, still relatively little is known about deinstitutionalization processes (Dacin and Dacin 2008).

Part B – Papers of the Dissertation

Paper A: Institutionalization of Architectural Coordination – Need and Conceptual Foundations

Table 5:   Bibliographic information for paper A

Title	Institutionalization of Architectural Coordination – Need and Conceptual Foundations
Author	Weiss, Simon University of St. Gallen, Institute of Information Management, Mueller-Friedberg-Strasse 8, 9000 St. Gallen, Switzerland simon.weiss@unisg.ch
Publication Outlet	Architectural Coordination of Enterprise Transformation, Proper, E.; Winter, R.; Aier, S.; de Kinderen, S. (eds.), Springer
Year	Forthcoming

A.1 Motivation

Various ACET-specific problem areas and solution approaches are discussed in this book. This is done under the notion that the ACET toolset is particularly fuelled by contributions from enterprise architecture management (EAM) and enterprise transformation (ET). On the EAM side, we can find well developed artefacts such as meta models for representing current and future states of an EA (Aier and Gleichauf 2010; The Open Group 2012; Winter and Fischer 2006), principles for governing its design and evolution (Aier 2014b; Greefhorst and Proper 2011), frameworks for overarching reference (IFIP-IFAC Task Force on Architectures for Enterprise Integration 2003; The Open Group 2009), good practices (Ross et al. 2006), and software tools to support architects' work (Matthes et al. 2008). On the ET side, we find reference of why and how transformations happen and how they are addressed (Rouse 2005; Rouse 2006), a classification and decomposition of transformations for a situational transformation approach (Baumöl 2005; Baumöl 2006) as well as guidelines of how to execute single transformations with the aid of existing methods like value management, business process management, program management, etc. (Uhl and Gollenia 2012).

This section discusses the challenge of bringing AC, and in this sense the foregoing toolset, into more effective operation by means of institutionalizing it among ACET stakeholders.

Architectural coordination (AC) represents a critical and difficult part of EAM's respectively architects' work, as it denotes the task of coordinating and mediating architectural concerns between different groups and individuals in an organization. *Architectural* refers to the broad and aggregate perspective onto the business-to-IT stack (Winter and Fischer 2006) as encompassed by EAM, whereas *coordination* refers to "the process of managing dependencies among activities" by the means of formal and informal coordination mechanisms (Malone and Crowston 1994, p. 87; cf. Williams and Karahanna 2013). The critical issue is that despite the aforementioned achievements, it remains challenging for practitioners to effectively anchor, i.e. institutionalize, architectural coordination (AC) in an organization (cf. Tamm et al. 2011). However, coordination of architectural changes due to concurrently executed projects and programs across organizational functions and/or levels is necessary to compose these activities into larger purposeful wholes (Holt 1988). These coordinated larger purposeful wholes, e.g. enterprise transformations, are in general to achieve overarching goals, to leverage synergies and to make the transformation or EA itself more effective and efficient. AC addresses these coordination challenges from an architectural view. ACET applies AC to the scenario of supporting ET. The problem exploration of this section focuses on AC, asking what can be done to diffuse and entrench it in an organization so as to make AC(ET) more effective.

Indeed, several schools recently identified entrenching a cross-departmental function like EAM in an organization as a difficult albeit critical task. Ross and Quaadgras (2012, p. 1) for example found that "business value accrues through management practices that propagate architectural thinking throughout the enterprise". This means that AC practices need to be actively promoted and diffused in order to deliver their full potential. In a similar vein, several highly renowned EA and ET scholars agree upon the growing value of EA for ET and emphasize the necessity and challenge of getting architectural thinking (Winter 2014) as a form of fostering AC(ET) integrated into an organization (Gardner et al. 2012). Relating to the institutionalization of another cross-departmental function, business process management (BPM), vom Brocke et al. (2012) likewise emphasize the necessity of governance structures, i.e. defined roles, agreed upon terminology, chosen methodology and tools, being "actually lived by all employ-

ees". In order to achieve this, respective structures "need to be perceived as useful and easy to apply" (vom Brocke et al. 2012). Vom Brocke et al. conclude their motivation for dealing with means for institutionalizing BPM by attesting that most BPM initiatives that fail, fail because of a lack of adoption.

With respect to AC we see similar patterns and challenges. A definition of the AC toolset is merely sufficient. In order to make ACET effective, it is necessary to institutionalize AC in the organization. The difficulty and criticality of institutionalizing AC has several reasons. One reason might be found in the fact that AC partially aims at utilizing potential synergies in an organization by *restricting the design freedom* of affected stakeholders (Dietz 2008; Hoogervorst 2009). Yet, reasonable arguments exist to do so, that is to pursue a global optimization (e.g. reducing functional redundancies on the overall application landscape) based on a coordinated enterprise-wide perspective instead of several only local optima found in the individual goals of projects or organizational units etc. However, affected stakeholders are often reluctant to follow architectural norms and values, to take part in the coordination effort and to eventually also give up some autonomy. As adequate stakeholder participation is critical for AC, though, respective stakeholders (i) need to be convinced of AC practices, (ii) understand the necessity for coordination and (iii) must be willing to take part in AC. If they do not, much of the aforementioned toolset may not realize its expected benefits.

Besides AC's inherently abstract and design-restricting nature, the challenge of institutionalizing AC may also be explained by the observation that so far EAM was much more concerned with technical issues addressing business and IT matters. Only few works take a more dedicated organization or people perspective (e.g. Aier 2014b; Ross et al. 2006; Ross and Quaadgras 2012). As noted however, for AC to be effective, it is crucial that many stakeholders take part in and comply with it. This problem area is also acknowledged by other scholars. Asfaw et al. (2009, p. 20) for example attest that "Enterprise architecture has an image problem.", and Winter and Aier (2011, p. 320) note that "only very few organizations consistently apply and manage EA principles" and that principle enforcement difficulties may be related to the way the principles are defined and justified.

In conclusion, this section's problem perspective deals with the challenges of making regulations, norms and values pertaining to architectural coordination stick in the organization so as to give them "a rule-like status in social thought and action" (Meyer and Rowan 1977). To discuss this challenge, we first portray different potential theo-

retical perspectives onto the issue (section A.2) prior to discussing concepts from institutional theory as our choice for underpinning this problem perspective in detail (section A.3). The section concludes by deriving relevant research questions from the problem perspective discussion.

A.2 Theoretical Perspectives on the Effective Anchoring of Architectural Coordination

When going beyond solely technical issues and incorporating socio-economic aspects into the area of interest, one faces tremendously increased problem complexity. In this sense, we are confronted with an even wickeder problem space than ACET techniques alone already deal with. In contrast to tame problems, "wicked problems" are those where at maximum the definition of the problem is clear, but the solution is not (Head and Alford 2013). This is due to the fact that wicked problems are complex and comprise an economic as well as a social component where different values and perceptions encounter each other. Furthermore, they are unique in each problem situation (Conklin 2006; Head and Alford 2013). Thus, (generally) solving a wicked problem is hardly possible. Rather, generating an understanding of the problem and its possible solutions is at the core of tackling these kinds of problems (Conklin et al. 2007).

In our case, we ask for alternative theories and concepts that may inform us on how to bring AC into more effective operation among stakeholders. To that end, wide bodies of knowledge in sociology, political science, psychology and organizational sciences with many potential possibilities for grounding and informing this issue exist. This section restricts itself to providing a brief review of prominent theories used in IS that offer insights and perspectives for building an understanding of the wicked problem of institutionalizing architectural coordination.

As part of ACET-related EA research, several approaches were adopted to underpin and inform this rather practice-driven discipline with theoretical foundations. Abraham and Aier (2012) for example look at ACET challenges from a *game theory* perspective. Generally speaking, "game theory concerns the behaviour of decision makers whose decisions affect each other" (Aumann 2008). Abraham and Aier translate three games from game theory into organizational coordination situations and analyse how EAM may help in these situations and how EAM should be designed, accordingly. Abraham and Aier conclude that an application of game theory helps theorizing and classifying a certain set of ACET situations. Their perspective is related to the problem

of institutionalizing AC in the sense that game theory can provide input as to how stakeholders may behave and decide when their goals are conflicting with AC purposes. On the other hand though, implications derived from game theory are generally limited by the theory's strong assumptions such as rationality of players and information asymmetry.

Another approach to make EA artefacts more effective was taken by understanding the role of culture (Aier 2013; Aier 2014b). Aier (2013, p. 1) proposes to "take *organizational culture* as a highly aggregated construct describing the context of EAM initiatives for building situational—or for that matter culture sensitive EAM methods—into account" as he finds that the success of EAM in general (2013) and of EA principles in particular (2014b) are moderated by an organization's or business unit's culture. In general, the analysis of organizational culture deals with the way humans behave as part of an organization and what meanings they attach to certain actions and values. To that end, Schein (2010) distinguishes three levels of culture ranging from artefacts (visible organizational structures and processes, but hard to decipher), to espoused values (espoused justifications such as strategies, goals and philosophies), to basic underlying assumptions (the ultimate source of values and action in terms of unconscious, taken-for-granted beliefs, perceptions, thoughts and feelings). In most cultural IS studies, culture is analysed on the intermediate values level and incorporated as mediating or contextual variable. However, despite its importance (Rouse 2006), it is generally agreed that organizational culture is both difficult to capture and to design. Still, Keller and Price (2011) found that organizations with an open and transparent, but also operationally disciplined culture perform better. These characteristics can be seen as both arguments and enablers for institutionalizing AC: On the one hand, AC fosters project and architectural transparency, and it calls for operational discipline to the better end of AC. On the other hand, if an organization already exhibits these cultural characteristics, it may be more receptive to AC in the first place.

A popular theory that aims at understanding and predicting how new ideas and technology spread through social groups is the *diffusion of innovations* (DOI) theory (Rogers 2003). DOI combines the concepts of adoption and diffusion. Adoption takes place at the individual level where people may adopt or reject an innovation, whereas diffusion describes the aggregate percentage of individuals that adopted an innovation as well as the respective process thereof. Similar to other large theories, DOI represents an umbrella for many concepts such as diffusion models, diffusion processes,

adopter categories, and key elements and antecedents that influence an innovation's diffusion success. However, DOI also makes several assumptions and comprises comparably simple theoretical models as pointed out and criticized by Lyytinen and Damsgaard (2001). They note that DOI is well-suited to explain individual adopters' behaviours with respect to a static technological artefact, but that DOI lacks constructs and explanations for complex and networked innovations. To that end, they propose to take further concepts into account such as political or institutional models as well as theories of team behaviour. Nielsen et al. (2014) make a similar point in their recent work by pointing out that DOI regards innovations often as fixed or immutable and ready-to-wear artefacts that are reproduced and transmitted without subsequent modification. To account for the more complex, socio-economic processes of diffusion, Nielsen et al. (2014), in their analysis of mobile IT use within Danish home care, build upon concepts from institutional theory instead. Indeed, concepts from institutional theory mirror the problem of institutionalizing AC inside organizations well. In the next section, we will therefore provide a more detailed view onto this perspective.[3]

Outside ACET-related research, Aladwani (2001) for instance, in an attempt to overcome workers' resistances to implementation of enterprise resource planning (ERP) systems, suggests to adapt *marketing* concepts and strategies. Concurrently grounded in *change management* practices, he proposes a model of successful ERP adoption. By employing change management as foundation, his approach is similar to ours, as change management can be regarded as the practical counterpart to the aforementioned theories. Change management is particularly related to DOI in organizations and deals with mechanisms to change attitudes, habits and values of individuals or teams, usually as part of transformation projects (Greenhalgh et al. 2004). Thus, on the one hand, change management practices may provide guidance on how to introduce AC. The other way round though, Espinoza (2007) argues, EA is also able to encourage change.

The aforementioned concepts for embedding new practices in organizations originated largely from organizational sciences. Besides them, the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003) as well as the DeLone and McLean (2003) IS success model have received a lot of attention in IS research. In part, these models conceptualize constructs that are relevant for and can be adapted to our issue of making a coordination/management approach stick in organizations (cf.

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[3] A thorough comparison of *diffusion* and *institutionalization* is provided by Colyvas and Jonsson (2011).

Weiss and Winter 2012). Accordingly, respective constructs and their measurement items may contribute to the understanding of our problem. However, in their nature, both models are rather technology-oriented and try to predict the initial usage intention of comparably immutable IS. In contrast to this, we are concerned with a mutable co-ordination/management approach to be long-term entrenched in organizations. We therefore intend to build upon foundations from organization and/or social sciences with a closer focus on entrenchment and social dynamics.

In conclusion, all aforementioned concepts and theories have in common that they aim at making IS artefacts more effective by considering their surrounding socio-economic context. This indicates that AC-related IS research is progressing by incorporating dimensions other than the better understood technical ones. However, what is missing is an elaborate conceptualization that a) pinpoints critical elements relevant for entrenching AC and bringing it into more effective operation, b) takes social processes and idiosyncrasies into account, and c) is based on solid theoretical grounds. This section and its respective problem perspective intend to narrow that gap. Following the general review of the playing field above, the next section will therefore review in depth the theory that shares its name with our challenge of institutionalizing architectural coordination. We choose concepts from institutional theory as the informing foundation for our perspective, because institutionalization "is concerned with stickiness, or how things become permanent" as opposed to, e.g. diffusion, which "is concerned with spreading, or how things flow" (Colyvas and Jonsson 2011, p. 30). As motivated, we are interested in clues that go beyond an initial straw fire of adoption, but make AC stick and, ideally, self-reproducing in organizations. These considerations represent a core focus of institutional theory (Colyvas and Jonsson 2011).

A.3 An Institutional Theory Perspective on Architectural Coordination[4]

A.3.1 Institutional Theory Foundations

Institutional theory deals with questions of how and why institutions get adopted, refused and changed over space and time. Institutional theory is contributed to by a wide field of research analysing institutional effects and processes following various re-

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[4] Parts of this section have been adopted from Weiss et al. (2013).

search methods in the disciplines of economics, political science, sociology and organizational studies on varying levels ranging from world-system and societal level to organizational subsystem and individual level (for an overview, see for instance Hall and Taylor 1996; Scott 2013). In our case, we build upon the new institutionalism in organizational analysis that developed from the foundational works of Meyer and Rowan (1977), DiMaggio and Powell (1983) and Zucker (1977). In this section we review the basic concepts from this stream prior to discussing our adoption of this theoretical lens at the micro, i.e. intra-organizational, level.

