Chapter 1
Introduction

Abstract In this Chapter, we introduce the phenomenon of enterprise transformation, its enterprise-wide character and the challenges that result from the co-existence of top-down design of transformations and decentralised implementation of change activities. We introduce *architectural coordination of enterprise transformation* (ACET[1]) as an approach that addresses these challenges and outline the playing field of contributions to the ACET body of knowledge.

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1.1 Enterprise transformation

An *enterprise* is understood as being "*any collection of organisations that have a common set of goals*" (The Open Group, 2011), e.g., a company, a network organisation, or a government agency. In the context of business informatics, the common set of goals is usually related to economic value creation in a specific context – such as offering certain services, addressing certain markets, or exploiting certain capabilities or resources.

Enterprises are dynamic systems which are constantly changing and evolving. There is a distinction, though not always a clear one, between what constitutes routine change or optimisation and what can be regarded as *transformation*. Hammer and Champy (1993) characterise transformation as fundamental change regarding an enterprise's products, markets or cost structures, whereas Winter (2010) concludes that the distinction between optimisation on the one hand and "small" transformations on the other hand is fluent. Optimisation is regarded as a gradual, continuous process that evolves existing structures step-by-step. Transformation, on the other

[1] A list of frequently used acronyms is provided on page xv

hand, is seen as taking place in unique and context-specific programmes and being wider in scope (Winter, 2010). In line with Rouse (2005), we define enterprise transformation as a fundamental change that "*substantially alters an [. . .] [enterprise's] relationships with one or more key constituencies, e.g., customers, employees, suppliers, and investors. Enterprise transformation can involve new value propositions in terms of products and services, how these offerings are delivered and supported, and / or how the enterprise is organised to provide these offerings*" (Rouse, 2005). As such, the concept of enterprise transformation is thus concerned with generally top-down initiated, and governed, change.

Typical exemplars of enterprise transformations include changes of the business model (Aspara et al., 2011), mergers & acquisitions (Johnston and Madura, 2000), large-scale outsourcing (Loh and Venkatraman, 1992), and introductions and replacements of core enterprise information systems (Sarker and Lee, 1999; Proper, 2001; Bhattacharya et al., 2010; Hock-Hai Teo et al., 1997).

Due to their strategic character, their complexity, and their consumption of resources, enterprise transformations significantly impact the competitiveness of enterprises, their economic success, and the people that are involved or affected. As a consequence, Enterprise transformations are a phenomenon of great significance for society and economy, and thus also for business informatics focusing on the role of Information systems in these transformations. Enterprise transformations may be triggered by internal drivers (e.g., strategic repositioning, efficiency enhancement programmes) or by external drivers (e.g., market changes, technology disruptions). Due to the related effort and risks, organisations only once in a while undergo enterprise transformations. Enterprise transformation is about fundamentally *changing* the business, not about *running* the business. As a consequence, organisations often lack well tested and established enterprise transformation approaches, and most of the standard management approaches are not sufficient to successfully plan and implement enterprise transformations. Enterprise transformations entail fundamental changes that do not only affect individual processes, organisational units, *information technology* (IT) systems, or products, etc., but rather touch upon several aspects of an enterprise simultaneously. They require cross-cutting, *enterprise-wide* perspectives to successfully deliver on the goals of the overall enterprise transformation.

The complexity of enterprise transformations creates challenges for its coordinated planning as well as for the many concurrent projects for its implementation. One of the challenges of *planning* enterprise transformations is to provide the relevant information regarding drivers, stakeholders, their goals and benefits, possible solutions, and contingencies of the transformation to the respective stakeholders. Insufficient information may for example lead to the underestimation of the transformation's complexity and to setting too ambitious and unrealistic targets. One of the challenges of *implementing* enterprise transformations is to consistently refine and implement the transformation plans locally by division of labour. Locally managed implementation projects may lead to inconsistent designs, conflicting goals, local project teams working against each other, and finally to inconsistent or inferior solutions.

1.2 The need for coordination

Despite the relevance of enterprise transformation, industrial reports indicate failure rates ranging from 70% to 90%, across a broad range of domains (CHAOS, 1999, 2001). Dietz and Hoogervorst (2008) name a lack of coordination in enterprise transformation projects as one key reason for the high rates of *inadequate strategy implementations*.

