

# Managing Strategy in Digital Transformation Context: An Exploratory Analysis of Enterprise Architecture Management Support

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**Abstract**— Most modern-day enterprises are confronted with the challenge of dealing with digital transformations. Digital transformation (DT) commonly refers to a disruptive process that changes profoundly the way companies compete, interact, and create value. Enterprise Architecture Management (EAM) is supposed to be a suitable means to support the management of enterprise transformations and fundamental changes. However, the depth and disruptive nature of the underlying changes raise multiple questions concerning the adequacy of EAM for digital transformation management; in current corporate practice, EAM does not appear to be regularly applied as a support service for digital transformation. In this paper, we investigate the extent to which EAM can provide the required inputs to conduct the activities part of digital transformation endeavors. To this end, we rely on a comparable study found in the literature and extend its scope into digital enterprise transformations. We start by examining which activities need to be carried out to manage digital transformation. We further identify information inputs that are necessary to conduct these activities. We can then analyze whether EAM can supply the required inputs. We will focus on strategic areas of Digital Transformation Management (DTM) and further investigate which information inputs are needed for these DTM activities. When demand and supply are compared, and although EAM provides valuable inputs to organizational issues, EAM shows weaknesses when it comes to information about market trends, contextual and environmental information needed for strategy management activities.

**Keywords** – *Digital Transformation Management, Enterprise Architecture Management, Strategy Management*

## I. INTRODUCTION

Recent years have witnessed rapid advancement in managerial practices and technological tools that aid enterprise development and their ability to evolve their Information System (IS) and optimize its alignment with business goals and corporate strategy. Among these tools and practices, Enterprise Architecture (EA) and EA Management (EAM) are essential. EA is an organized and structured description of an organization and its IS at all levels (technical, functional, strategic, etc.), and the aim of EAM is to go beyond enterprise modeling and to respond to business necessities and IT opportunities by developing EA in order to respond to business necessities and IT opportunities [1], [2].

EAM is believed to support the management of such transformations by guiding the necessary coordination efforts [3] and providing information for top management support or strategy development [4]. It also provides EA models to various stakeholders in transformation projects and enhances communication by establishing shared and mutual understandings. Furthermore, EAM can guide decision processes and contributes to better design choices that align with the operational and strategic goals of the transformation endeavor [5].

Yet, in certain circumstances, an enterprise faces major transformations that can potentially considerably alter its business model, its organization, or its relationships with certain stakeholders, e.g., customers [6]. In the case of Digital Transformation (DT), it can involve substantial new ways to provide old value propositions or radical changes to the inner structure of the enterprise; the goal of such transformations is to improve operational processes, increase in top-line businesses or business models evolution [7].

However, EAM is not regularly applied and is far from being considered as a support service for digital transformation. Furthermore, certain authors tend to consider that the term ‘architecture’ is heavily overloaded and that the role of the ‘architect’ is facing severe inflation [8]. According to Asfaw et al. [5], EAM has kind of an ‘image’ problem with a tendency to consider EAM as a discipline mostly about IT and located in the IT departments; while enterprise transformations such as DT is more profound and broader than an IT transformation and it impacts the different aspects of the enterprise, especially strategy management [7].

In line with similar investigations in the domain (in particular the work by N. Labusch [9]), we tend to consider that there is a serious disparity between the information offered by EAM and the managers’ information demands in digital transformation projects. Architects seem not clearly to know how to support DT managers, and these managers are often unaware of how EAM might support their effort [10]. For this paper, we rely on and extend a previous study conducted by Labusch and Winter in 2013 in which they confronted EA input with enterprise transformation information needs [11]. In this initial study, the author’s focus is on enterprise transformation in general, while in this paper, we consider the more specific case of Digital Transformation. Indeed, we postulate that the fast-growing digital era brings new complexities and specificities to enterprise transformation and that there is still a need to

understand better what DT managers require as inputs for their decisions to lead digital transformations. Our focus will be in particular on inputs concerning strategy management activities. We can afterward examine whether EAM can offer this information and thus provide a first step towards a better understanding of EAM support for DT.

This leads to a main research question with two sub questions:

RQ: Does EAM provide the adequate support to Digital Transformation Management?

- RQ1: What are the activities of digital transformation management concerning strategy management issues and what are the necessary information needs to these activities?

- RQ2: What are the content elements that EAM can provide?

The rest of this paper is structured as follows. We first review the literature and go on with describing our research approach. Second, we present the results, provide a discussion and end with a conclusion and future work.

## II. RELATED WORK

Digital Transformation (DT) is a complex and radical form of Enterprise Transformation, it commonly refers to a disruptive process that change profoundly the way companies compete, interact and create value [12]. It is defined as “*the use of technology to radically improve performance or reach of enterprises*” [7]. Another well-known, more holistic definition of the term is that it can be understood “*as the changes that digital technology causes or influences in all aspects of human life*” [12]. Finally, digital transformation can also be defined as the third and ultimate level of digital literacy that “*is achieved when the digital usages which have been developed enable innovation and creativity and stimulate significant change within the professional or knowledge domain*” [13]. This last description seems to go deeper than others because it explores the motivation for and consequences of undergoing digital transformation.