According to Jepperson (1991, p. 145), an *institution* "represents a social order or pattern that has attained a certain state or property", which Meyer and Rowan (1977, p. 341), in other words, refer to as "a rulelike status in social thought and action." *Institutionalization* "denotes the process of such attainment" (Jepperson 1991, p. 145). Institutions coordinate interactions, distribute tasks and roles, and define relationships among the actors (Walgenbach and Meyer 2008). As such, institutions provide stability and meaning to social life (Scott 2013), and they enable ordered thought, expectations and behaviour. But, they may also hinder critical reflection and the detection of more efficient ways of organizing (Zucker 1987). Consequently, institutions influence division of labour, specialization and productivity, and determine how efficient commercial activity may take place. The configuration and efficacy of institutions are therefore decisive factors for hampering or facilitating economic performance, prosperity and social development (Zucker 1987).

Classic examples of institutions are traffic rules, the handshake, systematic bookkeeping, contracting and human resource management departments. These examples represent institutions that are commonplace today and that have attained a rulelike status and a high degree of resilience. However, what actually makes these examples to institutions? Four criteria can be derived from literature concerning the formation or existence of an institution and the applicability of institutional concepts, respectively.

- First, the practice in question should not be a "fad", but something that exists a prolonged period of time and reaches entrenchment as opposed to initial adoption only (Zeitz et al. 1999).
- Second, institutionalization takes place on both the macro and micro level (Davis and Greve 1997; Walgenbach and Meyer 2008). Both levels are interlinked and forces fuelling an institutionalization come from multiple levels (Currie 2009; Zeitz et al. 1999). Respective institutionalizing practices and

structures manifest both across and within organizations (Colyvas and Jonsson 2011).

- Third, institutional theory originates from and presumes a social context with boundedly rational actors (humans) (Greenwood et al. 2008; Greenwood et al. 2011). An institution is shaped and enacted through social systems.
- Fourth, institutionalization is bound to legitimacy (Suchman 1995) in terms of norms, values and beliefs. Based thereon, institutionalized practices may eventually become self-sustaining. This is important for not equating institutionalization with formal authorization or faddish innovations (Colyvas and Jonsson 2011).

Notably, none of these four criteria dealt with the degree of diffusion of a practice. Diffusion and institutionalization may mutually support each other, but they should not be conflated. As Colyvas and Jonsson (2011, p. 29) point out in their matrix comparing diffusion and institutionalization, practices exist that are "ubiquitous but not accepted" (diffusion: yes; institutionalization: no), and practices exist that are "accepted, but not prevalent" (diffusion: no; institutionalization: yes).

Institutions can be analysed through what Scott (2013) termed the *three pillars of institutions*. The most prominent—the *regulative pillar*—underscores how institutions constrain and regularize behaviour through coercive mechanisms and regulative rules. The *normative pillar*, focusing on social obligation and binding expectations, calls attention to norms and values, which prescribe and evaluate how and to which valued ends things should be done. Finally, the *cultural-cognitive pillar* stresses underlying, taken for granted, shared conceptions and beliefs embraced by the mechanism of mimicries, i.e. imitation. The presence of a certain pillar/diffusion mechanism may vary strongly between institutions, though. Considering the handshake as a form of mutual agreement, the regulative mechanisms are essentially not present. Traffic rules in turn are usually imposed through mechanisms of all three pillars.

The decisive underlying proposition of institutional theory is that organizations are deeply imbedded in social and cultural contexts as part of which organizational structures and management practices are influenced by institutional demands. According to this, the institutional view can be summed up as follows: (1) An institution exerts pressures on actors to comply with the institution's demands (DiMaggio and Powell 1983). (2) Actors' compliance to institutional pressures is primarily motivated by an attainment of legitimacy and consequent survival in the institutional environment (Meyer

and Rowan 1977). (3) Actors do not act solely rationally and autonomously—they are inherently influenced and constrained by their institutional environment (Scott and Meyer 1991).

Concerning the level of analysis, the so called macro level (focussing on the sectoral, field, or global level) has been the primary level of institutional analysis so far: The aforementioned 'actors' in this case are organizations or groups of organizations that adapt to expectations and demands of the institutional environment, i.e. demands from outside the organizational boundaries. However, this view has also been criticized: Some argue that people were situated in an "iron cage" (DiMaggio and Powell 1983), others that the behaviour of organizations and individuals in organizations appear as "oversocialized" (Powell 1991). As a consequence, Oliver (1991) for example has drawn attention to the fact that organizations may indeed respond differently, i.e. more actively and interest-driven, to institutional pressures aside from compliance. Further-more, Zucker spearheaded research at the micro level (Powell and Colyvas 2008) where the organization may be regarded as institution and individuals or groups of in-dividuals inside the organization as responding actors (cf. Zucker 1991). As a matter of fact, this micro level has been called increased attention to recently. In their pro-found review, Greenwood et al. (2008) see this level as one direction for future re-search, stating that other levels of analysis aside from the organizational field or envi-ronment level "have been rarely considered. For example, few studies treat the organi-zation as the level of analysis […] or examine how the organization might be treated as an institutional context for understanding *intra*organizational behaviour." The ACET perspective adopts this micro level of analysis. In doing so, our research con-nects to the recent work by Pache and Santos (2013) who, on a micro level and like-wise building upon Oliver's (1991) work, conceptualize how individuals in organiza-tions respond to competing institutional logics.

In an IS context, institutional theory has been considered in many facets. Be it the in-terplay between IT and organizational research (e.g., Orlikowski and Barley 2001), the influence of institutional pressures on IS adoption (e.g., King et al. 1994; Teo et al. 2003), the interaction between IT and institutions (e.g., Soh and Sia 2004), institution-alization and de-institutionalization processes of IT (e.g., Baptista 2009), or a more general argumentation that and how theories from other disciplines can and should be used to contribute to IS research (e.g., Boudreau and Robey 1996; Markus and Robey 1988), to give a few prominent examples. However, the vast majority of studies are

rather generic and take place at the inter-organizational level of analysis, as is shown in the meta review by Mignerat and Rivard (2009). Similar to Greenwood et al. (2008), they conclude that there is room for an institutional perspective to be applied to the level of organizational sub-systems such as groups, departments and processes (Mignerat and Rivard 2009). Out of the 53 papers reviewed by Mignerat and Rivard, we analysed all papers that were attributed to the micro level of analysis, i.e. where either the entity from which pressures arise and/or the entity on which pressures are exerted are located at an intra-organizational level. We identified 11 papers where management, employees, groups or individuals were in the focus of studies at the organization or individual level of analysis. From these studies, we found six studies to be informative to the present problem perspective in a wider sense. Most notably, top (but also local) management championship and commitment were found to be strong influencing factors for an institutionalization of IT or of IS concepts such as knowledge platforms (Purvis et al. 2001), web technologies (Chatterjee et al. 2002), IT use in general (Lewis et al. 2003), or IS security concerns (Hu et al. 2007). In these studies, management is considered an institution exerting in particular normative pressures on organizational actors. To that end, the management provides significance and legitimization to the respective system and its use within an organization. Furthermore, an "organizing vision" has been found to be substantial for institutionalizing an innovation (Swanson and Ramiller 1997). An organizing vision is a focal community idea for the application of an IS innovation in organizations. It facilitates interpretation and legitimization of an innovation as well as mobilization of resources and actors for its realization (Swanson and Ramiller 1997). Lastly, Phang et al. (2008) point at several measures that fostered organizational learning of an enterprise-wide e-government information system. For example, managers may consider to first equip employees with required IT knowledge, and to then align their performance appraisal and training with corporate goals (Phang et al. 2008). In conclusion of this review, we see several factors that we envisage to be also relevant for an institutionalization of AC. However, none of the aforementioned studies dealt with EAM specifically. Furthermore, we would like to look beyond the well-researched effect of top management support and create a broader picture of antecedents for AC's institutionalization.

A.3.2   Application of Institutional Theory Concepts to Architectural Coordination

During the past ten years that we have been actively involved in what could best be described as action design research projects (Sein et al. 2011) in the area of EAM and ET, it became obvious that, despite methodological achievements, EAM's line of thought is challenging to institutionalize. We conclude that the EAM approach does not only have to be methodically sound, but, in order to become effective across large parts of an organization, it also needs to respect an organization's system of social norms and values that structure interactions. We argue that the latter issues are particularly important for AC for several reasons: First, while being an increasingly important function to manage proliferation and dependencies of IS, AC as well as related EAM approaches are still rather young corporate functions compared to marketing, production or controlling, for example. Consequently, the awareness of architectural requirements, the necessity for a coordinated approach to enterprise architecting, transformation and standardized procedures are still lacking widely (Gardner et al. 2012). Second, AC is not only a technical issue, but to a large extent also a social and political one, because (A) AC is about coordinating changes/transformations across levels and departments in an organization, which, after all, is about coordinating and arbitrating between people. (B) AC is concerned with overarching transparency, dependency-analyses, planning etc. for transformation and decision support, which is oftentimes depreciated by certain stakeholders who, for instance, have no interest in transparency. Finally (C), AC affects and pressures a high number of heterogeneous stakeholders (Dijkman et al. 2004; Kurpjuweit and Winter 2007). Third and last, institutionalizing AC practices is essential as it is the nature of AC to coordinate different, possibly heterogeneous stakeholder groups that need to accept and follow AC guidelines and values in order to realize expected business benefits (Ross and Quaadgras 2012).

With a view to adopting institutional theory concepts to our specific EAM/AC problem area and to the less common analysis level (micro/intra-organizational level), we will briefly discuss the theory's general applicability.[5] Concerning the four characteristics of institutions discussed before, we argue that they hold true for our problem.

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[5] Here, we look at EAM as AC's superordinate management practice, as it is the more common term in literature and practice.

- First, EAM is no fad, but a diffusing practice to manage complex business-IT relationships (Gardner et al. 2012).

- In this respect, second, EAM is driven by accounts on both micro and macro levels. From a rather macro perspective, EAM is a growing concern due to general trends such as a proliferation of IS in society and business, regulatory requirements (e.g., banking and energy provider reporting regulations), competition and pressure for efficiency (leading to the need for e.g., complexity management, synergies and agility in IS) and societal demands (e.g., expectation of proper IS management; personal data security concerns). More specifically, EAM manifests by a growing amount research in this area (Mykhashchuk et al. 2011; Simon et al. 2013), professional EA organizations (e.g., CAEAP, IFEAD, The Open Group), governmental EA initiatives (e.g., FEAF, DoDAF, Clinger-Cohen Act (OCIO 1996)), as well as large amount of EA tools and consulting services offered by industry. At the micro level, EAM then actually take place in organizations, where respective practices and tools are implemented. Driving individuals and groups on this level usually are enterprise architects and management.

- Third, EAM has a strong social component as motivated earlier. Although this aspect has been less dealt with in research so far, it is acknowledged that stakeholder attitude towards and acceptance of EAM is critical for its success. Also, stakeholders oftentimes have resistances to adopt EAM practices, even though it would be rational to do so. As each socio-organizational context is different, every organization theorizes and translates EAM differently, which is typical for institutionalization processes (Nielsen et al. 2014).

- Fourth, despite lacking legitimization within individual organizations, EAM generally represents a legal and legitimate practice that has shown to yield organizational benefits.

Concerning extant literature, there is so far only a limited amount of research on EAM/AC taking an explicit institutional perspective. Hjort-Madsen's work stands out by investigating how EA implementation (2006) and adoption (2007) is dependent upon and shaped by institutional forces, noting that this issue is underrepresented in EA research so far. He shows that interoperability and IS planning, which can be facilitated through EAM, are not only technical issues, but that economic, political and contextual factors are just as important. Focussing on public sector research, he identi-

fies three types of EA planning adopters (accepters, improvers, transformers) (Hjort-Madsen 2007). The adopter types illustrate that a certain level of compliance to national EA planning requirements do not necessarily lead to sincere administrative reform. The latter is only achieved, if forces from both micro and macro level promote transformation. Iyamu (2009, p. 221), similar to our perspective, focuses on the intraorganizational level of EAM's institutionalization, noting that "the design and development of EA has proven to be easier than its institutionalization." Based on two case studies, he presents six internal barriers to the institutionalization of EAM and relates them to four elements of the EAM development and implementation process. However, while the identified barriers are informative to management, his overall propositions remain to be rigorously evaluated.

We intend to complement and advance this limited institutional perspective on EAM. In doing so, we focus on the micro (intra-organizational) level, build upon solid foundations from institutional theory and intend to empirically test relevant factors for AC's institutionalization. Concerning the use of institutional concepts, our perspective is particularly inspired by Oliver's (1991) institutional framework, as it mirrors the mechanisms of our problem. On a generic level, she developed a typology of strategic responses to institutional pressures and presents institutional factors that affect the occurrence of certain response strategies. When setting up AC, one may principally observe the same mechanisms: Affected stakeholders have different reactions towards the AC approach—while some may follow immediately and dedicatedly, others will perceive it as constraining (Dietz 2007) and unnecessary, and therefore try to defy and manipulate respective endeavours. Considering these similar mechanisms, we see applying institutional and in particular Oliver's concepts to our AC context at the intraorganizational level as a promising, informing perspective (see Pache and Santos 2013 for a related approach). In doing so, we regard AC as pre-institutionalized as in practice it often is. At the pre-institutionalized stage, new structures "appear in response to existing problems" (Mignerat and Rivard 2009). They provoke change, but are still far from being taken for granted. According to Mignerat and Rivard's model, they undergo, prospectively, the theorization and diffusion phases at this stage (for a deeper elaboration and alternative terminology see Tolbert and Zucker 1996).

In conclusion, the here-portrayed problem of institutionalizing architectural coordination is complex, but important. It is important, because the ACET toolset will stay behind its potential or even diminish again, if AC is not respected and sustainably em-

bedded in an organization, i.e. institutionalized in terms of, at least, the regulative and normative pillar. Eventually though, AC should become part of an organization's culture and identity to be fully institutionalized. As illustrated, institutional theory provides a reasonable conceptual lens for this issue as well as models and factors that may help us understand and tackle this "wicked problem". We adopt an institutional theory perspective as its line of thought lies at the core of our problem, namely to derive factors and design principles that support giving AC a "rulelike status" and make it "structure social interactions" in an organization with respect to architectural (and transformational) concerns. In this section we therefore reviewed specific AC challenges that appear addressable from an institutional theory perspective. The institutional perspective helps us to a) contribute to an explanation for the observable challenges of embedding AC in an organization, and b) provide reference on how to approach these challenges.

A.3.3 Research Outlook for Addressing the Challenge of Institutionalizing Architectural Coordination

Reflecting the previous arguments, this section has answered the question of what constitutes the problem of institutionalizing architectural coordination. It has furthermore set forth what institutional theory can contribute to inform the solution to the problem. Based on these conceptual foundations, we can define the following forward-looking research questions (RQ) geared towards a solution for the problem:

Table 6: Research questions for addressing the challenge of institutionalizing architectural coordination

Number	Question	Character
RQ 1.1	What are antecedents for institutionalizing architectural coordination?	Explanatory
RQ 1.2	How does the institutionalization of architectural coordination contribute to EAM's benefit realization?	
RQ 1.3	What are the carriers of AC's institutionalization (inside and outside the focal organization)?	
RQ 2.1	Which design principles should be obeyed to foster an institutionalization of AC?	Prescriptive/ Design
RQ 2.2	How can the design principles be embedded in the ACET design theory?	