In complex organisations, enterprise-wide changes imply that a wide variety of actors are involved in the design and implementation of a large number of local changes. To make large enterprise transformations feasible and manageable, they are typically split into programmes and eventually into projects. Even more, larger enterprises typically do not just conduct one transformation programme at a time, but conduct multiple in parallel, which all need to be aligned with the enterprise's strategy. Local changes, as made in the set of projects that collectively make up the transformation programme(s), are not always in line with overall objectives because not only sub-unit specific concerns "pull" or "tug" the direction taken by the transformation, but also the perceived direction may deviate from the intended direction. Thus local changes need to be coordinated in order to constitute a purposefully engineered and coherently implemented intervention to the enterprise instead of an "emergent" change process. There is a need to guard the coherence between the different concerns and aspects of an enterprise across programme(s) (Op 't Land et al., 2008; Wagter et al., 2005; The Open Group, 2009).

Traditionally, project management and programme management are put forward as being responsible for these coordination tasks (Axelos, 2009; PMI, 2001). However, these approaches focus primarily on the management of typical project parameters such as budgets, resource use, deadlines, etc. When indeed only considering the typical project parameters, one runs the risk of conducting "local optimisations" at the level of specific projects.

For example, when making design decisions that have an impact that transcends a specific project, projects are likely to aim for solutions that provide the best cost / benefits ratio within the scope of that specific project, while not taking the overall picture into account. Regretfully, however, in practice such local optimisations do not just remain a potential risk. The risk actually materialises, and consequently damages the overall quality of the transformation result (Op 't Land et al., 2008). This type of risk generally occurs when stakes regarding general infrastructural elements of an enterprise collide with local short-term interests. This especially endangers the needed coherence / alignment between different aspects within an enterprise (such as business and IT, but also human resources, physical infrastructures, etc.). As a result, more often than not (CHAOS, 1999, 2001; Op 't Land et al., 2008), enterprises fail to actually realise the desired transformation even though it might be the case that all projects are finished on time, within budget, and delivering the specified (local) quality.

Malone and Crowston (1990) define coordination as the "*act of working together harmoniously*" and as "*managing dependencies between activities*". Coordination can be achieved through different mechanisms. Several scholars (March and Simon,

1958; Thompson, 1967; Mintzberg, 1983) have identified coordination mechanisms in organisations and provide classification systems for these mechanisms (Abraham et al., 2012a).

Martinez and Jarillo (1989) provide an extensive review of literature on coordination mechanisms. They discuss two classes of coordination mechanisms. The first class is comprised of structural mechanisms that represent a formally defined part of an organisation while the second class is comprised of informal mechanisms that is not formally decided upon but that may evolve over time. Table 1.1 provides an overview of the classification.

Structural	Informal
(1) Departmentalisation or grouping of organisational units, shaping the formal structure.	(6) Lateral or cross-departmental relations: direct managerial contact, temporary or permanent teams, task forces, committees, integrators, and integrative departments.
(2) Centralisation or decentralisation of decision-making through the hierarchy of formal authority	(7) Informal communication: personal contacts among managers, management trips, meetings, conferences, transfer of managers, etc.
(3) Formalisation and standardisation: written policies, rules, job descriptions, and standard procedures, through instruments such as manuals, charts, etc.	(8) Socialisation: building an organisational culture of known and shared strategic objectives and values by training, transfer of managers, career path management, measurement and reward systems, etc.
(4) Planning: strategic planning, budgeting, functional plans, scheduling, etc.	
(5) Output and behaviour control: financial performance, technical reports, sales and marketing data, etc., and direct supervision	

Table 1.1 Overview of coordination mechanisms (adopted from Martinez and Jarillo, 1989)

The numerical order of the mechanisms, from 1 through 8, indicates both the level of *rising effort in implementation* and the level of increasing *complexity level of strategies* they are able to support. While simple strategies can be coordinated using structural mechanisms only, more complex strategies demand the additional use of informal mechanisms of coordination. Informal coordination mechanisms are more costly, but at the same time capable of supporting more complex strategies than structural coordination mechanisms (Chan, 2002; Martinez and Jarillo, 1989).

Although coordination is often interpreted as an intra-organisational issue, more and more enterprise transformations involve enterprises across organisational boundaries (e.g., a value creation network) so that we understand coordination also as an inter-organisational issue.