Many research works have reported that partial problems within DT can be addressed by EAM. In [8], Lankhorst suggests that in order to be beneficial for the enterprise, the architects have to firmly communicate and negotiate with different stakeholders as the scope of EAM changes from single enterprises to a business network point of view. Indeed, due to IT-driven transformation, it is essential to focus on roles rather than actors and linkages between the network partners.

In [14], the authors consider EAM as a governing tool that has the potential to guarantee the alignment of portfolios of transformation steps. They see potentials in areas like strategic direction, gap analysis, tactical planning, and operational planning. In [15], the focus is on the strategic change process and how EAM can contribute. The author claims that the strategic fit with the market environment and business-IT alignment can potentially be supported by EAM. Moreover, EAM can contribute to the preparedness for change by standardization and modularization of parts of the enterprise.

The benefits of EA are not limited to the enterprise transformations. In [16] for example, Foorthuis et al. recognize benefits in terms of achieving key business goals, managing organizational complexity and contributing to project success with enhanced integration, standardization and communication. Furthermore, in [17], Lang et al. considers use of EA as a major success factor besides other factors such as artifact quality, infrastructure quality, service quality, corporate culture, etc. Nevertheless, no distinction is made among these benefits in terms of explicit link to transformation.

From a ‘strategy management’ point of view, the authors in [5] provide a more holistic overview of the transformations support by EAM. They identify success factors like communications, stakeholder involvement and guided application development according to three perspectives (communications, management support and structure). Yet, they conclude that, to cope with all challenges, architecture as such is insufficient and some other approaches are needed, e.g., change management. In [18], Winter et al. discuss differences and commonalities between EAM and Enterprise Transformation Management (ETM). They focus particularly on the to-be designs and change project roadmaps created by EAM. These both are considered as input for ETM and as an integrated implementation component. However, neither [5] nor [18] focus on the management tasks that are part of digital transformations before considering the support provided by EAM.

Several recent studies (e.g. [19], [20]) examine the evolution of language and modeling techniques to better adapt them to the new age of digital transformation assuming that during enterprise transformations, coordination among the stakeholders involved is key. Shared understanding, agreement, and commitment, is needed on topics such as: the overall strategy of the enterprise, the current affairs of the enterprise and its context, as well as the ideal future affairs. Models, and ultimately enterprise modeling languages and frameworks, are generally seen as an effective way to enable such (informed) coordination. When these languages were developed, the digital transformation challenges were not yet that noticeable. At that time, the focus was more on consolidation and optimization. As such, it is logical to expect that the existing languages may require some “updates” based on available tools such as Data Analytics and Intelligent Systems to be truly ready for the digital transformation.

Summarized, the review of the literature shows that the focus is more on transformations management from an EAM perspective and on how EAM can support it (e.g. [21], [14], and [8]). From a Digital Transformations point of view, the demand aspect is not explicitly and extensively mentioned in the current discussion. In this paper, we acknowledge the work done by Labusch et al. (i.e., [9]) and further investigate which information inputs the demand side requires and analyze the extent to which current EAM is able to provide.

### III. RESEARCH METHODOLOGY

To answer our research questions, we proceeded in 3 steps (figure 1):

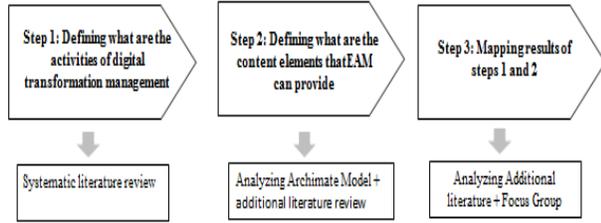


Figure 1. Research approach

#### A. Step 1: Defining what are the activities of digital transformation management, and then, focusing on Inputs needed for Strategy Management

In order to assess which DTM activities can be supported by EAM, we need to identify those activities. We use the model describing transformation management activities proposed by Winter et al. in [11]. Next, we apply a structured literature search process to update this model regarding digital context; we used a systematic literature review, following [22] and [23] protocol. This approach is a “strict protocol for the search and appraisal of literature” and is claimed to be objective, unbiased and rigorous [24].

The systematic literature review includes six steps (figure 2):



Figure 2. Steps of systematic literature review

##### 1) Research identification:

The idea here is to examine and evaluate research on digital transformation management. For that, we investigated the research question RQ1.

##### 2) Research strategy:

The first step consists in identifying major terms related to the research question, including any alternative spelling and synonyms. To connect the search terms, we used the Boolean operators (AND, OR). The following strings resulted: ("digital transformation" OR "digitalization") AND ("management" OR "management activities"). To conduct the search for papers, we used the Scopus database and did not consider any time limit. The search began on January 05, 2019, and lasted for two days.