Answering these research questions should bring us a considerable step forward on how to foster an institutionalization of AC in organizations. Research questions 1.X are primarily of explanatory nature. As part of this, they deal with building cause-effect relationships that elaborate the problem further and indicate which causes have to be dealt with for a successful solution. For example, answering RQ 1.1 would provide determinant factors (antecedents) fostering AC's institutionalization. Answering RQ 1.2 would verify that the antecedents and AC's institutionalization are worthwhile in terms of a contribution to organizational benefits attributable to EAM. Answering RQ 1.3 would shed light on who and what drives (legitimizes) AC, and what contradicts it. A possible starting point for structuring such an analysis may be the "institutional pillars and carriers" framework from Scott (2013, p. 96). Drawing on the explanatory insights, the remaining questions are more design-oriented and should consequently lead to practical means-ends relations. The expected contribution is to provide practical guidance in the form of design principles (Gregor and Hevner 2013; Gregor et al. 2013) for enterprise architects and management. However, such design efforts raise the question, to which extend institutions are actually designable. Drawing on the *agent-based* view (Scott 2008a) of institutionalism, we hold the opinion that AC's institutionalization is not ultimately designable (as, for example, in a crafting, technical sense), but influenceable, as institutionalization is also "a product of the political efforts of actors to accomplish their ends and that the success of an institutionalization project and the form that the resulting institution takes depend on the relative power of the actors who support, oppose, or otherwise strive to influence it." (DiMaggio 1988, p. 13) On the other hand we acknowledge that institutionalization is also something that evolves slowly "from the collective sense-making and problem-solving behavior of actors confronting similar, problematic situations", which represents the *naturalistic* view onto institutional construction (Scott 2008a, p. 222).

To a large extent, the questions from Table 6 will be addressed in chapter 4 (ACET Design Theory) (Gregor and Jones 2007).

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Paper B: An Institutional Framework for Analyzing Organizational Responses to the Establishment of Architectural Transformation

Table 7: *Bibliographic information for paper B*

Title	An Institutional Framework for Analyzing Organizational Responses to the Establishment of Architectural Transformation
Authors	Aier, Stephan; Weiss, Simon University of St. Gallen, Institute of Information Management, Mueller-Friedberg-Strasse 8, 9000 St. Gallen, Switzerland stephan.aier | simon.weiss@unisg.ch
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Abstract:

The need for constant transformation of enterprises is omnipresent. A discipline that has been proposed to support the coordination of enterprise transformation is Enterprise Architecture Management (EAM) which has grown to a mature discipline in academia and practice. However, it can be observed in practice that it still is a challenge to introduce such an architectural coordination approach for supporting enterprise transformation. This may be due to the reason that the institutional context of EAM is only little understood, that is, the interplay between the pressures EAM exerts on the organisation and the response strategies of this organisation. The paper reviews existing work on institutional theory and confirms by means of a case study that the institutional factors of cause, constituents, content, control, and context are not only relevant for EAM but may be consistently linked to response strategies of acquiesce, compromise, avoid, defy, and manipulate. Moreover the case study implies to add additional institutional factors for EAM, namely trust and participation.

Keywords:

Enterprise Architecture, Institutional Theory, Analysis Framework.

B.1 Introduction

The need for constant transformation of enterprises is omnipresent (Rouse 2005). Transformation here stands for a number of large-scale transformation programs and many smaller but still important change projects running concurrently with possibly common objects of transformation like specific products, business processes, or information systems (IS) (Aier et al. 2011a). It may not be obviated that these programs and projects have conflicting goals which constitutes the need for coordination of transformation activities.

A discipline that supports the coordination of enterprise transformation is *Enterprise Architecture Management* (EAM) (Harmsen et al. 2009).[6] A wide set of EAM methods, tools and best practices have been researched, developed, and applied (cf. e.g. Buckl and Schweda 2011; Mykhashchuk et al. 2011). It is understood that successful EAM requires situational adaption as opposed to a one-size-fits-all approach, and different forms of EAM practices have been identified (Aier et al. 2011c). Despite of these achievements, it can be observed in practice that it still is a challenge to introduce such an architectural coordination approach. This may be due to the reasons that (1) EAM ultimately aims at utilising potential synergies by *restricting the design freedom* of various stakeholders (Dietz 2008) and that (2) the *institutional context of EAM* is only little understood, that is, the interplay between the pressures EAM exerts on the organisation and the response strategies of this organisation.

Understanding the context of application, and potential sources of resistances and support, respectively, is valuable for any transformation approach. Indeed, some institutionalists argue that being able to cope with and manage the institutional (legitimating) environment is a key success factor of business endeavours (cf. Oliver 1997). With respect to EAM, this poses a particular challenge for two major reasons: (1) due to its intra-organizational nature, EAM is subject to pressures originating primarily from the inside of the focal organization. One example is the need of EAM to constantly justify its own right to exist; (2) EAM is concerned with overarching transformation affecting

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[6] While acknowledging that coordination of transformation is supported by a variety of disciplines, we have chosen to illustrate our ideas using EAM because it provides a number of mature methods which are widely applied in practice. Although *standardization through coordination of transformation* may be seen as an ultimate goal of EAM, there are a number of foundational services like providing transparency, planning, defining and enforcing rules etc. which EAM has to deliver. In the paper at hand, however, we focus on EAM as a means for *coordination of transformation* from a more global perspective.

the organization as a whole, or large parts of it (Harmsen et al. 2009). As such, one can expect (and observe) that a high quantity and diversity of stakeholders are affected by EAM (Dijkman et al. 2004). In order to implement such transformation approaches successfully, respective pressures and response strategies have to be explicitly dealt with.

We argue that EAM approaches do not only have to be methodically sound, but, in order to be adopted successfully across an organization, they also need to respect an organization's institutional context. Based on previous work on institutional theory, we discuss *institutional factors* that are relevant for the choice of *response strategies* taken by EAM stakeholders. Based on four case studies we extend existing analysis frameworks based on institutional theory towards a more EAM specific toolset. The resulting framework allows for analysing and shaping the so far often neglected intuitional factors for successfully implementing EAM in an organization. Therefore our research questions are:

(1) *Which institutional factors are relevant for the implementation of EAM?*
(2) *Which response strategies can be observed for specific values of each institutional factor?*

However, it is not the goal of this paper to develop more effective EAM methods, models (March and Smith 1995) or design theories (Gregor and Jones 2007; Walls et al. 1992), but to contribute to the so far lacking theoretical grounding (Goldkuhl 2004) of EAM by making institutional approaches accessible to EAM research. Specifically we contribute factors and ranges of favourable factor values that need to be observed when implementing an EAM function in an enterprise.

The remainder of the paper is organized as follows. Section two lays the foundations by introducing the essence of institutional theory as well as related work. Section three presents the framework used for analysing responses to EAM implementations. We then apply the framework to four cases of EAM implementation in organizations (section four), and discuss our findings and the validity of the analysis framework in section five. The paper ends with a conclusion.

B.2   Conceptual Foundations and Related Work

Scott (2001) defines institutions as "social structures that have attained a high degree of resilience", that is, they embody the more durable social structures, made up of mul-

tifaceted elements such as material resources, symbols, structures, rules, norms, routines and social activities. These elements are usually maintained over long periods of time without further justification. As such, they may both increase stability and effectiveness, but also hinder critical reflection and the detection of more efficient ways of organizing (Zucker 1987). In an organizational context, Selznick's (1948) influential work is regarded as the initiator of an extensive amount of research on institutional frames influencing organizational behaviour and decision-making. In this respect, institutions are often considered the rules of the game whereas organizations are considered the players (North 1990).

Widely accepted is the perception that institutions are composed of three related albeit distinct pillars, a *regulative*, a *normative* and a *cultural-cognitive* pillar (Scott 2001). Most prominent is the *regulative* pillar, which underscores how institutions constrain and regularise behaviour through explicit activities such as rule-setting, monitoring and sanctioning (DiMaggio and Powell 1983): Individuals and organizations complying to respective rules, laws and sanctions do this out of expedience and self-interest, as well as a fear of punishment and a hope for reward, respectively. From a *normative* perspective, institutions rest on values and norms which prescribe how an individual or an organization should act. Norms define legitimate means for the valued ends. As such, normative systems define general goals (e.g. making profit) but also designate appropriate ways how to pursue them. However, values and norms are not enforced by coercion as in the regulative pillar, but by a code of conduct along with moral and social obligation. The *cultural-cognitive* pillar calls attention to the underlying shared conceptions and beliefs that constitute social reality. While the first two pillars are generally subject to debate, cultural-cognitive aspects are seen as the much more embedded words, signs and gestures that shape the meanings a social group attributes to objects and activities. These cultural-cognitive interpretations are embraced by the mechanism of mimicries based on taken-for-grantedness and shared understandings.

In an IS context, institutional theory has been considered in many facets. Boudreau & Robey (1996), Markus & Robey (1988) for example argue that and how theories, including institutional theory, can contribute to questions of information technology and organizational change. In a similar vein, Orlikowski & Barley (2001) elaborate on the interplay between IT and organizational research, suggesting that transformations cannot be understood without considering their institutional contexts. Also, from a macro perspective, it has been analysed which institutions influence (IT) innovations and how

institutional pressures influence the adoption of respective systems (e.g. King et al. 1994; Teo et al. 2003). Another stream of research deals with processes of institutionalization of IT in organizations, with institutionalization and de-institutionalization processes and respective forces that drive such endeavours (cf. e.g. Baptista 2009). While being far from complete, this brief review shows that an institutional perspective is being considered important in the context of IS and (strategic) management.

Focused on the relationship between institutional theory and EAM the work by Hjort-Madsen stands out. Hjort-Madsen investigates how EA implementation (2006) and adoption (2007) is dependent upon and shaped by institutional forces, noting that this issue is underrepresented in EA research so far. Looking at public sector organizations, Hjort-Madsen points out that interoperability and IS planning, which can be facilitated through EAM, is not only a technical issue, but economic, political and contextual factors are just as important. Related to different institutional settings, he identifies adoption patterns that describe how EA is adopted by agencies. By considering formerly ignored institutional pressures, he contributes to understanding and advancing EA as a transformation approach. However, his work stays on a descriptive-explorative level. In contrast to this, we intend to apply an institutional framework to the EA discipline, outlining influencing factors that lead to certain EAM response strategies or, for that matter, adoption patterns. Overall, we found that a concrete structuring of institutional factors influencing EAM approaches in an intra-organizational context is lacking so far.

B.3 Research Design and Analysis Framework

B.3.1 Overview

For the purpose of investigating institutional factors and response strategies of EAM, case study research was chosen, as it allows to examine contemporary phenomena at an early stage of research in their real-world context (Benbasat et al. 1987; Yin 2003). The course of the research follows the five guiding points proposed by Yin (2003, pp. 20-27): As outlined in section 1, the paper addresses the (i) research question as to which *institutional factors* are relevant for the choice of *response strategies* to the implementation of EAM. The case study explores a phenomenon which is still relatively unexplored and therefore sound theoretical research propositions are hardly available (Yin 2003). However, Yin (2003) stipulates (ii) to design a conceptual framework that guides the investigation. In section 3.2 we describe our conceptual framework. A defi-

nition of the (iii) unit of analysis is important as it sets the boundaries of the scope of the analysis. In the paper at hand, the unit of analysis is *EAM as a coordination approach*. The conceptual framework works as the (iv) logic which links the data to the propositions and it forms a lens through which the individual cases can be studied and compared. Finally, (v) criteria for interpreting the findings are derived from the institutional theory perspective. The interpretation of findings results in propositions on EA specific institutional factors and their values for desired response strategies.

B.3.2   Conceptual Framework

Based on institutional and resource dependence perspectives, Oliver (1991) developed a typology of strategic responses to institutional pressures and presents ten institutional factors that affect the occurrence of alternative response strategies. When setting up an overarching, coordinating institution for enterprise transformation, such as EAM, one will most certainly face many different reactions from the various stakeholders affected. While some may follow almost blindly, others will perceive it as constraining (as it actually is (Dietz 2008)) and unnecessary, thus trying to defy and manipulate respective endeavours. The following response strategies and its corresponding tactics represent these reactions (cf. Oliver 1991).

Acquiescence is the least resisting form of responding to new requirements. The related tactics (*habit, imitate* and *comply*) basically resemble blind adherence to new propositions. *Habit* refers to an adherence based on already taken-for-granted norms and values. If, for example, the process for enterprise modelling is to be institutionalized across the organization, and a division is already doing this long-since, then this division may actually follow that guideline invisibly out of habit. The tactic of *imitation* implies that a successful entity is more or less consciously imitated or taken advice from. *Compliance* means to actively decide to comply with an institutional pressure as a result of a range of e.g. self-serving, legal, social, and economic considerations.

Compromise: While still being in the spirit of conforming to and accommodating (new) corporate demands, stakeholders following this strategy are more active in promoting their own interests. By employing the tactics of *balancing, pacifying* or *bargaining*, involved stakeholders seek for a reflected and after all satisfactory solution on all hands. *Balancing* refers to the "accommodation of multiple constituent demands" (Oliver 1991) which may oftentimes be desirable: Given for instance the decision to migrate to a unified IS, it may be crucial that stakeholders not simply acquiesce, but

review current usage practices, and articulate potential conflicts and requirements. *Pacifying* refers to placating and accommodating certain elements. An example might be a particular business unit getting more time or a different scope for realizing a transformation programme. *Bargaining* is the most active form of negotiating compliance to institutional pressures.

Avoid: This strategy aims at circumventing the conditions that make conforming behaviour necessary. This may be achieved by *concealing*, *buffering*, or *escaping*. *Concealment* means to disguise non-conformity behind a facade of acquiescence. *Buffering* refers to reducing the extent of external scrutiny by decoupling technical activities from external contact, which means that the details of implementation are decoupled from the design, whereby only the latter is subject to inspections. *Escaping* is the most dramatic way of avoiding institutional pressures. Here, the necessity of conformity is avoided altogether by e.g. exiting the domain respective pressures exist in. For instance, stakeholders often set up a number of smaller projects in order to escape certain architectural checks bound to project size.

Defy: Defiance is a more active as well as unequivocal form of resistance to imposed processes. In contrast to the avoidance strategy, defiance does not try to cover anything up. Three corresponding tactics are *dismissal*, *challenge*, and *attack*. *Dismissal* means to deliberately ignore explicit rules, norms and values. *Challenge* does not only mean to ignore a guideline, but to follow a path that clearly contradicts envisaged rules, norms, and values. *Attack* is even more aggressive as it tries to assault, denounce or even destroy the pressure exerting entity, e.g. an EAM department.