A number of disciplines intend to provide means to achieve coordination. *Leadership* aims at influencing an actor's behaviour in a certain way, *HR management* guides actors' behaviour by defining personal goal and reward systems, *budgeting*

and *financial control* allocate an enterprise's resources in a distinct way, or enterprise architecture management restricts the way certain artefacts are designed. The above mentioned disciplines have in common that they have a potentially cross-cutting, i.e., enterprise-wide, coordinating effect. They implement some of the coordination mechanisms listed in Table 1.1 to different degrees. Thus they provide different lenses, i.e., methods and models, for implementing these coordination mechanisms.

In the book at hand, we focus specifically on the methods and models of enterprise architecture management as a starting point for improving the coordination of enterprise transformations.

1.3 Enterprise architecture management

One of the most often cited publications on the definition of *architecture* is the IEEE standard 1471-2000 (IEEE, 2000)[2] and its adaptation to Enterprise architecture by The Open Group (2011). Architecture is defined there as (1) "*[t]he fundamental organisation of a system embodied in its components, their relationships to each other, and to the environment*", and as (2) "*the principles guiding its design and evolution*" (IEEE, 2000). In the field of enterprise architecture, 'system' is then specialised to 'enterprise'. As enterprises are social systems with a purpose and typically use technological artefacts to (better) achieve its purpose, enterprise architecture covers a diverse set of artefacts ranging from social constructs (e.g., shared objectives, valuations) all the way to technical constructs (e.g., software, IT infrastructure). The (1) *fundamental organisation* (the "what") of enterprise architecture can be represented by models of its as-is state and / or possible to-be states. The (2) *principles guiding an EA's design and evolution* (the "how") are related to enterprise architecture management which is concerned with the establishment and development of enterprise architecture in order to consistently respond to business and IT goals, opportunities, and necessities (Abraham et al., 2013a). Enterprise architecture intends to represent a holistic perspective on an enterprise as a socio-technical system.

'Managing', the M in enterprise architecture management, therefore is not only concerned with describing and envisioning aggregate representations of a diverse set of artefacts, their dependencies and their evolution, but is also concerned with the task of reaching, and maintaining, consensus among stakeholders about the current status and the desired future development of the enterprise.

The "holistic" perspective of enterprise architecture spans at least three dimensions of the enterprise (Jonkers et al., 2006; Lankhorst, 2012; Winter and Fischer, 2007; van't Wout et al., 2010):

1. enterprise architecture covers the entirety of artefacts of a specific type in an enterprise, e.g., all objectives or all applications or all processes or all projects.

[2] As well as its later versions in ISO / IEC 42010:2007 and ISO / IEC / IEEE 42010:2011.

2. enterprise architecture covers the entirety of aspects / concerns that stakeholders have in an enterprise, e.g., strategic concerns, operational business concerns, IT implementation concerns, or social concerns (company culture, company politics, leadership style).
3. enterprise architecture covers at least a complete transformation cycle, e.g., the entire lifecycle (from requirements analysis, via design to decommissioning) of all affected artefacts.

Due to complexity limitations, no management discipline can be holistic and cover all details at the same time. Enterprise architecture management looks at the enterprise from a holistic, but aggregate perspective. This differentiates enterprise architecture management approaches from other management disciplines like business process management or IT project management, which have a more focused perspective and, as a consequence, can cover more detail. Please note that enterprise architecture may of course be applied with more focus (e.g., positioned towards project management or portfolio management (Op 't Land et al., 2008)) – but in this book we take an enterprise-wide perspective and therefore use enterprise architecture management in a holistic way.

If enterprise architecture covers an enterprise transformation holistically, then enterprise architecture management is expected to identify and leverage potential synergies (or detect incoherence) that cannot be detected or handled by a single project, in a single process, or a single organisational unit. Hence enterprise architecture management appears to enable appropriate coordination mechanisms for enterprise transformation. The enablement can be achieved by providing the necessary transparency throughout the business-to-IT stack and over the planning horizon as a basis to support discourse and decision-making for diverse stakeholder groups in organisations, thereby implementing some of the coordination mechanisms presented in Table 1.1 by, e.g., enterprise architecture planning or enterprise architecture principles. Enterprise architecture planning contributes to coordination by deriving local transformation activities from and / or fitting local transformation activities to a consistent overall plan that describes the preferred to-be state of the enterprise architecture as well as the projects or programmes necessary to achieve this state. Enterprise architecture principles do not describe the preferred to-be state; they rather guide the design decisions in the enterprise transformation in a consistent way. Therefore, enterprise architecture management supports the constant (re-)alignment of an organisation's resources internally as well as with the changing requirements of its environment (Abraham et al., 2012b).