##### 3) Study selection:

In this step, we defined selection criteria to determine which studies are included or excluded. We only included papers written in English, published in a scientific journal, and that deal with issues directly related with digital transformation. We excluded articles which weren't accessible, as well as Master and Doctoral theses,

proceedings or conference articles, working papers and textbooks.

This choice of journal articles falls in line with [25], who believes that “*academics and practitioners alike use journals most often for acquiring information and disseminating new findings and represent the highest level of research*”.

##### 4) Quality assessment:

The goal of this step is to ensure that only papers of a certain level of quality are included in the literature review. This assessment requires the complete review of the paper. Based on known guidelines in [22] and [23], we reused the same quality criteria that appear in [26]:

- Is there an adequate description of the context in which the research was carried out?
- Is there a clear statement of research aims?
- Does the paper describe an explicit research question?
- Is the research design appropriate to address the research aims?
- Is the literature review adequate?
- Is the collected data in a way of addressed research issue?
- Is the data analysis sufficiently rigorous?
- Is there a clear statement of findings?
- Is the study valuable for research or practice?
- Does the paper discuss limitations or validity?

Each question has four possible options: (0) issue is not mentioned at all, (1) little mentioned, (2) adequately addressed and (3) completely addressed. Hence, we used a four points Likert scale for collecting answers. Articles with an average quality score lower than 1, were removed. At the end of this process 8 articles were qualified to be analyzed for the data extraction step.

##### 5) Data extraction:

In this step, we extracted data from the qualified articles. We reflected our consolidated activities using results in [11] to ensure validity and reliability. When the framework added activities or information inputs that did not emerge from the other data, we added those.

##### 6) Data synthesis and analysis:

At the end, the extracted data provided some results. These were synthesized in a table inspired by those appearing in [11] (p. 5). Figure 3 presents the literature search, selection and assessment process.

#### B. Step 2: Defining what are the content elements that EAM can provide by analyzing Archimate Meta model

After defining which are the activities of Digital Transformation Management (DTM), we underlined the information inputs that EAM can provide to the DTM activities. We begun by using the content meta-model of Archimate 3.0 because it is a mature industry standard that is maintained by firms and research organizations; it is also used as a foundation for many famous EAM frameworks [30]. Archimate offers generic concepts of the information that EAM can provide without being on the level of detailed individual reports (like capability maps or application landscapes), and thus allows for a more universal discussion.

We guaranteed validity by comparing the identified content elements with other metamodels like TOGAF [27], GERAM [28], Zachman [29], DoDAF [30], and IEEE [31].

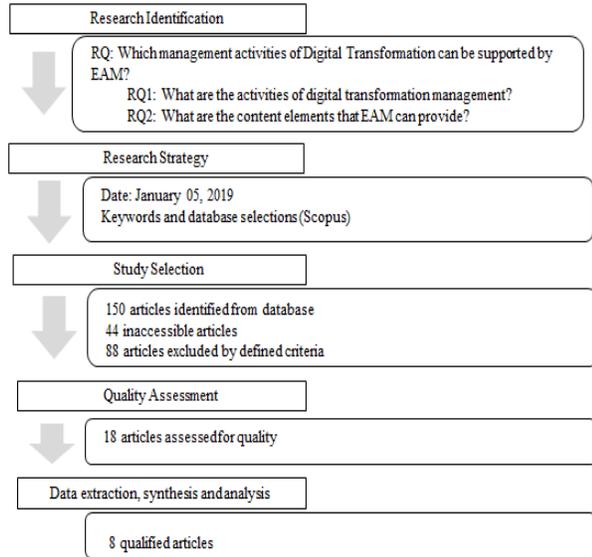


Figure 3. Systematic literature review processes

### C. Step 3: Mapping results of steps 1 and 2:

After identifying the required information inputs of DT and the potential information outputs of EAM, we proceed to map both results in a final step. The main challenges were the different languages apparent in different disciplines and that make one-to-one mapping non trivial. Thus, we decided to conduct a Focus Group [32] where we presented our pre-filled mapping to Enterprise Architects from a French bank using Archimate as a meta-model of their Modeling activities. We collected feedback on our initial mapping by doing a practical exercise after the presentation. The use-case that we considered is “Online banking”, it is a digital project that allows customers to have the services of their banks on their phones, tablets or still at home on a personal computer. The architects tried to analyze, for each DTM information that is needed, the extent to which it can be provided by EAM. The focus with the architects during these iterations was only on strategy management activities. We afterwards analyzed our results by checking back with the DT literature, if the information provided by EAM is sufficient to fulfill the required information input of the activity. We ranked this on a five point scale “DT activity almost not supported by EAM” to five “full support”

## IV. RESULTS

### A. DTM Activities and Inputs

We reflected our consolidated activities using results from Winter et al. in [11] to ensure validity and reliability. In [11], they have identified eight major groups of Enterprise