Manipulate: Through *co-opting*, *influencing* or *controlling* tactics, the manipulation strategy aims at actively altering, re-creating or controlling the power exerting institutions. It is the most active response, which does not take any pressures and expectations as given constraints to be obeyed or defied, but instead regards them as manipulable for the purpose of one's own benefit. *Co-optation* intends to neutralize institutional opposition and enhance legitimacy by means of coalition-building, for example. *Influencing* tactics are directed to generally shape values and assessment criteria. A typical method to this end is to influence other people's opinion and funding decisions through the means of lobbying. *Controlling* represent efforts to exercise direct power and dominance over institutional sources or processes, rather than to influence, shape or neutralize them.

Reviewing these strategies as possible responses to an EAM initiative, it is apparent that the latter three strategies are not helpful. Our proposition accordingly is that any EAM approach (a) should be cautious about these strategies, and (b) will be more successful the better it can provoke stakeholders to follow the strategies of *acquiescence* and *compromise*. Going one step further, though, raises the question what the rationale for conformance or resistance to EAM pressures is.

Table 8:   Predictive factors to strategic responses (Oliver 1991)

Predictive Factor	Strategic Responses				
	Acquiesce	**Compromise**	**Avoid**	**Defy**	**Manipulate**
Cause	Why are organizational units pressured to conform to rules or expectations?				
Legitimacy	High	Low	Low	Low	Low
Efficiency	High	Low	Low	Low	Low
Constituents	Who is exerting pressures?				
Multiplicity	Low	High	High	High	High
Dependence	High	High	Moderate	Low	Low
Content	To what norms and requirements are organizational units pressured to conform?				
Consistency	High	Moderate	Moderate	Low	Low
Constraint	Low	Moderate	High	High	High
Control	How or by what means are the pressures being exerted?				
Coercion	High	Moderate	Moderate	Low	Low
Diffusion	High	High	Moderate	Low	Low
Context	What is the organizational context within which pressures are being exerted?				
Uncertainty	High	High	High	Low	Low
Interconnected-ness	High	High	Moderate	Low	Low

Table 8 gives an overview of the ten hypothesized dimensions that contribute to the willingness or resistance to conform. The scale from low to high represents the contribution to the likelihood of choosing a particular strategy given a higher degree of a factor. For instance, the strategy of acquiescence is more likely to occur when the proposed programme promises efficiency gains. In the following, we will detail each factor's meaning and influence on strategy choice in the light of architectural transformation initiatives.

Cause: Cause refers to the question why institutional pressures are exerted and why one should conform to them. The first factor, *legitimacy*, refers to the extent the pressure exerting entity itself (EAM) is legitimated within the organization. The higher legitimacy is the higher is the probability that stakeholders chose acquiesce or at least compromise procedures. The second factor, *efficiency*, implies that the higher the perceived efficiency of EAM as well as the subsequently expected efficiency gains for each stakeholder are, the higher is again the probability for conforming strategies.

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Constituents: Stakeholders within an organization often confront multiple (conflicting) interests and pressures. Constituents like HR, purchase, marketing, production, IT exert pressures on each other with respect to requirements, releases, project portfolios, business development etc. A challenge of EAM is to coordinate and line up with all these pressures. It is therefore hypothesized that a higher *multiplicity* of constituents results in a higher probability for resistant strategies, because, after all, not all interests and exceptions can be respected in a transformation programme. The likelihood of resistance to EAM pressures is also predictable from a *dependence* perspective, hypothesizing that resistance is less likely if stakeholders depend on the pressure exerting party.

Content: Content is about the *what* of obliged processes. The two important factors are *consistency* and *constraint*. If exerted pressures are consistent with already stipulated goals and practices, the likelihood to choose a conforming strategy increases. With respect to constraints, the correlation is the other way round—the more new regulations and processes constrain organizational units in their freedom of decision, the more resistance has to be expected.

Control: Control refers to the enforcement mechanism of imposed pressures. This may happen through *coercion*: If non-conformity leads to punitive consequences, for instance due to a violation of legal requirements, the probability of acquiescence increases, whereas in less coercive situations, stakeholders can be expected to seek compromises for their conformance. *Diffusion* refers to a voluntary adoption of practices. An organizational entity might be particularly convinced to acquiesce in an institutional behaviour, if the behaviour in question can be observed to work elsewhere.

Context: The institutional context, i.e. an organizational unit's environment is likely to be a determinant of strategic response. Environmental *uncertainty* can be defined as "the degree to which future states of the world cannot be anticipated and accurately predicted." (Pfeffer and Salancik 2003) It is argued that in turbulent and uncertain times, an organization will exert greater effort to re-establish the illusion or reality of control and stability over future organizational outcomes (Oliver 1991). In consequence, affected entities (a) are more willing to comply with demands imposed upon them by super ordinate constituents, and (b) tend to mimic other similarly pressured stakeholders. The factor of *interconnectedness* is related to the observation that interconnectedness facilitates the voluntary diffusion of norms, values, and shared infor-

mation. That is because interconnected environments provide relational channels through which institutional norms and values can be diffused and coordinated.

B.3.3   Case Selection

We have chosen four cases of companies that have introduced EAM functions several years ago and made experiences with the evolution of these functions. We have chosen these cases in order to cover a broad spectrum of EAM approaches (Eisenhardt 1989)—each case is archetypical in a certain way. Data for the case studies have been collected with three of these companies since 2006 and with the remaining since 2008. Key stakeholders in IT management, EAM, and business/IT relationship management have been interviewed. In addition to the interviews regular review meetings have been set up to observe state, development, and architectural issues in the companies involved. Three of the companies participated in long term collaborative research projects in IS integration and EAM involving ten companies in the period of 2002–2010. Data presented in the case studies below aggregate research results gained with these companies until summer 2010. Due to company request case studies have been made anonymous.

B.4   Cases

Company A is a technology group comprised of several, rather autonomous divisions. On a corporate level company A started a central EAM initiative several years ago in order to leverage the benefits of reuse of services or the standardization of platforms and processes worldwide. However, it turned out that achieving a strong position on corporate level with EAM eventually aiming at reducing the design freedom of the divisions is a laborious undertaking. The central EAM function contradicts the reconfirmed autonomy of the divisions where for example the division CIO reports to the division CEO and not to the group CIO. Consequently central coercion to implement EAM group-wide has been limited. Besides this lacking legitimacy of EAM, efficiency has at least in the past only been a minor topic, since company A had a monopoly-like market position with some of its customers. Therefore the enterprise architects at company A followed two strategies: One strategy being to get a buy-in division by division with taking the respective requirements of each new partner into account and helping them to solve some of their most painful problems as a demonstration of EA's utility. The second strategy, however, was to centrally decide on certain EA rules and principles supported by company A's top management in a fast way and thus without

further participation of stakeholders in the divisions. Overall, company A's EAM initiative may not be considered successful yet. This is a shared understanding which exists for some time in the company especially, since for the first two years of the EA initiative no EAM results existed at all which compromised the division's trust in the architect's skills and EAM's utility.

Company B is a major transportation and logistics service provider. It offers both cargo and passenger transportation and provides rail infrastructure. A couple of years ago, the inauguration of a new CIO resulted in renewed architecture efforts including the creation of a corporate EAM team. The EAM team is complemented by domain architecture teams. EAM processes have been set up altering existing development processes to reflect architectural issues, e.g. by defining quality gates, which projects cannot surpass without conforming to EA principles. This change in processes is fostered by a broad range of efforts to enhance EAM attention, knowledge, and skills throughout the company. Therefore a broad training program, addressing architects as well as non-architects, was set up. In addition to that, further initiatives were set up. For example (1) EA communication has been advanced by an EA tool providing a broad set of EA artefacts in an easy-to-use web interface, (2) all information required to meet EA principles in the quality gates is available through a well-organized intranet web application. From an EAM perspective, this communication and participation oriented approach has paid off. EAM efforts are discussed, but EAM principles are also widely legitimated and can be enforced. However, if there is good reason there also is a viable process to call for an exception from a principle or for even changing the principle.

Company C is a major financial service provider in Switzerland primarily focusing on standardized retail banking and transaction processing. All architectural levels from business to IT can be found with broad, defined EAM processes. All business related EA artefacts are managed by an organizational unit directly reporting to the CEO. Alignment of business and IS architectures is explicit and facilitated by personal interweavement by having former IS architects included in the business architecture unit. Due to the "experimental" positioning of EAM on business side, the EAM function had a passive role. Their main task was to host the EA repository and to support the integration of existing partial enterprise models (e.g. process models, application landscapes etc.). Also the EA meta model was strictly focused on stakeholder needs and thus was very lean. However, over time this passive set-up also revealed its weaknesses, namely poor coordinative power on interfaces of different stakeholders as well as

poor performance/utility in leveraging synergies among various business and IT projects. Therefore the EAM function developed a more and more active role, e.g. by being involved in all major transformation projects by design. Especially the relationship between the EAM department and the still existing IT architecture, however, became an issue. Both departments address overlapping parts of the EA. While they may have different concerns they redundantly start to define EAM processes, functions and also tools.

Company D is an IT service provider for a large banking network. In its current form, the network is the result of several mergers of formerly independent, regional IT service providers. Every formerly independent company had its own, evolutionary grown banking solution. However, none of these solutions had a predominant position within the network. Therefore the network decided to implement a new and common system as their core banking solution. This merger strategy made it very clear that a major goal of company D is achieving efficiency by realising economies of scale. The development started in 2002 and was finished in 2005 for the time being. The new system design follows a service oriented paradigm in order to adapt and to consistently provide the implemented functionality to every partner. The business architecture design of company D follows the process reference model which has been defined for the banks belonging to the network. Strict EA principles are defined mainly for software, and infrastructure architecture. These EA principles are enforced through coercion in forms of tools, repositories, and processes (e.g. for release management) which are the basis of company D's development. Because of this highly structured and tool supported processes, any development outside this environment is almost impossible and thus non-existent. The lead for different EA topics like processes, mainframe infrastructure etc. is decentralised and attached to the regular departments of the company which fosters the understanding of the necessity as well as the belief in the utility of coordination efforts in the departments. In conclusion, high efficiency gains in the backend and the ability to deliver customized solutions at the frontend made Company D's approach very successful.

Table 9:   Case evaluations according to predictive factors

Predictive Factor	Company A	Company B	Company C	Company D
Cause				
Legitimacy	Low	High	Low	High
Efficiency	Low	High	High	High
Constituents				
Multiplicity	High	Low	Moderate	High

Dependence	Low	High	Moderate	High
Content				
Consistency	Low	High	Moderate	High
Constraint	Moderate	High	Moderate	High
Control				
Coercion	Moderate	High	Moderate	High
Diffusion	Moderate	High	Moderate	Moderate
Context				
Uncertainty	High	Low	Low	High
Interconnectedness	Low	Low	Low	High
Response Strategy	**Defy/Manipulate**	**Acquiesce**	**Avoid**	**Acquiesce**

Although case descriptions had to be short they already indicate varying responses and successes when introducing EAM. Table 9 details the description of our observations with respect to the predictive factors from Table 8. Based on that, the predominant response strategy is determined by summing up the partial strategies related to the predictive factors' manifestations. As we have no reliable and in-depth information about each factor's weight yet, we left impact factors aside.

B.5   Discussion

The resulting predominant strategies shown in Table 9 fit our overall impression of each case. We also found that the factors' manifestations of Table 8 matched our observed influence on a response strategy. In other words, if a 'low' of a factor was predicted to have a negative effect on the response strategy (e.g. legitimacy), this was either observable in the EAM context, too, or we think if we had a 'low' it would have influenced a respective case negatively. However, we found that the generic factors (from Table 8) are not sufficient in the intra-organizational context EAM operates in, because they do not reflect the reciprocal relationship between EAM and other business units enough. In typical institutional considerations, the distance between the pressure exerting entity (e.g. government) and other parties (e.g. single citizens) is rather high. Pressures flow unidirectional causing reactions from affected individuals, but direct reverse pressure is rare, indirect and much more delayed. In an EAM context, this is different. Business units frequently have budgetary power to fund EAM activities and stakeholders are in close proximity. As such, stakeholders also exert considerable pressure on EAM if their concerns are not addressed adequately. In consequence, we propose two more predictive factors for the EAM context. The aforementioned cases yield that *trust* and *participation* are further factors that should be taken into account. These two factors shall (a) capture critical issues that could be ob-

served with regard to establishing EAM, and (b) be more concrete and tailored to the EAM context. In the following, the two proposed factors are described briefly, Table 10 illustrates how the factors occur in the four cases and Table 11 outlines the influence on the response strategies.

Table 10:   Case evaluations according to predictive factors

Predictive Factor	Company A	Company B	Company C	Company D
Trust				
Utility	Low	High	Low	High
Qualification	Low	High	High	High
Participation				
Stakeholder Views	Low	High	High	Moderate
Dogmatism	Moderate	Low	Moderate	Moderate

Trust: This factor is not about business units not trusting EAM to keep one's word with respect to certain goals or commitments. This would be against the self-conception of EAM and ruin any faith in the approach. Rather, the basic question of this factor is whether business units have trust in the advocated utility of the EAM approach and the enterprise architects' qualifications to actually achieve this utility. As EAM programmes are oftentimes operating at a complicated nexus of IT and multiple business units, provocative questions like 'Wherefrom do *you* know what *we* need or should do?' are not a rarity and may indicate a low trust in qualification, for instance. Based on such observations and previous work that indeed identified trust as a critical issue (e.g. Aziz et al. 2005), we propose trust as an additional factor with the two sub-dimensions *utility* and *qualification*. This proposition is strongly supported by cases A, B and D. *Utility* refers to the extent affected business units trust in the need for and in the overall usefulness of EAM. However, even if they regard the utility of EAM to be high, they may still respond with a compromising strategy in order to maximize the personal benefit. The factor *qualification* asks whether a business unit trusts in the EAM team as being capable and competent to deliver this utility. The trust factor is relevant, because business units may also opt not to collaborate with EAM and in doing so choose a safe strategy over a risk strategy. The risk strategy would yield higher benefits for both parties, but also imply to give up some autonomy as illustrated in case A. This trade-off is described in the *assurance game* as part of game theory, which provides an informative foundation for our proposed factor (cf. e.g. Aumann 1985; Camerer and Knez 1996).