This understanding of enterprise architecture management, however, is only one aspect of *architecting*. Plans and principles are, in a top-down manner, *a restriction of design freedom* of affected actors / actor groups (Dietz, 2008; Hoogervorst, 2004, 2009; Greefhorst and Proper, 2011). This traditional way of implementing enterprise architecture management makes establishing it in a given organisation's governance structure a key challenge. Although an enterprise as a whole is expected to benefit from EAM (Schmidt and Buxmann, 2011; Tamm et al., 2011b), individuals or groups in the enterprise are often hesitant or openly refuse to adopt enterprise architecture management or its consequences (Aier and Weiss, 2012).

In the face of the necessity to be accepted by a large number of actors that need to be coordinated in an enterprise transformation, the traditional, stipulative and governance-enforced implementation of enterprise architecture management therefore needs to evolve. Supportive elements that specifically address the large number of local decision-makers such as informing design, visualising dependencies, simulating indirect impacts, etc., need to complement the traditional, often centralised toolbox of enterprise architecture management in order to create an effective means for architectural coordination.

1.4 Architectural coordination of enterprise transformation

ACET utilises the holistic perspective of enterprise architecture management to support the coordination of enterprise transformations. The core purpose of ACET is to inform decision-makers with local concerns as well as decision-makers with more enterprise-wide concerns in a way that overall transformation goals can be successfully pursued, i.e., that inconsistencies are reduced and local decisions contribute to overarching goals. Therefore, ACET integrates and aggregates local information and provides different viewpoints, such as financial, structural, or skill perspectives to the respective stakeholder groups. ACET aims at creating a shared understanding and consensus among the stakeholders of an enterprise transformation – often such a shared understanding is only needed among a few stakeholders and only with regard to a selection of concepts.

ACET, therefore, does not aim to perform direct steering of enterprise transformation, but rather focuses on providing the actors who *are* responsible for steering an enterprise transformation with the relevant information in order to increase the efficiency and effectiveness of their action. ACET will indeed takes the diversity of enterprise transformations into account and provides configuration mechanisms for adapting ACET to transformation types.

The focus of ACET is to provide coherency and alignment at an architectural level. It does not focus the implementation on a project level. More specifically, as also summarised in Table 1.2:

- ACET is global, not local – ACET is enterprise-wide, instead of concentrating on local (e.g., project / programme / department level) optimisations.
- ACET is long-term oriented, instead of short to mid-term oriented – Architecture is concerned with that part of the enterprise that remains stable over a long time, and with translating this long-term view into short-term actions. This is opposed to operational change management programmes, which focus on the short to medium-term perspectives without considering the long-term strategic perspective.
- ACET is purposeful and planned, not emergent and improvised. ACET concentrates on engineering oriented change: purposeful, planned, and employing a defined set of methods. This is opposed to emergent / evolutionary change.

From the point of view of emergence, change just happens and, as a result, responses to change are improvised on the fly rather than a priori planned.

	ACET is	ACET is not
Nature of time horizon	Long-term oriented	Short- to medium-term oriented
Span of control	Global, across projects or programmes	Local, project specific
Intentionality of change	Purposeful	Emergent
Type of change	Fundamental	Routine change, continuous improvement
Essentiality	Based on the consensus of key stakeholders	No explicit consensus required
Planning of change	Planned	Unplanned, bricolage or improvisation

Table 1.2 What ACET is, and what it is not

ACET approaches the integration of enterprise transformation approaches and enterprise architecture management approaches from two directions. First, ACET identifies those aspects of enterprise transformations that potentially benefit from architectural coordination. Second, ACET translates and extends EAM's methods and models in a way to make it them accessible and valuable to enterprise transformation managers.