Transformation management activities that we update regarding Digital Context: DT Meta Management includes the management of the DT itself. It includes activities like managing the overall process and governance, identifying digital transformation drivers, managing risks and communication [33]. DT Performance Management includes the financial performance but also additional progress and performance control [34]. The DT Strategy Management deals with the conformance of the DT with the corporate strategy [35]. The DT Execution Management includes the overall project and program management of the DT [36]. Furthermore, identifying unplanned issues and stable intermediate steps is part of this group. DT Human Resource Management is concerned with managing the employee’s skills and organizational issues during the DT; we will focus on it in the mapping step. It needs to take into account cultural issues and training of necessary skills [37]. DT Information Technology Management takes care of managing the transformation of the IT landscape, while DT Structure Management is concerned about the horizontal structure in terms of processes [38] and the vertical structure in terms of the hierarchy [39]. DT Relationship Management is concerned with including customers [40] and suppliers [41] into the DT.

Tables I and II below illustrate the inputs about strategy management that we will use for the mapping step.

TABLE I. “DEFINE GOALS OF THE DIGITAL TRANSFORMATION” ACTIVITY AND NECESSARY INFORMATION NEEDS

Activity 1 of Strategy Management: Define Goals of the Digital Transformation
Benefits [7] Organizational capabilities [42] Top Line Growth [35], [7], [43], [44] Customer needs [45], [13], [46], [43] Organizational Structure [45], [1] Digital Strategy [42], [4], [12], [47] Customer touch points [46], [12]

TABLE II. “ANALYZE CORE VALUE PROPOSITION OF OWN COMPANY” ACTIVITY AND NECESSARY INFORMATION NEEDS

Activity 2 of Strategy Management: Analyze Core Value proposition of own company
Digitally-modified business model [48], [49], [50] Socially-informed knowledge [41], [51], [52] Predictive analysis [53], [7], [51] Market trends [48], [13], [54], [55] Digital Drivers [56], [4], [12], [52], [57], [1], [58] Market information [48], [59]

### B. EAM Outputs

After defining the required inputs for the DTM activities, we explain which information EAM can provide by following the structure of the Archimate 3.0 content metamodel [60]. It contains generic elements that are connected to all other elements in the metamodel. The other elements are differentiated into business, data, application and technology architecture. We summarize the consolidated content elements in figure 4.

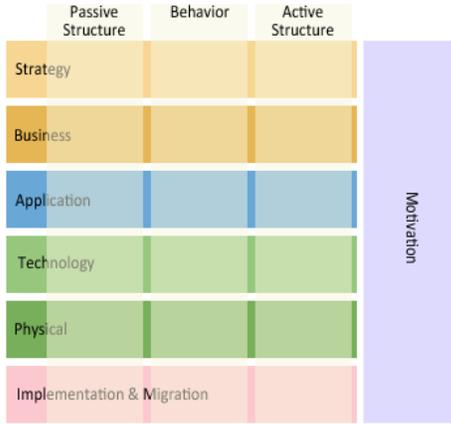


Figure 4. Archimate Generic Metamodel

This standard is the specification of the ArchiMate Enterprise Architecture modeling language, a visual language with a set of default iconography for describing, analyzing, and communicating many concerns of Enterprise Architectures as they change over time. The standard provides a set of entities and relationships with their corresponding iconography for the representation of Architecture Descriptions.

**Active structure elements** are the subjects that can perform behavior. These can be subdivided into internal active structure elements; i.e., the business actors, application components, nodes, etc., that realize this behavior, and external active structure elements; i.e., the interfaces that expose this behavior to the environment. An interface provides an external view on the service provider and hides its internal structure.

**Behavior elements** represent the dynamic aspects of the enterprise. Similar to active structure elements, behavior elements can be subdivided into internal behavior elements and external behavior elements; i.e., the services that are exposed to the environment.

**Passive structure elements** are structural elements that cannot perform behavior. Active structure elements can perform behavior on passive structure elements.

Several **motivation elements** are included in the language: stakeholder, value, meaning, driver, assessment, goal, outcome, principle, and requirement, which in turn have constraint as a subtype. The motivation elements address the way the Enterprise Architecture is aligned to its context, as described by these intentions.

### C. EAM Inputs for DTM Activities

Based on the descriptions in the EAM meta-models and the DTM literature, we analyzed for each DTM information need the extent to which it can be provided by EAM information. Throughout this analysis, we notice that some DTM information needs can be (almost) fully provided by EAM, some almost not. In figures 5 and 6 we provide the mapping results of strategy management activities.

In tables III and IV, we summarize the findings of the mapping process, focusing on the information needs for

strategy management activities that can be well supported (rated five during the analysis) by EAM and those that can be less supported (rated one or two during the analysis).