Participation: In general, participation has been shown to have strong positive effects on change implementations and goal achievement (e.g. Aier et al. 2011c). In our context, it refers in particular to the way stakeholders can influence and take part in EA guideline development and application. Other recent studies on EAM have also identified participation to be a significant dimension (Schmidt and Buxmann 2011). *Stakeholder views* refers to the openness of the EAM team to consult stakeholders and incorporate their concerns into EA planning and execution. This includes, for example, to have defined processes to gather input and review current practices (e.g. EA principles in case B). *Dogmatism* relates to the way EA plans and principles are followed: High dogmatism means that no exceptions are granted at all, even if there might be good reasons to do so. Such a dogmatic application of EA rules may lead to frustration on the part of affected stakeholders and lead to defying or manipulating response strategies. Company B for instance follows a stringent, but collaborative and less dogmatic approach, resulting in about 100 request p.a. to bypass EA guidelines, out of which about 50% are granted.

Table 11: Additionally proposed factors for the EA context

| Predictive Factor | Strategic Responses | | | | |
	Acquiesce	Compromise	Avoid	Defy	Manipulate
Trust	What is the trust relationship between organizational units and the EA team?				
Utility	High	High	Moderate	Low	Low
Qualification	High	High	Moderate	Low	Low
Participation	Can organizational units contribute to the EA?				
Stakeholder Views	High	High	Moderate	Low	Low
Dogmatism	Low	Low	Moderate	High	High

In due consideration of trust and participation, Table 12 depicts the response strategy scorings of each case and highlights the respective dominating strategies using bold numbers The scoring without our proposed factors is given in parenthesis.

Table 12: Resulting response strategies

Case	Acquiesce	Compromise	Avoid	Defy	Manipulate
Company A	1 (1)	6 (6)	8 (5)	9 (6)	9 (6)
Company B	11 (7)	6 (2)	1 (1)	3 (3)	3 (3)
Company C	4 (2)	**6 (4)**	**6 (5)**	4 (3)	4 (3)
Company D	9 (7)	6 (4)	6 (4)	2 (2)	2 (2)

Evaluating the scorings and the resulting dominating response strategies yields two major findings. Firstly, the framework in general seems feasible to assess EAM initia-

tives from an institutional perspective. The predictive factors adequately represent the case situations in terms of the dominating response strategies. Based on such an assessment, one may derive fields of action for improving the efficacy of an EAM initiative. As, to the best of the authors' knowledge, an institutional perspective is up to now lacking when regarding EAM initiatives, this work may provide directions towards a respective assessment tool. Secondly, the way we added the additionally proposed factors (*trust* and *participation*) seems to contribute describing the actual situation appropriately: On the one hand, the initial scoring is for the most part emphasized and thus the dominating response is highlighted more clearly. On the other hand, the new factors contribute to a stronger manifestation of the *compromise* response—thus a more differentiated model. According to our observations, this is more realistic, because pure acquiesce responses without any balancing elements could basically not be observed. The effect corrects especially the picture of company B, as compromise is now the second-strongest response.

B.6   Conclusion and Outlook

In the paper at hand we have investigated institutional (design) factors that should be considered in order to build and anchor an effective EAM approach in organizations. Our proposed assessment framework is theoretically grounded in institutional theory and empirically grounded in EAM cases. The work contributes to understand observable, organizational struggles with introducing EAM. Our case study demonstration suggests that this perspective is worth considering and that the influencing factors are able to provide a fitting picture of organizations' response strategies towards EAM. As such, the framework may be developed to serve as an assessment tool based on a theory to predict (cf. Gregor 2006).

Having said this, further research should especially cater for a more rigour evaluation of our framework's *utility*. An evaluation of *validity* is less critical as the proposed framework has been developed applying inductive reasoning based on four cases. A certain amount of validity can therefore be expected due to the adopted research approach. As part of a utility evaluation, the following issues shall be addressed, and the proposed framework developed accordingly: Firstly, impact factors for all institutional factors should be identified. It is well perceivable that certain factors have more impact than others, that additional factors have to be added, or that some factors turn out to be obsolete. Secondly, the factors' classification from high to low in relation to the re-

sponse strategies has to be reviewed. Currently, some factors can only be classified high or low, which might be a too simplistic distinction for our problem. Finally, the framework should be developed from a tool for analysis (theory to understand) into a tool for design (prescriptive/design theory). Therefore the identified institutional factors need to be operationalized towards design principles prescribing the implementation of an EAM function in organisations.

Paper C: Institutionalization and the Effectiveness of Enterprise Architecture Management

Table 13:   Bibliographic information for paper C

Title	Institutionalization and the Effectiveness of Enterprise Architecture Management
Authors	Weiss, Simon; Aier, Stephan; Winter, Robert University of St. Gallen, Institute of Information Management, Mueller-Friedberg-Strasse 8, 9000 St. Gallen, Switzerland simon.weiss | stephan.aier | robert.winter@unisg.ch
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Abstract:

Enterprise Architecture Management (EAM) has become a prominent discipline for managing increasingly complex Business/IT relationships in organizations. The more tangible aspects of EAM like modeling, planning, principles or governance structures are widely discussed and understood. However, institutionalizing EAM in an organization remains a challenging issue. Therefore, actually realized EAM benefits can be observed to vary widely across organizations. To address these issues, we take an institutional theory perspective and propose nine hypotheses which are tested based on quantitative empirical data. Our findings confirm seven institutional factors as antecedents for institutionalizing EAM in terms of positive stakeholder response, EA consistency and a realization of EAM benefits for the organization. Our research supports the understanding of the relevant phenomenon of institutionalization of EAM as a rather practice-driven discipline, where theoretical foundations as well as research into non-technical issues are limited so far.

Keywords:

Enterprise architecture management (EAM), structural equation modeling (SEM), institutional theory

C.1 Introduction

In the ISO/IEC/IEEE Standard 42010 architecture is defined as "the fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution" (ISO/IEC/IEEE 2011). The Open Group adopts this definition for their definition of enterprise architecture (EA) and substantiates 'system' as an enterprise that is "any collection of organizations that has a common set of goals" e.g. a company or government agency (The Open Group 2009). Ross et al. (2006) refer to EA as "the organizing logic for business processes and IT infrastructure, reflecting the integration and standardization requirements of the company". The notion of enterprise architecture management (EAM) goes beyond EA and includes the tasks of establishing, maintaining and purposefully developing an organization's EA (Aier et al. 2011c).

EAM is often discussed as an effective means for managing the considerable degree of complexity corporate information systems (IS) have reached today. Among others, EAM's goals of achieving and maintaining IS efficiency and effectiveness as well as its contribution to an organization's business value are often highlighted and confirmed by empirical data (Boucharas et al. 2010; Foorthuis et al. 2010; Ross 2006b; Schmidt and Buxmann 2011; Tamm et al. 2011).

On the one hand, the EAM toolbox is well developed and comprises (1) artifacts such as meta models for representing current and future states of an EA (Aier and Gleichauf 2010; The Open Group 2012; Winter and Fischer 2006), principles for governing its design and evolution (Aier 2012; Greefhorst and Proper 2011), frameworks for overarching reference (IFIP-IFAC Task Force on Architectures for Enterprise Integration 2003; The Open Group 2009), good practices (Ross et al. 2006), and software tools to support architects' work (Matthes et al. 2008).

On the other hand and despite all these achievements, it remains challenging for practitioners to effectively anchor, i.e. institutionalize, EAM in an organization (Tamm et al. 2011). Analyst company Gartner only recently found that most organizations assessed are still at an "initial" or "developing" level of EAM rather than on a "defined", "managed" or "optimized" level (Gartner 2012). But why is that? Ross and Quaadgras (2012) found that "business value accrues through management practices that propagate architectural thinking throughout the enterprise". In other words, in order to make EAM effective it is necessary to institutionalize EAM in an organization. One of the reasons for the observed difficulties with institutionalizing EAM might be found in the

fact that EAM ultimately aims at utilizing potential synergies in an organization by *restricting the design freedom* of affected stakeholders (Dietz 2008; Hoogervorst 2009). Despite reasonable arguments to do so, that is to pursue a global optimization (e.g. reducing functional redundancies on the overall application landscape) based on an enterprise wide perspective instead of several only local optima found in the individual goals of projects or organizational units etc., affected stakeholders are often reluctant to follow EAM's norms and guidelines.

We approach this issue by taking an institutional theory perspective as a theoretical lens to advance EAM practice and research. Institutional theory is, among other aspects, concerned with questions of how organizations and individuals respond to pressures—in our case the restriction of design freedom—and what factors influence their conformance to or rejection of the pressuring entity (Oliver 1991; Scott 2008b; Zucker 1987). Institutionalization can be defined as the process of establishing a practice as a norm thus giving it a "rulelike status in social thought and action" (Meyer and Rowan 1977). Along this line of thought, the aim of this research is to confirm factors fostering an institutionalization of EAM. Drawing on respective institutional theory literature and previous case study work (Aier and Weiss 2012; Oliver 1991; Scott 2008b), we have developed a research model that conceptualizes institutional factors for EAM. These factors are hypothesized to foster positive stakeholder responses (RES) and EA consistency (CON), which represent the constructs where EAM's institutionalization should manifest. RES and CON are significant prerequisites for realizing the benefits (BEN) attainable by the organization through EAM. In this paper, we test these relations employing a partial least squares (PLS) approach to structural equation modeling (SEM). Our research question can be formulated in two steps accordingly: 1) *What are the factors that influence an institutionalization of EAM? and 2) How does the institutionalization of EAM contribute to EAM's benefit realization?*

Our findings show that institutional factors contribute significantly to the realization of EAM benefits. Our research confirms seven factors supporting the institutionalization of EAM and, subsequently, its benefit realization. Overall, our tested relations and the herein employed institutional perspective contribute in understanding EAM phenomena and provide a novel perspective for informing EAM research and design. For practitioners, our findings suggest that trust building activities should be at the fore for institutionalizing EAM among affected stakeholders. Given these findings we generally expect more EAM research in the area of making existing EA artifacts and procedures more effective.

The remainder of this paper is structured as follows: Section two introduces this paper's line of thought by reviewing related work pertaining to the relevant conceptual foundations. Based on this, section three delineates our research model and hypotheses. Section four outlines the PLS-SEM approach taken for model testing, followed by a model evaluation in section five. Section six discusses the findings and implications. The paper ends with a short conclusion and a research outlook.

C.2   Conceptual Foundations

C.2.1   Institutional Theory

Institutional theory deals with questions of how and why institutions get adopted, refused and changed over space and time. Institutional theory is contributed to by a wide field of research analyzing institutional effects and processes following various research methods in the disciplines of economics, political science, sociology and organizational studies on varying levels ranging from world-system and societal level to organizational subsystem and individual level (for an overview, see for instance Hall and Taylor 1996; Scott 2008b). In the paper at hand, we build upon the new institutionalism in organizational analysis that developed from the foundational works of Meyer and Rowan (1977), DiMaggio and Powell (1983) and Zucker (1977). In this section we review the basic concepts from this stream prior to discussing our adoption of this theoretical lens at the micro (i.e. intra-organizational) level.

According to Jepperson (1991), an *institution* "represents a social order or pattern that has attained a certain state or property", which Meyer and Rowan (1977), in other words, refer to as "a rulelike status in social thought and action." *Institutionalization* "denotes the process of such attainment" (Jepperson 1991). Institutions coordinate interactions, distribute tasks and roles, and define relationships among the actors (Walgenbach and Meyer 2008). As such, institutions provide stability and meaning to social life (Scott 2008b), and they enable ordered thought, expectations and behavior. But they may also hinder critical reflection and the detection of more efficient ways of organizing (Zucker 1987). Consequently, institutions influence division of labor, specialization and productivity, and determine how efficient commercial activity may take place. The configuration and efficacy of institutions are therefore decisive factors for hampering or facilitating economic performance, prosperity and social development (Zucker 1987). Classic examples of institutions are traffic rules, the handshake, sys-

tematic bookkeeping or contracting. These examples represent institutions that have attained rulelike status and a high degree of resilience.

Institutions can be analyzed through what Scott (2008b) termed the *three pillars of institutions*. The most prominent—the *regulative pillar*—underscores how institutions constrain and regularize behavior through coercive mechanisms and regulative rules. The *normative pillar*, focusing on social obligation and binding expectations, calls attention to norms and values, which prescribe and evaluate how and to which desirable ends things should be done. Finally, the *cultural-cognitive pillar* stresses underlying, taken for granted, shared conceptions and beliefs embraced by the mechanism of mimicries, i.e. imitation. The presence of the mechanisms of a certain pillar may vary strongly among institutions, though. Considering the handshake as a form of mutual agreement, the regulative mechanisms are essentially not present. Traffic rules in turn are usually imposed through the mechanisms of all three pillars.

The decisive underlying proposition of institutional theory is that organizations are deeply imbedded in social and cultural contexts as part of which organizational structures and management practices are strongly influenced by institutional demands. According to this view, the 'mode of operation' can be summed up as follows: (1) An institution exerts pressures on actors to comply with the institution's demands (DiMaggio and Powell 1983). (2) Actors' compliance to institutional pressures is primarily motivated by an attainment of legitimacy and consequent survival in the institutional environment (Meyer and Rowan 1977). (3) Actors do not act solely rationally and autonomously—they are inherently influenced and constrained by their institutional environment (Scott and Meyer 1991).

To that end, the so called macro level has been the primary level of institutional analysis so far: The aforementioned 'actors' in this case are organizations or groups of organizations that adapt to expectations and demands of the institutional environment, i.e. demands from outside the organizational boundaries. However, this view has also been criticized: some argue that people were situated in an "iron cage" (DiMaggio and Powell 1983), others that the behavior of organizations and individuals in organizations appear as "oversocialized" (Powell 1991). As a consequence, Oliver (1991) for instance has drawn attention to the fact that organizations may indeed respond differently, i.e. more actively and interest-driven, to institutional pressures aside from compliance. Furthermore, Zucker spearheaded research at the micro level where the organization may be regarded as institution and individuals or groups of individuals inside the organization as responding actors (cf. Zucker 1991). As a matter of fact, this micro

level has been called increased attention to recently. In their profound review, Greenwood et al. (2008) see this level as one direction for future research, stating that other levels of analysis aside from the organizational field or environment level "have been rarely considered. For example, few studies treat the organization as the level of analysis [...] or examine how the organization might be treated as an institutional context for understanding *intra*organizational behaviour." Our work adopts this micro level of analysis. In doing so, our research connects to the recent work by Pache and Santos (2013) who, on a micro level and likewise building upon Oliver's (1991) work, conceptualize how individuals in organizations respond to competing institutional logics.