From a functional perspective, ACET should be specified in terms of its goals, products, and resources. From a constructional perspective, ACET should be specified in terms of its constructs and their dependencies, its processes, capabilities, and principles. These specifications can partially be adopted from existing enterprise architecture management approaches (for overviews, see Aier et al. (2008); Mykhashchuk et al. (2011); Schelp and Winter (2009); Schönherr (2009); Simon et al. (2013)) and existing enterprise transformation approaches (e.g., Rouse (2006); Uhl and Gollenia (2012)), but need to be adapted, integrated and extended by configuration mechanisms as enterprise transformation is largely contextual and a "one size fits all" approach would not be able to exploit the full potential of ACET.

Compared to existing proposals to apply enterprise architecture management for supporting enterprise transformations (see Lankhorst (2012); Ross et al. (2006); Op 't Land et al. (2008); Pulkkinen et al. (2007); Greefhorst and Proper (2011)), the approach outlined in this book (a) goes far beyond the IT perspective of enterprise transformations (Asfaw et al., 2009) and (b) is conceptually "outside in", i.e. develops the approach based on context and stakeholder analysis instead of being driven by a collection of models and methods that have been developed in a different domain.

Scientifically, ACET can be approached from fundamentally different directions. Descriptive research would aim at understanding ACET as a phenomenon in the real world, identifying relevant constructs, hypothesising and validating cause-effect re-

lations. Design research would aim at understanding ACET as a problem (i.e. a gap between a – to be determined – desired state and observed state in the real world) and proposing effective means that address important aspects of that problem. The ACET initiative summarised in this book adopts the latter approach, i.e. aims at understanding ACET as a situated design problem and ultimately proposing effective configurable solution components.

1.5 Outline of this book

These challenges have triggered us to initiate a broad research programme on ACET, involving a collaboration between researchers from Luxembourg, Switzerland, as well as the Netherlands. The ACET programme involved four applied research projects: the core ACET project, the GEA project, the Corporate Intelligence project, and the RationalArchitecture project, involving different constellations of the University of St. Gallen in Switzerland, the Luxembourg Institute of Science and Technology in Luxembourg, the Radboud University in the Netherlands, the University of Luxembourg, and several industrial partners such as Ordina and SAP.

Each of these applied research projects focussed on different aspects of enterprise transformations, and different strategies to use enterprise architecture to steer the direction of such transformations. The ACET project formed the integrative core of these four research projects, also leading to the general focus of this book on architectural coordination of enterprise transformation.

The resulting book brings together the work of ten PhD researchers and six senior researchers. While this book is built around individual contributions of the researchers involved, the final result goes beyond being a mere collection of disconnected Chapters. As the work involved four collaborative projects, the different results are well connected to each other, while some terminological and theoretical integration across the different researchers has also been achieved. At the same time, it should be said, that this book can only provide a humble beginning towards the creation of a more complete understanding of architectural coordination of enterprise transformation and the development of an integrated set of instruments supporting ACET in practice.

The ambitions at the start of the ACET research programme were higher. It was, indeed, the ambition to develop an integrated design theory for ACET. However, the early stages of the projects involved in the programme, provided the insight that the heterogeneity and multifacetness of the domain of ACET was so high, that the development of an integrated design theory for ACET would be too ambitious. A choice had to be made between the creation of a "superficial" overall method for ACET, or a, for the moment, set of disconnected and partial, yet well founded, elements / components towards a more comprehensive method for ACET. We made a choice for the latter, where the research efforts were compartmentalised, in the sense that each of the involved researchers focussed on a specific (set of related) aspects, with the aim to develop an initial explanatory theory covering the aspect.

Regardless of whether their concerns are primarily local or enterprise-wide, decision-makers will accept and use ACET solutions only as long as the perceived specific characteristics of the enterprise and of the transformation are considered. As a consequence, we adopt a clear outside-in approach in this book. Starting with an analysis of the current state of corporate ACET practice (Part I), we continue with an exploration (Part II) of the challenges facing ACET from a more theoretical perspective.

In Part III, we propose a collection of concrete components for "doing" ACET. These components have been "harvested" from the work of the individual researchers in the programme. This collection of components, one could say method fragments, can be arranged and / or tuned in different ways depending on the specific situation, in particular, the actual enterprise architecture management approach used, the enterprise transformation type, and the transformation's context.

Chapter 26 concludes the book with a brief review on the results presented in this book, as well as a reflection on the use of design science in the development of a large-scale design theory as the ACET programme set out to do a the start, and finally a discussion of what could / should be the next steps in future research.