TABLE III. MAJOR INPUT OF “HR ACTIVITY” SUPPORTED BY EAM

Major support by EAM		
Benefits Organizational structure	Digital Strategy Digitally-modified business model	Organizational capabilities

TABLE IV. MINOR INPUT OF “HR ACTIVITY” SUPPORTED BY EAM

Minor support by EAM		
Digital drivers Customer needs Top line growth Predictive analysis	Customer touch points Digital Drivers Market information	Market trend Socially-informed knowledge

We based the initial finding on exploring if the meta-model elements contribute to providing the necessary DTM activity needs. This exposes some metamodel elements that are more important for DT support than others. In particular, knowledge about roles and processes is needed for almost half of all transformation activities that we identified. Sometimes they are explicitly requested (e.g. organizational structure), sometimes in combination with the general EAM elements like digital strategy language or drivers. Elements that are less often needed are constructs like IT-related elements such as physical application or infrastructures components.

It should be noted here, that all “strategy management activities” listed in tables 1 and 2, have at least one input that is not fully supported, or not at all supported by content elements that ArchiMate can provide.

## V. DISCUSSION

The findings show that EAM has a limited potential to support the management of DT from a strategy point of view. Our results further show that there are some information components that EAM can deliver with low efforts since the relevant information output exists explicitly and is maintained frequently (e.g. structures, goals or benefits). Other information inputs need more analysis and interpretation by the architects in order to be a valuable input to the requesting DTM activity (e.g. digital strategy).

Information ‘of strategy management activities’ that are well documented by EAM have some characteristics: First, they do not focus on individuals but cover an overall perspective (e.g. goals, structures of the enterprise). Activities that take a social and a narrower focus would be better supported by other disciplines like human-focused management or psychology (e.g. customer needs customer journey). Second, the information has a strong focus to the internal perspective of the enterprise; they are about the organizational processes, structures, etc. Thus, information that needs to be collected outside the company like digital drivers, enabling IT opportunities, market trends or top line growth unfilled by providers, etc. are not included in the current EAM practice.

DTM needs / EAM Inputs		Active structure			Behavior					
		Internal element	Collaboration	Interface	Internal behavior	Process	Function	Interaction	Service	event
Define Goals of the Digital Transformation and Establish Vision	Benefits									
	Customer needs									
	Organizational capabilities	x				x	x	x	x	x
	Organizational structures	x				x	x	x	x	x
	Top line growth									
	Customer touch points						x			
	Digital strategy									
Analyze Core Value Proposition of own Company	Digitally-modified business model						x			
	Digital Drivers									
	Market information									
	Predictive analysis									
	market trend									
	Socially-informed knowledge									

Figure 5. Results for DT Strategy management activities – part 1

DTM needs / EAM Inputs		Passive structure	Motivation element									Strategy element		
		Passive element	Value	Meaning	Driver	Assessment	Goal	Outcome	Principle	Requirement	Constraint	Capability	Resource	Course of action
Define Goals of the Digital Transformation and Establish Vision	Benefits		x	x	x	x	x	x	x		x			
	Customer needs						x			x				
	Organizational capabilities	x									x	x	x	
	Organizational structures	x									x	x	x	
	Top line growth				x									
	Customer touch points										x			
	Digital strategy		x	x	x	x	x	x	x	x			x	
Analyze Core Value Proposition of own Company	Digitally-modified business model						x		x		x	x	x	
	Digital Drivers				x		x							
	Market information				x									
	Predictive analysis													
	market trend				x									
	Socially-informed knowledge													

Figure 6. Results for DT Strategy management activities – part 2

Such external information is explicitly hard to collect for EAM (because of the limitations in the metamodels), and thus, should be rather piloted by other disciplines like marketing departments or special projects that sense for such needed information. Third, EAM mostly supports DTM activities that are based on explicit and formal requirements. Inputs that are related to society, trends (socially informed knowledge, market information) or predictive analysis are usually not supported and provided by EAM.

We note also that all ‘strategy management activities’ listed in tables I and II, have at least one input that is not fully supported, or not at all supported by content elements that ArchiMate can provide. Taking into account these theoretical finding, the identified disparity of EAM supply and DTM information demands surprises. We claim that one of reasons might be that the theoretical potentials of EAM are not yet apprehended in practice.

In addition, we have noticed that Archimate does not cover methodological element like “procedures or methods” that formalizes the method support and guidance which EAM could provide to manage DTM and strategy management issues. We would expect that enterprise architects can especially provide this input to the DTM because they are familiar with diverse methods and governance frameworks.

## VI. CONCLUSION

In this paper, we discussed which DTM activities EAM can support in relation to strategy management in the context of digital transformation endeavors. This work relies on and extends a previous study conducted by Labusch and Winter in 2013 [11]. Our contribution consists in generalizing the analysis that was made for Enterprise Transformation towards the specific issue of Digital Transformation. We contributed first with a detailed literature survey to identify DTM activities with a focus on strategic activities. Next, by adapting existing findings, we have defined the information inputs needed for these activities to understand, what DT is comprised of, and to provide a solid foundation for further research in the topic area. The results show that, in general, EAM is suited to support strategic management activities for Digital Transformation. Such activities have a strong focus on the internal perspective of the enterprise that is based on formal requirements (e.g., organizational structure).