In an information systems (IS) context, institutional theory has been considered in many facets. Be it the interplay between IT and organizational research (Orlikowski and Barley 2001), the influence of institutional pressures on IS adoption (King et al. 1994; Teo et al. 2003), institutionalization and de-institutionalization processes of IT (Baptista 2009), or a more general argumentation that and how theories from other disciplines can and should be used to contribute to IS research (Boudreau and Robey 1996; Markus and Robey 1988), to give just a few prominent examples. However, the vast majority of studies are rather generic and take place at the inter-organizational level of analysis, as is also shown in the meta review by Mignerat and Rivard (2009). Similar to Greenwood et al. (2008), they conclude that there is room in particular for an institutional perspective to be applied to the intra-organizational level of subsystems such as groups, departments and processes (Mignerat and Rivard 2009). Regarding the question of what constitutes the process of institutionalization, Mignerat and Rivard (2009) illustrate a general process covering the phases of innovation, theorization, diffusion, full institutionalization and beginning of deinstitutionalization. However, out of 53 analyzed IS papers that adopted an institutional perspective, ten studies dealt with institutionalization as a process, out of which only two took place at the micro level. From their analyzed studies, Mignerat and Rivard conclude that an organizing vision is of particular importance when intending to institutionalize new practices. However, we did not find more specific factors or guidelines among the papers analyzed by Mignerat and Rivard that appear more readily applicable, in particular for practitioners, when it comes to fueling the institutionalization of a particular practice inside organizations. We can only speculate as to whether the issue is either underrepresented in IS research so far and/or whether it is too context-specific, meaning that respective institutional factors and guidelines depend upon the element(s) to

be institutionalized, which is why such studies did not show up in Mignerat and Rivard's review.

C.2.2   An Institutional Perspective on EAM

With respect to EAM there seems to be only a limited amount of institutional research so far. To that end, Hjort-Madsen's work stands out by investigating how EA implementation (2006) and adoption (2007) is dependent upon and shaped by institutional forces, noting that this issue is underrepresented in EA research so far. He shows that interoperability and IS planning, which can be facilitated through EAM, are not only technical issues, but that economic, political and contextual factors are just as important. However, his work stays on a descriptive-explorative level and focuses on pressures coming from outside of the focal organization. In contrast to this, we intend to test factors that relate to an intra-organizational institutionalization of EAM. A second exception is represented by the work of Iyamu (2009). Based on two case studies looking at the intra-organizational level, he presents six barriers to the institutionalization of EAM and relates them to four elements of EA utility. Our work addresses the same practical problem and can thus be seen as complementary or extending to his study. However, we take a different approach by adding more detail with respect to anteceding institutional factors and by empirically testing our hypotheses.

We adopt an institutional theory perspective as its line of thought lies at the core of our research goal, namely to derive factors that support giving EAM a "rulelike status" and that "structure social interactions" in an organization with respect to architectural concerns. In this sub-section we therefore review specific EAM challenges that appear addressable from an institutional theory perspective. The institutional perspective helps us to a) contribute to an explanation for the observable challenges of embedding EAM in an organization, and b) provide reference on how to approach this problem.

Although research and practice have delivered EA models, methods, frameworks (Mykhashchuk et al. 2011), and also have successfully tested EAM success factor models (Schmidt and Buxmann 2011), it is still challenging for practitioners to introduce and sustainably anchor an EAM function in their organization (Tamm et al. 2011). During the past ten years, two of the authors have been actively involved in what could best be described as action design research projects (Sein et al. 2011) aiming at the development and use of methods for EA modeling, EA meta modeling, EA planning, the definition of EA principles, and the development of EA software tools.

Based on this research project experience it became obvious that, despite these achievements, EAM's line of thought is challenging to institutionalize.

We conclude that EAM approaches do not only have to be methodically sound, but, in order to become effective across large parts of an organization, they also need to respect an organization's system of social norms and values that structure interactions. We argue that the latter issues are particularly important for EAM for several reasons: First, while being an increasingly important function to manage proliferation and dependencies of IS, EAM is still a rather young function compared to functions like marketing, production or controlling. Consequently, the awareness of EAM issues, the necessity for a coordinated approach to enterprise architecting, as well as standard procedures are still lacking widely. Second, EAM is not only a technical issue, but to a large extent also a social and political one, because (a) EAM is about coordinating the architectural development across levels and departments in an organization, which, after all, is about coordinating and arbitrating between people; (b) EAM is concerned with overarching transparency, analysis and transformation, which is often depreciated by certain stakeholders; and (c) EAM affects and pressures a high quantity and diversity of stakeholders (Dijkman et al. 2004; Kurpjuweit and Winter 2007). Third and last, a wide-spread institutionalization of EAM practices is important as it is the nature of EAM to coordinate different, possibly heterogeneous stakeholder groups that need to comply in order to achieve the expected benefits.

Concerning the use of institutional concepts, our research is particularly inspired by Oliver's (1991) institutional framework, as it mirrors the mechanisms of our EAM problem. On a generic level, she developed a typology of strategic responses to institutional pressures and presents institutional factors that affect the occurrence of certain response strategies. When setting up an EAM initiative, one can principally observe the same mechanisms: Affected stakeholders will certainly have different reactions towards the EAM approach. While some may follow almost blindly, others will perceive it as constraining (Dietz 2007) and unnecessary, and therefore try to defy and manipulate respective endeavors. Considering these similar mechanisms, we applied Oliver's concept to the EAM context at the intra-organizational level (see Pache and Santos 2013 for a related approach). We analyzed four EAM cases using polar sampling through this institutional lens in previous work, concluding that this perspective provides a fresh, applicable and useful view onto the abovementioned EAM challenges (Aier and Weiss 2012). In the paper at hand we advance this research stream and test derived hypotheses based on quantitative data. In doing so, we regard EAM as pre-

institutionalized as in practice it often is. At the pre-institutionalized stage, new structures "appear in response to existing problems" (Mignerat and Rivard 2009). They provoke change, but are still far from being taken for granted. According to Mignerat and Rivard's model, they undergo, prospectively, the theorization and diffusion phases at this stage (see Tolbert and Zucker 1996 for a deeper explanation and alternative terminology). Our research model's endogenous and exogenous variables and respective hypotheses will be explained in the following section.

C.3 Research Model

Our model (Figure 1) is comprised of two major blocks hypothesized relevant for institutionalizing EAM. First, we conceptualize institutional factors aimed at convincing stakeholders of the EAM approach on an individual or group level. The stakeholder response variable (RES) reflects the resulting observable actor behavior. In other words, the response variable serves as manifestation of EAM's institutionalization among stakeholders, i.e. the actor aspect. If the antecedents social legitimacy (LEG), efficiency (EFF), organizational grounding (GRO) and trust (TRU) are marked well, stakeholders can be expected to respond more positively (hypotheses H1a-H1d).

Second, we take up the traditional, rather regulative EA governance approach targeted at EA consistency (CON) and enrich it with elements from a likewise institutional perspective (hypothesis H2a-H2c). Analogous to RES, CON is intended to reflect the institutionalization of EAM. As opposed to RES, however, CON represents the more visible, material or structural outcomes of an institutionalization of EAM practices, namely a higher EA consistency. Accordingly, the related antecedents governance (GOV), goal alignment (GOA) and enforcement (ENF) can be seen as more tangible, pertaining to the institutional setup of EAM in the organization.

Eventually, these two sub-streams (represented by stakeholder response (RES) and EA consistency (CON)) are expected to support the benefits (BEN) achievement provided by EAM to the organization (hypotheses H3 and H4). By combining these two facets, we intend to get a differentiated picture of the matter and to be able to contrast them in terms of impact onto our final dependent variable, EAM benefits. All relations, denoted by the respective nine hypotheses, will be motivated in the following sub-sections.

Figure 2:   Research Model
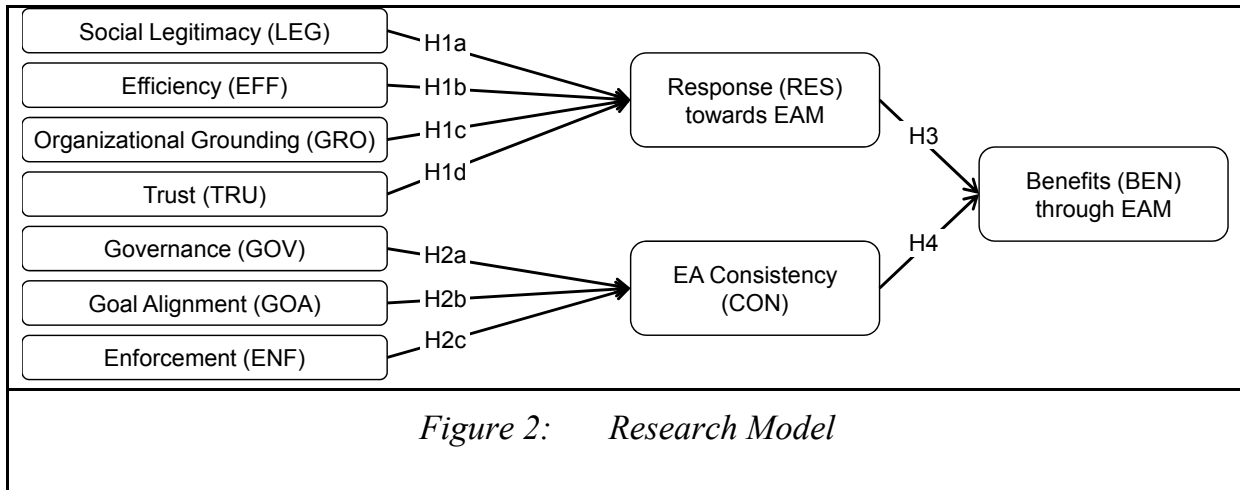
C.3.1   Social Legitimacy and Response

The factor of *social legitimacy (LEG)* represents the perceived social rationale for complying with EAM guidelines. It asks to which degree a stakeholder gains social fitness inside the organization when complying with EAM guidelines. If an actor can expect to personally gain a better social status, he will be more likely to respond positively to the matter. The importance of legitimacy and its relevance for decision making and support (in our case represented by a positive response towards EAM) has been acknowledge profoundly in literature (Jepperson 1991; Meyer and Rowan 1977; Oliver 1991; Suchman 1995). We can therefore propose our first hypothesis:

> *H1a: Higher levels of social legitimacy to be attainable from conformity to EAM will foster a positive stakeholder response.*

C.3.2   Efficiency and Response

Efficiency (EFF) is the economic counterpart to legitimacy. It aims at the perceived economic rationale for following EAM guidelines. It asks to which degree a stakeholder becomes more efficient when following EAM guidelines. According to Oliver (1991), efficiency expectancy is besides legitimacy another causal antecedent of an affected entity's response. From an architect's perspective, efficiency gains through investing in a coordinated EAM function, establishing guiding principles and providing implementation support for instance, is a major argument. However, it is important that also affected stakeholders like project and middle management perceive EAM as helpful for achieving their personal economic goals. As a result, we propose the following hypothesis:

H1b: Higher levels of economic gain perceived to be attainable from conformity to EAM will foster a positive stakeholder response.

C.3.3   Organizational Grounding and Response

Organizational Grounding (GRO) describes to which degree EAM is anchored within the organization's values in terms of strategy definition, top management support or the position in the organizational hierarchy. Institutional studies have shown that values and norms, manifesting in top management championship and respective strategy formulations have an influence on individuals' beliefs and adoption of practices (Chatterjee et al. 2002; Lewis et al. 2003; Purvis et al. 2001). On this account we hypothesize these mechanisms to be important for EAM, too. Another argument for this structural relation can be derived from the previous EAM problem statement: EAM (a) is in particular a top management concern (pursuit of sustainable and synergy-leveraging EA) and (b) has oftentimes a rather young history and track record. Consequently, a propagation and mediation of EAM's values through adequate organizational grounding, that is through institutional symbols and artifacts (Scott 2008b) like top management, position in hierarchy and strategy, appears to be important for fostering desirable stakeholder reactions. Our hypothesis reads as:

H1c: Higher levels of organizational grounding of EAM will foster a positive stakeholder response.

C.3.4   Trust and Response

The concept of trust is a complex and prominent research issue in many fields, including institutional, organizational and IS research (Benbasat et al. 2010; Mayer et al. 1995; Reed 2001). As part of this, trust has been related to many effects such as adoption, risk taking or willingness for coordination and collaboration. These elements are reflected in this relation and based on our project experience we argue that they are crucial: Only if stakeholders trust the EAM team, they will be willing to give up some autonomy, adopt certain architectural rules and collaborate towards a greater end. Thus, our construct of *trust* (TRU) asks to which degree stakeholders trust the EAM function to do the right things right. We formulate our hypothesis as follows:

H1d: Higher levels of trust in the EAM function will foster a positive stakeholder response.

C.3.5   Governance and EA Consistency

As the first of what could be termed traditional, tangible factors to foster consistency of the enterprise architecture, *Governance (GOV)* captures essential aspects of how to control (govern) design-restricting EA guidelines (Winter and Schelp 2008). In other words, our *Governance* factor asks on a general level *how* that game is played in terms of e.g. centrally signing off guidelines and having adequate processes in place for reviews of and exceptions to EA guidelines. From an institutional perspective, this factor embodies a mixture of the regulative and normative strand (Scott 2008b). We propose the following hypothesis:

> *H2a: Higher levels of governance will foster EA consistency.*

C.3.6   Goal Alignment and EA Consistency

Goal Alignment (GOA) refers to the degree EA goals are aligned with stakeholders' individual goals. In literature, this factor is also known under the terms of incentive-centered design (ICD) or incentive alignment (e.g. Ba et al. 2001). In institutional theory, compatibility of the institutional demands with the affected entity's goals is a an acknowledged factor of actually achieving the demanded issues (Oliver 1991; Whetten 1978). With respect to EAM, the observable problem is that project managers for instance are oftentimes reluctant to go the extra mile for a sustainable and EA-conform solution, which may result in a slightly quicker solution at first, but may become very costly and risky in the long run. Thus, from an EAM perspective, this factor appears important, because it represents an incentive to not only optimize locally, but to consider EA consistency-related objectives like reusable and redundancy-reducing solutions. We therefore propose the following hypothesis:

> *H2b: Higher levels of goal alignment will foster EA consistency.*

C.3.7   Enforcement and EA Consistency

Our last institutional factor, *Enforcement (ENF)*, is of solely regulative nature and is strongly related to what Oliver (1991) from an institutional viewpoint refers to as "the degree of legal coercion behind institutional norms and requirements", which comprises enforcing and sanctioning mechanisms (Scott 2008b). Transferred to EAM, we see enforcement as complement to the previous two factors by asking to which degree stakeholders are dependent upon EAM in terms of budget, knowledge and formal approval. The logic behind this is that certain stakeholders may only contribute to EA

consistency reliably when they are ultimately dependent upon EAM. Otherwise, stakeholders may conduct their projects in an arbitrary fashion again. Consequently, we propose the following the hypothesis:

H2c: Higher levels of enforcement will foster EA consistency.