Nevertheless, EAM lacks support when it comes to activities that need inputs from the environment (e.g., digital drivers, customer needs, etc.) or society, trends, or predictive aspects. We note some significant limitations: The metamodels reflect the information that EAM can provide but do not integrate specific potentials that EAM as an overall framework could additionally cover (e.g., project management, best practices, etc.). We dealt with this limitation by conducting several iterations during the Focus Group and by including additional EAM literature during the mapping procedure.

As future work, we intend to focus on the Enterprise Architecture Support to other activities (e.g., HR Management). We will also adapt our work [61], which proposes a new visual approach to support digital

transformations to take into account these highlighted weaknesses.

## REFERENCES

- [1] J. W. Ross, P. Weill, and D. Robertson, *Enterprise architecture as strategy: Creating a foundation for business execution*. Harvard Business Press, 2006.
- [2] D. Greefhorst and E. Proper, *Architecture Principles: The Cornerstones of Enterprise Architecture*. Berlin/Heidelberg: Springer, 2011.
- [3] R. Abraham, S. Aier, and N. Labusch, “Enterprise Architecture as a Means for Coordination – an Empirical Study on Actual and Potential Practice,” in *MCIS 2012 Proceedings*, AIS Electronic Library, 2012.
- [4] T. Tamm, P. B. Seddon, G. Shanks, and P. Reynolds, “How does enterprise architecture add value to organisations,” *Comm. of the AIS*, vol. 28, no. 1, pp. 141–168, 2011.
- [5] T. Asfaw, A. Bada, and F. Allario, “Enablers and challenges in using enterprise architecture concepts to drive transformation: Perspectives from Private Organizations and Federal Government Agencies,” *Journal of Enterprise Architecture*, vol. 5, no. 3, pp. 18–28, 2009.
- [6] W. B. Rouse, “A theory of enterprise transformation,” *Systems Engineering*, vol. 8, no. 4, pp. 279–295, 2005.
- [7] G. Westerman, C. Calm ejane, D. Bonnet, P. Ferraris, and A. McAfee, “Digital Transformation: A Roadmap for Billion-Dollar Organizations,” MIT Center for Digital Business and Capgemini Consulting, 2011.
- [8] M. M. Lankhorst, *Enterprise Architecture at Work: Modelling, Communication and Analysis*. Berlin/Heidelberg: Springer, 2017.
- [9] N. Labusch, “Information Requirements in Enterprise Transformations: An Enterprise Architecture Management Perspective,” PhD dissertation, University of St Gallen, Switzerland, 2015.
- [10] N. Labusch, S. Aier, M. Rothenberger, and R. Winter, “Architectural support of enterprise transformations: Insights from corporate practice,” in *Tagungsband Multikonferenz Wirtschaftsinformatik 2014*, 2014, pp. 1048–1060.
- [11] N. Labusch and R. Winter, “Towards A Conceptualization Of Architectural Support For Enterprise Transformation,” in *European Conference on IS (ECIS) Proceedings*, AIS Electronic Library, 2013.
- [12] E. Stolterman and A. C. Fors, “Information Technology and the Good Life,” in *Information Systems Research - Relevant Theory and Informed Practice*, B. Kaplan, D. P. Truex III, D. Wastell, A. T. Wood-Harper, and J. I. DeGross, Eds. Springer US, 2004, pp. 687–692.
- [13] A. Martin, “Digital Literacy for the Third Age: Sustaining Identity in an Uncertain World,” *eLearning Papers*, no. 12, pp. 1–15, 2009.
- [14] F. Harmsen, H. A. E. Proper, and N. Kok, “Informed Governance of Enterprise Transformations,” in *Advances in Enterprise Engineering II*, Berlin/Heidelberg, 2009, pp. 155–180.
- [15] F. Radeke, “Toward Understanding Enterprise Architecture Management’s Role in Strategic Change: Antecedents, Processes, Outcomes,” in *Wirtschaftsinformatik Proceedings 2011*, Zurich Switzerland, 2011.

- [16] R. Foorhuis, M. van Steenberg, N. Mushkudiani, W. Bruls, S. Brinkkemper, and R. Bos, "On Course, but Not There yet: Enterprise Architecture Conformance and Benefits in Systems Development," in *ICIS 2010 Proceedings*, AIS Electronic Library, 2010.
- [17] M. Lange, J. Mendling, and J. Recker, "Measuring the realization of benefits from enterprise architecture management," *Journal of Enterprise Architecture*, vol. 8, no. 2, pp. 30–44, 2012.
- [18] R. Winter, S. Townson, A. Uhl, N. Labusch, and J. Noack, "Enterprise architecture and transformation: The differences and the synergy potential of enterprise architecture and business transformation management," *360°-The Business Transformation Journal*, no. 5, pp. 22–31, 2012.
- [19] B. van Gils and H. A. Proper, "Enterprise Modelling in the Age of Digital Transformation," in *The Practice of Enterprise Modeling*, R. A. Buchmann, D. Karagiannis, and M. Kirikova, Eds. Springer International Publishing, 2018, pp. 257–273.
- [20] A. Fayoumi, "Toward an Adaptive Enterprise Modelling Platform," in *The Practice of Enterprise Modeling (PoEM)*, 2018, Springer Int. Publishing, pp. 362–371.
- [21] M. Pulkkinen, A. Naumenko, and K. Luostarinen, "Managing information security in a business network of machinery maintenance services business – Enterprise architecture as a coordination tool," *Journal of Systems and Software*, vol. 80, no. 10, pp. 1607–1620, 2007.
- [22] B. A. Kitchenham and S. Charters, "Guidelines for performing Systematic Literature Reviews in Software Engineering," Keele University, EBSE Technical Report EBSE-2007-01, 2007.
- [23] C. Okoli and K. Schabram, "A Guide to Conducting a Systematic Literature Review of Information Systems Research," *Sprouts: Working Papers on Information Systems*, vol. 10, no. 26, 2010.
- [24] S. K. Boell and D. Cecez-Kecmanovic, "On being 'systematic' in literature reviews," *Journal of Information Technology*, vol. 30, no. 2, pp. 161–173, 2015.
- [25] E. W. T. Ngai and F. K. T. Wat, "A literature review and classification of electronic commerce research," *Information & Management*, vol. 39, no. 5, pp. 415–429, Mar. 2002.
- [26] E. Henriette, M. Feki, and I. Boughzala, "The Shape of Digital Transformation: A Systematic Literature Review," in *MCIS 2015 Proceedings*, AIS Electronic Library, 2015.
- [27] The Open Group, "TOGAF® Version 9.1," 2009. [Online]. Available: <https://www.opengroup.org/togaf/>. [Accessed: 26-Jun-2016].
- [28] P. Bernus and O. Noran, "A Metamodel for Enterprise Architecture," in *Enterprise Architecture, Integration and Interoperability*, 2010, pp. 56–65.
- [29] Z. Chen and R. Pooley, "Requirement Analysis for Enterprise Information Systems-Developing an Ontological Meta-Model for Zackman Framework," *ICIS 2009 Proceedings*, AIS Electronic Library, 2009.
- [30] Department of Defense (DoD), "DoD Architecture Framework Version 2.02," 2012. [Online]. Available: [https://dodcio.defense.gov/Library/DoD-Architecture-Framework/dodaf20\\_dm2/](https://dodcio.defense.gov/Library/DoD-Architecture-Framework/dodaf20_dm2/). [Accessed: 03-Jun-2019].
- [31] IEEE, "1471-2000 - IEEE Recommended Practice for Architectural Description for Software-Intensive Systems." IEEE Computer Society, 2009.
- [32] F. Rabiee, "Focus-group interview and data analysis," *Proceedings of the Nutrition Society*, vol. 63, pp. 655–660, 2004.
- [33] T. Kotnour and T. R. Bollo, "Strategic management of a transformation in a multi-program technology program involving convergence and divergence of programs: observations from NASA," *Int. Journal of Technology Management*, vol. 53, no. 2–4, pp. 257–272, 2011.
- [34] J. Ward, T. Rennebaum, and S. Amling, "Value Management," in *A Handbook of Business Transformation Management Methodology*, A. Uhl and L. A. Gollenia, Eds. Routledge, 2016, pp. 85–112.
- [35] A. Uhl and L. A. Gollenia, Eds., *A Handbook of Business Transformation Management Methodology*. Routledge, 2016.
- [36] M. Rosemann, J. Recker, and N. Safrudin, "Program and Project Management Ronald Marketsmueller," in *A Handbook of Business Transformation Management Methodology*, A. Uhl and L. A. Gollenia, Eds. Routledge, 2016, pp. 217–244.
- [37] C. Pimmer, J. Haeffliger, and F. Blumer, "Competence and Training Management," in *A Handbook of Business Transformation Management Methodology*, A. Uhl and L. A. Gollenia, Eds. Routledge, 2016, pp. 227–244.
- [38] J. Caverlee, J. Bae, Q. Wu, L. Liu, C. Pu, and W. B. Rouse, "Workflow management for enterprise transformation," *Work, Workflow and Information Systems*, vol. 1, p. 61, 2007.
- [39] A. Hellström and J. Peterson, "Adopting Process Management—the importance of recognizing the organizational transformation," *Asian Journal on Quality*, vol. 7, no. 1, pp. 20–34, 2006.
- [40] C. N. Madu and C.-H. Kuei, "Strategic total quality management—transformation process overview," *Total Quality Management*, vol. 5, no. 5, pp. 255–266, 1994.
- [41] C. Ashurst and J. Hodges, "Exploring Business Transformation: The Challenges of Developing a Benefits Realization Capability," *Journal of Change Management*, vol. 10, no. 2, pp. 217–237, 2010.
- [42] C. G. Ash and J. M. Burn, "Assessing the benefits from e-business transformation through effective enterprise management," *European Journal of IS (EJIS)*, vol. 12, no. 4, pp. 297–308, 2003.
- [43] O. Kohnke, S. Reiche, and E. Balla, "Organizational Change Management," in *A Handbook of Business Transformation Management Methodology*, A. Uhl and L. A. Gollenia, Eds. Routledge, 2016, pp. 169–198.
- [44] S. Sitalaksmi and Y. Zhu, "The transformation of human resource management in Indonesian state-owned enterprises since the Asian Crisis," *Asia Pacific Business Review*, vol. 16, no. 1–2, pp. 37–57, 2010.
- [45] A. A. Armenakis, S. G. Harris, M. S. Cole, J. L. Fillmer, and D. R. Self, "A Top Management Team's Reactions to Organizational Transformation: The Diagnostic Benefits of Five Key Change Sentiments," *Journal of Change Management*, vol. 7, no. 3–4, pp. 273–290, 2007.
- [46] T. B. Lawrence, N. Malhotra, and T. Morris, "Episodic and Systemic Power in the Transformation of Professional Service Firms," *Journal of Management Studies*, vol. 49, no. 1, pp. 102–143, 2012.
- [47] A. Laukia, J. Lamberg, H. Tikkanen, and J. Aspara, "Strategic management of business model transformation: lessons from Nokia," *Management Decision*, vol. 49, no. 4, pp. 622–647, 2011.