C.3.8   Response and EA Consistency and EAM Benefits

Neither the independent variables nor the intermediate dependent variables of response and EA consistency are an end unto themselves; they should eventually result in business benefits provided by EAM for the organization. Therefore, the last two relations are important as they depict this goal (Aier 2012; Foorthuis et al. 2010). The respective hypotheses read as follows:

H3: Higher levels of positive stakeholder response will contribute to the realization of benefits provided by EAM for the organization.

H4: Higher levels of EA consistency will contribute to the realization of benefits provided by EAM for the organization.

C.4 Research Methodology

C.4.1   Construct Operationalization

Following the recommendations of MacKenzie et al. (2011), we first defined the conceptual domains of the constructs including general properties, underlying themes and a brief construct definition. The necessary measurement items were then derived from literature, construct definitions, and expert suggestions (MacKenzie et al. 2011). In operationalizing our constructs, we strived for reuse and adaption of existing measurement items that are described as critical for success and are supported either by a broad literature review or by empirical data. If necessary, the items suggested by literature were reformulated and/or adapted to account for the specifics of EAM, thus following Ajzen & Fishbein's (1980) suggestions of tailoring measurement items to the research issue in question. However, few items were also directly derived from the construct conceptualizations as respective measurement items at the nexus of institutional theory and EAM were scarce in literature. We do not discuss each measurement item-related publication here but reference the literature that supports our construct operationalization (see Table 1) in the following.

Measurement items for the seven independent variables were primarily shaped by the institutional literature referenced above as part of the research hypotheses development section. In addition, we consulted prominent IS literature like Moore and Benbasat (1991), Thompson et al. (1991) and in particular Venkatesh et al. (2003) where measurement scales were consolidated and validated. These sources were used to inform us on item selection and item wording for the constructs of legitimacy, efficiency and grounding. For trust, we could draw on measurement scales from Weatherford (1992) and Serva et al. (2005), out of which we selected and adapted measurement items that are most relevant to our EAM research issue in question. With respect to the constructs of governance and enforcement, we could also draw from EAM literature as these aspects have already been taken into account in various nuances in previous research (Foorthuis et al. 2010; Schmidt and Buxmann 2011; Winter and Schelp 2008). At last, measurement items for goal alignment were essentially solely derived from broader literature and our construct definition, as we did not find scales fitting our particular EAM issue. Measurement items for the first dependent variable, response, were derived from Oliver's (1991) responses towards pressure exerting entities. The seven independent variables as well as the response variable were measured with mostly three indicator items (only grounding has two and governance four indicators). The measurement items for EA consistency and EAM benefits were adopted from pertinent EAM literature (Aier et al. 2011c; Aier 2012). The therein tested measurement instruments are comprised of 16 items from mostly practice-driven publications (Niemann 2006; Ross 2006a; van den Berg and van Steenbergen 2006; Wagter et al. 2005). We adapted these items slightly and reduced them to overall 12 items in our final model (5 items for CON, 7 for BEN).

For all items, respondents were asked to evaluate their organization's current implementation level measured on a 5-point-Likert-scale ranging from 'not at all' (1) to 'completely' (5).

C.4.2   Sample and Procedure

In order to test our hypotheses we follow a quantitative empirical approach by means of a questionnaire used in a survey among enterprise architects. The questionnaire was distributed in German language at one major and three minor practitioner events in Switzerland, Germany and Austria between April and October 2012. The major event accounted for 76 of the overall 112 collected responses, out of which 7 (6%) had to be dropped due to missing or nonsensical data. The overall response rate was high at

90%. While, on the one hand, we cannot claim our sample to be representative, we can on the other hand expect data of high quality as respondents have a strong link to EAM because all of them were participants of events that specifically addressed EAM issues. Study participants came from Switzerland, Germany, Austria and Liechtenstein. Having analyzed the events' list of participants, we can state that the potential number of multiple questionnaires referring to the same organization is small (5% at maximum).
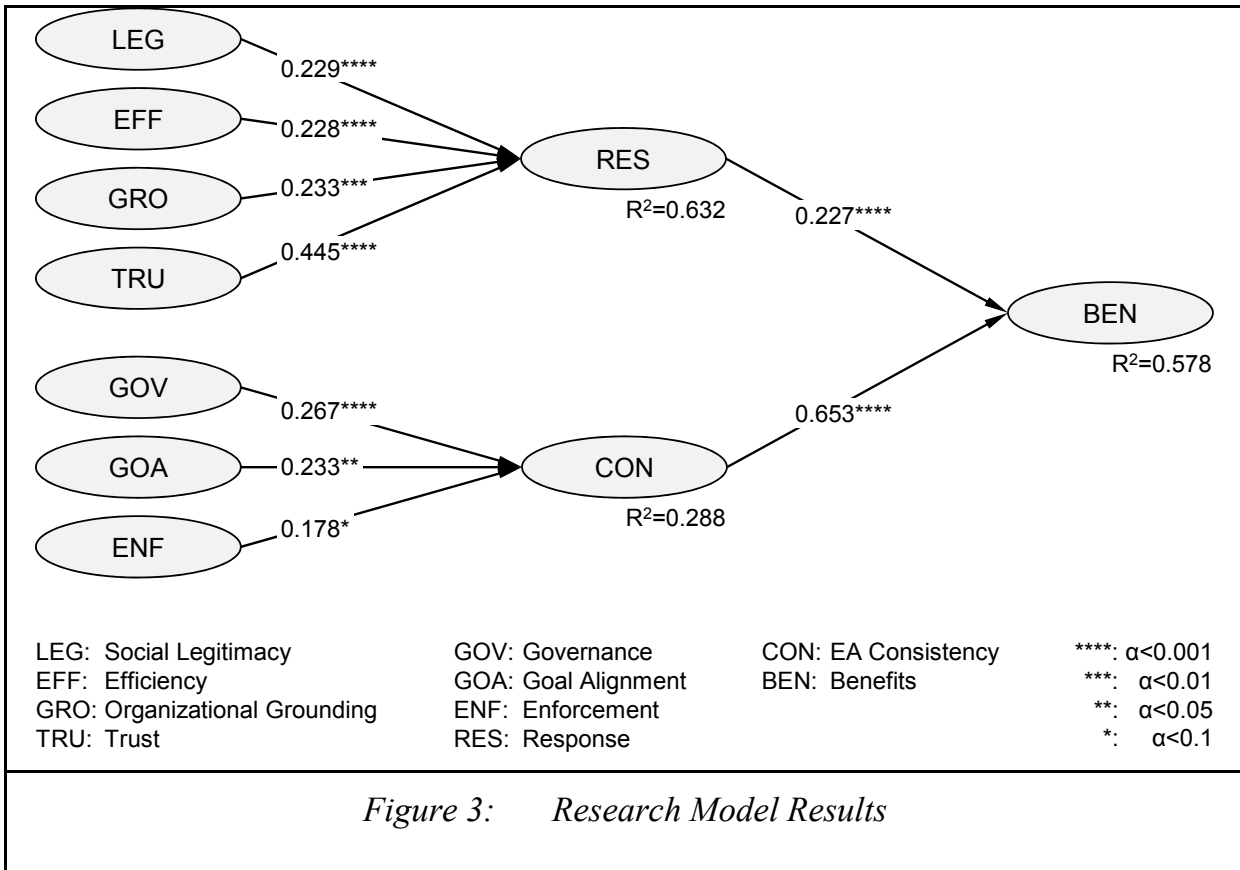
The questionnaire additionally included seven items on demographics and meta data. The majority of respondents (74%) worked for an IT unit rather than for a business unit. 90% of the respondents were actively involved in an EAM function in their organizations. The respondents were primarily representatives of large organizations. 47% of the respondents came from very large companies (5,000 employees and more), 24% from large companies (1,000–4,999 employees), 12% from medium large companies (250–999 employees), and 7% from medium sized or small companies (249 employees or less). The majority of survey participants were well experienced in the field of EAM. 33% of the respondents reported a long EA experience (more than 5 years), 25% 3–5 years, 15% 2 years and 17% 1 year or less. Survey participants were broadly distributed among industries. The most frequently reported industries in the survey are financial industry (27%), public services (14%), followed by insurances (13%), telecommunications (9%), and others (8%).

The research model was transformed into a structural equation model which was tested using a partial least squares (PLS) approach.[7] The PLS approach was favored over other (esp. covariance-based) SEM approaches, as PLS overall fits our research purpose better for several reasons: First, PLS naturally avoids the problems of inadmissible solutions and factor indeterminacy. Second, PLS has less strict distributional assumptions and is more suitable for exploration of relationships. Third, PLS has lower sample size requirements. According to the discussion in (Chin et al. 2003), the sample size for PLS should be at least ten times the maximum number of predictor variables for a construct (in our case 4). The resulting sample size requirement of 10x4=40 is easily met. The stability of the estimates was assessed using the bootstrapping resampling procedure with 500 resamples. Based on this, significances were determined by means of two-tailed t-tests.

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[7] We used the PLS implementation in SmartPLS, version 2.0.M3 (Ringle et al. 2005).

C.5 Model Evaluation

The evaluation of the measurement model and the structural model follows commonly accepted procedures according to Chin (2010) and Götz et al (2010).

| LEG | Social Legitimacy | GOV: Governance | CON: EA Consistency | ****: α<0.001 |

Figure 3:   Research Model Results

All constructs were measured in reflective mode. The *measurement model* needs to be evaluated in terms of (1) content validity, (2) indicator reliability, (3) construct reliability, (4) convergent validity, and (5) discriminant validity. *Content validity* has to be ensured upfront through theoretical considerations, namely that the measurement model (qualitatively) represents the conceptual domain of the construct in question. This was done as part of our model and construct development described in the previous sections of the paper. *Indicator reliability* specifies which part of an indicator's variance can be explained by the underlying latent variable. This implies that factor loadings λ should be larger than 0.7. Indicators with loadings smaller than 0.4 should be deleted. In our model all loadings are larger than 0.6 and only 5 out of the overall 36 indicators are not larger than 0.7 (see Table 14). All loadings are highly significant at a 0.001 significance level (two-tailed t-test) at least. *Construct reliability* indicates whether all the construct's indicators jointly measure the construct adequately. It can be assessed with the composite reliability (CR) criterion or the Cronbach's alpha (CA)

criterion (assuming equal weightings). In either case, values should be larger than 0.6. In our case, both criteria are always above the threshold, with the lowest CR being 0.83 and the lowest CA being 0.65 (see Table 15). However, the composite reliability criterion is more adequate in our case since we do not necessarily assume equal weightings among the facets that a construct's indicators capture. *Convergent validity* is assessed with the average variance extracted (AVE) measure, which should be larger than 0.5, meaning that more than 50% of a construct's variance is explained by its indicators and not by the error term. In our model, AVE is always larger than 0.5. *Discriminant validity* deals with the dissimilarity of a measurement model's constructs. According to the Fornell-Larcker-criterion, discriminant validity is proven if the square root of a latent variable's AVE is larger than the common variances (correlations) of this latent variable with any other of the model's constructs. This holds true for all our measurement constructs (Table 15).

Table 14:	Measurement model (survey items including mean value, standard deviation and factor loading)			
Indicator	Description	μ	σ	λ
LEG1	Minding EA increases the chance of obtaining a promotion	1.85	0.84	0.67
LEG2	People minding EA have more prestige than those who do not	2.34	0.86	0.87
LEG3	Minding EA increases the chance of project acceptance	3.26	1.05	0.82
EFF1	Non-architects believe to accomplish tasks faster because of EA	2.59	0.98	0.68
EFF2	Non-architects believe to increase the quality of their work with EA	2.98	0.90	0.92
EFF3	Non-architects believe to make better use of available infrastructure knowledge due to EA	3.11	0.99	0.92
GRO1	EA guidelines are grounded in the organization's strategy	3.68	1.02	0.79
GRO2	EAM is anchored in the organizational hierarchy and receives top management support	3.42	1.18	0.92
TRU1	Non-architects regard EAM to be a reasonable instrument for the organization	2.88	0.80	0.72
TRU2	Non-architects regard the EAM team to be professionally well qualified	3.39	0.91	0.88
TRU3	Non-architects feel their concerns to be taken seriously by the EAM team	3.23	0.88	0.82
GOV1	EA guidelines are signed off centrally	3.65	1.19	0.82
GOV2	It is defined how and which EA contents are communicated	3.01	1.19	0.70
GOV3	For the review of EA guidelines exist defined processes	3.13	1.36	0.83
GOV4	Exceptions to EA guidelines are discussed through defined channels/processes	3.25	1.31	0.84
GOA1	Leading non-architects know about other units' transformations	2.84	0.80	0.82
GOA2	Leading non-architects' goal systems take account of EA goals	2.61	1.00	0.88
GOA3	Non-architects have incentives to pursue cross-project/-departmental goals	2.50	1.07	0.66
ENF1	Non-architects depend upon EAM for project approval	3.09	1.37	0.87

ENF2	Project budgets depend to some extent on a consideration of EA guidelines	2.22	1.14	0.85
ENF3	Non-architects depend on EA knowledge/technology to conduct projects	2.80	1.07	0.75
RES1	EA content is eagerly accepted in the organization	2.54	0.82	0.82
RES2	There is an active demand for EAM services in the organization	2.66	1.04	0.82
RES3	EA guidelines and services are constructively discussed	3.10	0.96	0.86
CON1	Information silos are dissolved	3.04	1.06	0.61
CON2	Heterogeneity of technologies is reduced	3.67	1.00	0.80
CON3	Inconsistency and redundancy in EA is reduced	3.23	1.15	0.82
CON4	Reuse of platforms, information, and functions is increased	3.56	1.00	0.82
CON5	Standardization of applications is increased	3.31	0.97	0.81
BEN1	Better management of complexity	3.40	1.10	0.82
BEN2	Coordination of change projects is enhanced	3.33	0.99	0.80
BEN3	Costs for change the business are reduced	2.73	0.97	0.88
BEN4	Costs for run the business are reduced	2.91	1.02	0.71
BEN5	Lowered risk by being prepared for unplanned change	3.05	0.94	0.77
BEN6	Standardization of processes is increased	2.98	1.02	0.62
BEN7	Better realization of the corporate strategy	3.18	0.97	0.85

Table 15:   *Descriptive statistics and inter-construct correlations with square root of AVE on the main diagonal*

	AVE	CR	CA	GOA	ENF	CON	BEN	EFF	GRO	LEG	GOV	RES	TRU
GOA	0.63	0.83	0.72	0.79									
ENF	0.68	0.86	0.77	0.45	0.82								
CON	0.60	0.88	0.83	0.42	0.40	0.78							
BEN	0.57	0.90	0.87	0.45	0.50	0.73	0.75						
EFF	0.72	0.88	0.82	0.41	0.26	0.31	0.30	0.85					
GRO	0.73	0.84	0.65	0.44	0.43	0.30	0.42	0.17	0.86				
LEG	0.62	0.83	0.70	0.40	0.40	0.29	0.36	0.37	0.25	0.79			
GOV	0.64	0.88	0.81	0.41	0.45	0.44	0.51	0.23	0.53	0.19	0.80		
RES	0.69	0.87	0.78	0.56	0.35	0.34	0.45	0.50	0.53	0.43	0.47	0.83	
TRU	0.65	0.85	0.73	0.47	0.37	0.29	0.42	0.34	0.46	0.14	0.48	0.66	0.81

One important metric for judging the *structural model* (Figure 2) is the *determination coefficient* (R^2) which reflects the share of an endogenous variable's variance that is explained by its exogenous variables. However, there are no general recommendations on acceptable values of R^2. What is acceptable or not depends on the individual study. In our model 63.2% of RES can be explained by its four institutional antecedents, which is encouraging. With respect to CON, the explained variance is 28.8%. Eventually, RES and CON jointly explain 57.8% of realized EAM benefits (BEN).