- [48] H.-H. Teo, B. C. Y. Tan, and K.-K. Wei, "Organizational Transformation Using Electronic Data Interchange: The Case of TradeNet in Singapore," *Journal of MIS*, vol. 13, no. 4, pp. 139–165, 1997.
- [49] L. W. Fry, S. Vitucci, and M. Cedillo, "Spiritual leadership and army transformation: Theory, measurement, and establishing a baseline," *The Leadership Quarterly*, vol. 16, no. 5, pp. 835–862, 2005.
- [50] E. K. Clemons and I.-H. Hann, "Rosenbluth International: Strategic Transformation of a Successful Enterprise," *Journal of MIS*, vol. 16, no. 2, pp. 9–27, 1999.
- [51] G. E. Dehler and M. A. Welsh, "Spirituality and Organizational Transformation: Implications for the New Management Paradigm," *Journal of Managerial Psych*, vol. 9, no. 6, pp. 17–26, 1994.
- [52] E. M. Daniel and H. N. Wilson, "The role of dynamic capabilities in e-business transformation," *European Journal of IS (EJIS)*, vol. 12, no. 4, pp. 282–296, 2003.
- [53] K. Breu, "The Role and Relevance of Management Cultures in the Organizational Transformation Process," *International Studies of Management & Organization*, vol. 31, no. 2, pp. 28–47, 2001.
- [54] J. Cross, M. J. Earl, and J. L. Sampler, "Transformation of the IT Function at British Petroleum," *MIS Quarterly*, vol. 21, no. 4, pp. 401–423, 1997.
- [55] R. Swapna and K. g Raja, "Business Transformation Management- The Role of Talent Management with special reference to Service Sectors," *Advances In Management*, vol. 5, no. 2, 2012.
- [56] M. Beer, "The transformation of the human resource function: Resolving the tension between a traditional administrative and a new strategic role," *Human Resource Management*, vol. 36, no. 1, pp. 49–56, 1997.
- [57] P. I. Morgan and E. Ogbonna, "Subcultural dynamics in transformation: A multi-perspective study of healthcare professionals," *Human Relations*, vol. 61, no. 1, pp. 39–65, 2008.
- [58] E. Roskies, J. K. Liker, and D. B. Roitman, "Winners and losers: Employee perceptions of their company's technological transformation," *Journal of Organizational Behavior*, vol. 9, no. 2, pp. 123–137, 1988.
- [59] S. E. A. Dixon, K. E. Meyer, and M. Day, "Stages of Organizational Transformation in Transition Economies: A Dynamic Capabilities Approach," *Journal of Management Studies*, vol. 47, no. 3, pp. 416–436, 2010.
- [60] The Open Group, "ArchiMate® 2.1 Specification," 2017. [Online]. Available: <http://pubs.opengroup.org/architecture/archimate2-doc/>. [Accessed: 02-May-2019].
- [61] M. Hafsi and S. Assar, "Towards a Visual Modeling Approach to Manage the Impact of Digital Transformation on Information Systems," in *Proceedings of IEEE 20th Conference on Business Informatics (CBI)*, 2018, vol. 02, IEEE Comput. Soc. Press, pp. 21–31.