As can also be seen, all *path coefficients* are in conformance with the hypothesized direction and have an absolute value above the recommended 0.1 threshold. Despite one exception, all path coefficients are in fact above 0.2, indicating worthwhile rela-

tions. Furthermore, all hypothesized relations are significant with the majority of relations being highly significant at a 0.001 level.

Finally we tested our model's *predictive validity* by means of the non-parametric Stone-Geisser test applying the blindfolding procedure in SmartPLS. The test shows how well the empirical data can be reconstructed using the model and the PLS parameters (Götz et al. 2010). If the test criterion is larger than 0 the model is considered to have predictive validity which holds true for our model.

C.6 Discussion

The objective of this study was to develop and empirically validate a theoretical model that helps to understand institutionalization and benefit realization challenges of EAM. To do so, we conceptualized seven institutional factors and two intermediate constructs affecting organizational benefits attainable through EAM. The study is original because it integrates three major aspects: First, we based our conceptualizations on institutional theory. In the IT and practice-driven discipline of EAM, the application of kernel theories from related disciplines is still rare, albeit promising for understanding EAM phenomena (Winter et al. 2013). Second, as intermediate variables, we combined the traditional construct of EA consistency (CON) and the construct of stakeholder response (RES) in our model. The rationale is that successful institutionalization and leverage of EAM benefits also require a constructive response of affected stakeholders next to more visible and material effects of EA consistency. Both RES and CON are therefore conceptualized as materializing constructs for EAM's institutionalization. Third, we related these constructs to a final variable that conceptualizes attainable benefits for an organization through EAM. This was important to us as we do not regard any of the anteceding factors as having value by themselves, but they become important when contributing to relevant business matters. The resulting model was successfully tested with a partial least squares approach to structural equation modeling using data collected from 105 survey respondents. The model evaluation yields a number of interesting findings which will be discussed in the following subsections.

C.6.1   Implications for Theory and Research

The model evaluation provides evidence that all our research hypotheses hold (Table 16). Looking at first at the high R^2 (R^2=0.632) of our response variable (RES), we can conclude that the four antecedent factors predict stakeholder response well and are

indeed therefore of importance to get stakeholders on board. All path coefficients have a reasonable impact and are statistically highly significant. Among the four antecedents, TRU (H1d) stands out having a substantial effect on RES with a path coefficient of 0.445. In line with our experience, this value in particular underscores that institutionalizing EAM among stakeholders in an organization is not only a technical issue, but entails a social process that builds upon mutual trust. A more detailed consultation of trust building literature and assessment of respectively successful EAM practices may hence represent a particularly fruitful chapter for EAM.

With respect to CON, the explained variance by the three anteceding variables is lower, but still at a respectable 28.8%. However, as elucidated before we only dealt with factors from an institutional perspective in our study. We would expect a higher explained variance if further elements from the EAM toolbox like EA planning (Aier et al. 2011a) or principle management (Aier 2012) were related to CON in addition. The fact that GOV is the strongest antecedent of CON (H2a) may support this interpretation, as GOV can be seen to represent at most traditional EAM toolbox elements. That being said, we regard our study as complementary and compatible with other findings related to successful practices pertaining to the EAM toolbox and its proven utility, respectively (Schmidt and Buxmann 2011). Concerning GOA and ENF, we can still confirm these factors having a significant impact onto EA consistency (H2b, H2c). To that end, we could imagine the strongly regulative enforcement factor (ENF) to be a controversial one, though—although confirmed in our study to generally have a positive effect on EA consistency, further research may assess whether this is actually true in all cases or whether such mechanisms depend upon EAM maturity or organizational culture, for instance.

Finally, evaluating the relations of RES and CON with BEN, we see that both factors explain a notable 57.8% of the variance of realized EAM benefits (R^2=0.578). In conjunction with the highly significant relations from RES (path coefficient = 0.227) and CON (path coefficient = 0.653), we can conclude that both factors should be considered in practice and research when intending to generate higher EAM benefits for the organization. However, while RES provides an additional contribution, CON remains the primary issue for realizing EAM benefits. This does not come as a surprise, though, since mastering the more tangible structures and techniques of the EAM toolbox certainly is the core issue that needs to be addressed. Given the general maturity thereof, we may nonetheless propose that the herein confirmed institutional relations, in particular the ones geared towards stakeholder response (RES), are pivotal to

bringing EAM to the next level in organizations. To that end, this work addresses a current topic as it is closely related to other recent EAM publications addressing the question of how to make EAM practices more effective in different situations based on a growing consensus of what the key concepts of EAM are (Winter et al. 2013).

Table 16:	Results of PLS path analysis			
Hypothesis	Path description	Path coefficient and significance	t-score	Result
H1a	LEG → RES	0.229****	3.924	Supported
H1b	EFF → RES	0.228****	3.795	Supported
H1c	GRO → RES	0.233***	3.108	Supported
H1d	TRU → RES	0.445****	6.228	Supported
H2a	GOV → CON	0.267****	3.398	Supported
H2b	GOA → CON	0.233**	2.465	Supported
H2c	ENF → CON	0.178*	1.851	Supported
H3	RES → BEN	0.227****	3.623	Supported
H4	CON → BEN	0.653****	13.421	Supported

From an institutional theory perspective, we asked how EAM's institutionalization manifests in terms of stakeholder response and structural EA consistency. Our work contributes in applying institutional concepts at an intra-organizational level, which aids both in enriching institutional theory as well as respective management practices like EAM.

What we did not explicitly discuss in this paper but consider a complementing and compatible concept to our study is the concept of institutional logics (Greenwood et al. 2011). Future research may for example discuss whether EAM thinking and values of transparent, coordinated and to some extent design restricting enterprise architecting represents a new institutional logic that penetrates large organizations. It may be interesting to use, for instance, Pache and Santos' (2013) model to analyze existing logics with respect to architectural concerns and to assess individuals' responses in light of the herein proposed factors.

C.6.2   Implications for EAM Practice

With these theoretical considerations in mind, several practical recommendations can be deduced from this research.

As EAM practitioners oftentimes have an IT background, we are confident that the presented perspective and the institutional factors provide valuable inspiration and vantage points to advance EAM in their organization. For organizations with a rather

low EAM maturity, the professionalization of factors fostering EA consistency should be the primary concern. This comprises in particular the introduction of transparent and stakeholder-oriented governance and management processes for EAM. In a second step, we expect an adequate amount of top management support to be necessary in order to institutionalize these practices further in terms of e.g. goal alignment and enforcement measures. A practical, albeit detailed and research-based guide on how to implement and leverage EA endeavors can for instance be found in Ross et al. (2006).

However, drawing on findings from institutional theory, EAM practitioners should also start early on making EAM services appealing to stakeholders, because such processes usually take much longer than setting up the more formal structures and processes. As shown in this study, a positive stakeholder response eventually has a significant impact on wider EAM benefits. Concerning the respective factors of this study targeted at positive stakeholder responses, we may consequently propose the following recommendations for action: (1) Ideally backed up by senior management, run "marketing campaigns" for EAM and position it as desirable and rewarding for both the organization and affected stakeholders in order to raise social legitimacy. (2) Raise perceived efficiency gains of stakeholders by showing that EAM actually helps conducting analyses and projects more efficiently. This implies in particular that EAM should also find a mode that allows for quick help instead of in-depth and elaborate architecture assessment. Also, architects should gather case studies of success stories, if possible from their own organization. (3) Rationalize EAM procedures by anchoring them in or at least deriving them from the organization's strategy. Secondly, EAM norms and values should find a senior advocate or sponsor that raises the awareness of architectural issues personally. Again, this aspect of institutionalization has a lot to do with (stakeholder-specific) communication, which according to our experience is oftentimes lacking among architects that are more focused on technical matters. (4) Finally, trust building is crucial according to our study. To this end, being perceived as restrictor of design freedom or as 'police' is rarely helpful, even if this is eventually part of the job. Accordingly architects should be positioned as enablers and supporters, be skilled in their domain and be able to transport a clear and vivid vision and explanation of why EAM is necessary at all in the focal organization. Also, we observed internal architecture education and training to be a rewarding practice, as part of which architecture roles were built up that are anchored *outside* the EAM department and then contributed strongly to raising awareness of each other's problems and needs. However, given the wide field of organizational trust research (Schoorman et al. 2007), we

would expect many more points to address this important factor in a dedicated and EAM-tailored fashion.

C.6.3 Limitations and Future Work

As with any empirical study, this work has limitations which need to be considered when interpreting the results, but which may also represent opportunities for future research. First, our data collection—although it took place in a controlled environment—did not yield a representative sample. It might be interesting to repeat this study with respondents having different roles in their organizations. With respect to our study, we may expect a biased answer with respect to the positive effects of EAM (in particular the BEN variable) similar to Foorthuis et al. (2010). Foorthuis et al. contrasted the ratings of "EA creators" and "EA users" with respect to "EA benefits for the organization" and "EA benefits for projects", finding that EA creators rated both benefits significantly more positive. However, Foorthuis et al. also contest that "EA users may be no less subjective […] as they can not view the overall picture due to their local focus." That being said, we see two implications for our study. On the one hand, we would expect a less enthusiastic rating of any business benefits if we had asked other people, i.e. EA stakeholders. On the other hand, we see our choice of respondents—enterprise architects—as an asset to the study. They may represent the minority that has an overarching view and who is therefore able to evaluate which EAM structures are established and whether this actually results in a more consolidated EA. With respect to stakeholder responses, we argue that asking enterprise architects is likewise reasonable. Due to rather short feedback loops in organizations and architects' project work, architects are often directly confronted with stakeholder opinions and can be observed to have a realistic appreciation of the actual degree of EAM's acceptance across stakeholders. In conclusion of these considerations, we see potential for refinement and differentiation of our results by surveying further audiences, but we have no reason to believe that our results would be strongly impeded, as we can attest a fit between our respondents' knowledgeability and the research issue in question.

Second, while representing a relatively novel perspective on EAM with a balanced set of institutional factors, our model may allow for refinement and in particular further in-depth probing. The factors presented in this study may represent starting points for the latter. Indeed, we are currently engaged in more in-depth inquiries pertaining to

how exactly architects and organizational leaders tried to address herein discussed factors in order to foster EAM's institutionalization.

Third, we are aware of the fact that many more (contextual) factors exist, which may ultimately have an influence (e.g. on EAM benefit realization). This is not surprising though, as we are after all dealing with a wicked problem, i.e. "poorly formulated, confusing, and permeated with conflicting values of many decision makers or other stakeholders" (Pries-Heje and Baskerville 2008) and are thus naturally limited in our scope of analysis.

Finally, with our findings we hope to have sensitized both researchers and practitioners that EAM is not only a technical issue where stakeholders act rationally, but that an institutional perspective may well inform EAM phenomena. Regarding this perspective as indeed promising, we envision two major elements as future EAM research. For one thing a deeper analysis and solution development for individual institutional factors, and for another an analysis of when and how these factors should best be addressed as part of an EAM institutionalization process in organizations.

C.7 Conclusion

Starting out from the problem of institutionalizing enterprise architecture management in organizations, we formulated our research questions of 1) *What are the factors that influence an institutionalization of EAM? and 2) How does the institutionalization of EAM contribute to EAM's benefit realization?* To answer these questions, we elaborated nine research hypotheses based on a triangulation of institutional theory and EAM literature, previous case study analysis and long-term EA action design research experience. The resulting research model was tested based on 105 survey responses using a PLS approach to SEM.

Our findings confirm 1) seven institutional factors as important predictors for an institutionalization of EAM and 2) that this institutionalization contributes to the realization of EAM benefits for the organization. The findings were discussed from a theoretical and a practice perspective including a proposition of recommendations for action. Future work may particularly (a) advance and confirm the herein presented relations, and (b) develop guidelines to more effectively address the individual institutional factors. Overall, the institutional lens of this work can be regarded as an enriching perspective on the predominantly practice-driven discipline of EAM and our work contributes to understanding relevant EAM challenges.

For researchers concerned with EAM we provide an instrument to observe and analyze the organizational empowerment of their artifacts. We concede that this article is just one step towards conceptualizing the parameters that influence EAM benefits. Nonetheless, from our practical experiences we consider this a valuable step, given the level of maturity of the core EAM artifacts like models, tools, or planning approaches, to make these artifacts more effective.

C.8 Acknowledgements

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Curriculum Vitae

Personal Information

Name	Karl Simon Weiß
Date of Birth	17 January 1985
Place of Birth	Hail, Saudi-Arabia
Nationality	German

Education

2011 – 2015	University of St. Gallen (HSG), Switzerland Ph.D. Programme in Management (PMA), Business Innovation
2008 – 2011	University of Münster (WWU), Germany Master of Science in Information Systems
2009 – 2010	Queensland University of Technology (QUT), Brisbane, Australia Exchange Studies in Information Systems
2005 – 2008	University of Münster (WWU), Germany Bachelor of Science in Wirtschaftsinformatik
2004	Marianne-Weber-Gymnasium, Lemgo, Germany A levels

Work Experience

2011 – 2014	University of St. Gallen (HSG), Institute of Information Management, Chair of Prof. Dr. Robert Winter, Switzerland Research Assistant at the Architecture and Transformation Group
2010	Accenture GmbH, Munich, Germany Internship in Strategic IT Effectiveness
2007 – 2008	University of Münster, Institute for German Language and Literature Studies, Germany Student Assistant for IT support
2006	Minuskel Screen Partner GmbH, Berlin, Germany Internship in Networking and Windows Server Administration
2004 – 2005	Aktion Sühnezeichen Friedensdienste e.V., Berlin, Germany Voluntary Year of Social Service