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ENTERPRISE ARCHITECTURE ARTIFACTS FACILITATING THE STRATEGY PLANNING PROCESS FOR DIGITAL TRANSFORMATIONS: A SYSTEMATIC LITERATURE REVIEW AND MULTIPLE CASE STUDY

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ABSTRACT

The exploitation of new value propositions enabled by disruptive digital technologies—also known as digital transformations—influences the configuration of people, processes, and technology in a firm and must be considered in the enterprise's strategy. Strategy planning, i.e., the process that determines strategy, is facilitated by enterprise architecture (EA). Hence, strategic plans are reflected in EA documents called artifacts. Our research identified fifteen EA artifacts that facilitate digital transformations' strategy planning process through a systematic literature review. Furthermore, a multiple case study in the financial services sector was carried out to verify our theoretical findings. The case organizations show a fragmented implementation of EA artifacts, with each organization having established its own, almost unique, way of using them. Only four of the theoretically conceptualized artifacts were found in all organizations. Moreover, two EA artifacts used in all case organizations were not included in our theoretical conceptualization. In combination with the empirical research, the systematic literature review leads to an improved understanding of EA artifacts and their use in the strategy planning process for digital transformations.

KEYWORDS

Enterprise Architecture, Digital Transformation, Strategy Planning, Multiple Case Study, Financial Services

1. INTRODUCTION

The complexity and volatility of today's business environments and the endless possibilities offered by new digital technologies impact organizational strategies in all industries, including financial services providers. To cope with this complex and volatile environment, and with the new digital technologies, practitioners and scholars suggest that organizations use digital transformation strategies (Hess *et al.*, 2016; Chanias, 2017; Gartner, 2019). Rogers (2016) even argues that digital transformation (DT) concerns strategy more than technology. If an organization is to integrate and exploit new digital technologies in its value propositions in response to digital disruption, it must leverage digital capabilities (Ross *et al*., 2019; Vial, 2019). These digital capabilities are delivered using digital technologies. Furthermore, new digital technologies, such as artificial intelligence, the Internet of Things, and cyber-physical technologies, present both game-changing opportunities and existential threats (Sebastian *et al*., 2017). DT is a process that aims to create new value propositions by triggering significant changes to the properties of an organization through combinations of information, computing, communication, and connectivity technologies (Vial, 2019). In other words, a DT defines value propositions enabled by the capabilities of digital technologies (Ross *et al*., 2019). The enterprise architecture (EA) is affected by strategic initiatives that utilize these technologies for DTs (Ahlemann *et al*., 2012). Therefore, EA practice attempts to bridge the gap between strategy planning and implementation efforts (Radeke, 2011; Bernard, 2012; Simon, Fischbach, and Schoder, 2014; Kotusev, 2018; Gong and Janssen, 2019). EA artifacts are used to facilitate transformations by describing the enterprise from an integrated business and IT perspective; they are the documents that describe the fundamental organization of an enterprise as a socio-technical system, along with the principles governing its design and development (Ahlemann *et al.*, 2012).

However, while to date EA has had a strong framework orientation. Consequently, very little is known about the 'real' practices that are used and followed, how well they fit their purposes, the challenges that arise, and how different stakeholders act in successful EA practice (Kotusev, 2018; Gong and Janssen, 2019). Moreover, our theoretical and practical understanding of how EA can be leveraged to create business value for firms remains limited (Van de Wetering, 2020). Popular frameworks, such as The Open Group Architecture Framework (TOGAF) (The Open Group, 2018) and the Department of Defense Architecture Framework (DoDAF) (United States Department of Defense [DoD], 2010) introduce EA artifacts but give no insight into which are fundamental for facilitating DTs.

A major problem seems to be the absence of empirically validated best practice for EA artifacts (Kotusev, 2018; Gong and Janssen, 2019). Kotusev (2018) essentially invalidates the conceptualization of EA as a set of business, information, application, and technology architectures or as a current state, future state, and transition roadmap. Framework conceptualizations such as TOGAF and DoDAF contradict empirical evidence from numerous established EA practices (Kotusev, 2018). Overall, few studies provide a clear, up-to-date description of EA artifacts—such as repositories, maps, objects, or models—and elucidate the use of these artifacts.

Additionally, there is a call for the reconceptualization of EA, with a focus on new, realistic models that align with genuine industry best practice (Kotusev, 2018) and fill the research gap on leveraging EA for DTs (Hafsi and Assar, 2016). Our research aims to understand which EA artifacts organizations use to support the strategy planning process for DTs. Moreover, we want

to identify the purposes for creating EA artifacts, and how they are used. Therefore, our research aims to explore and synthesize the current knowledge on EA artifacts that facilitate the DT strategy planning process. Thus, our research questions are as follows:

RQ1: What is currently known about the EA artifacts that facilitate the strategy planning process for digital transformations?

RQ2: Which EA artifacts facilitate the strategy planning process for digital transformations?

Thus, due to the lack of empirically validated best practices for EA artifacts and the research gap on leveraging EA artifacts for DTs, we employed an exploratory approach to answer our research questions. We analyzed popular EA sources, conducted a systematic literature review (SLR), and organized an expert session as an initial, empirical validation of the results of our synthesis of popular EA sources and the literature review. Additionally, we conducted a multiple case study of four financial services organizations to further deepen our understanding of the use of EA artifacts that facilitate the DT strategy planning process. This research builds upon our previous research (Grave, Van de Wetering and Kusters, 2021) and extends it with a multiple case study.

This article is structured as follows. First, in Section 2, we give further background information about our research subject, followed—in Section 3—by a description of the methodology for our study. We present and discuss the results of the SLR and expert session in Section 4. The multiple case study results are presented in Section 5, followed by a discussion of the results in Section 6. Finally, Section 7 presents our conclusions, limitations, and suggestions for future research.

2. BACKGROUND

EA is a collection of documents that describe an organization from an integrated business and IT perspective (Bernard, 2012; Kotusev, 2018). EA documentation, also known as EA artifacts, describes the EA in its current, future, or transitional state. These artifacts may contain principles, and they always serve a purpose (Bernard, 2012; Kotusev, 2018; The Open Group, 2018). Examples of EA artifacts include landscape diagrams, catalogs with principles, solution designs, and application/data matrixes. EA artifacts are the products of EA practice (Kotusev, 2018): An EA practice delivers EA artifacts to facilitate strategy planning, technology optimization, project delivery, and operations to achieve business-IT alignment (BITA) (Kotusev, 2018). We define BITA as a state where IT is applied in an appropriate and timely way (Luftman and Kempaiah, 2007). Thus, EA artifacts are used to align strategic business objectives with state-of-the-art technologies (Ross, Weill, and Robertson, 2006; Van de Wetering, 2020).

A business strategy aims to create future competitive advantage faster than the competitors (Johnson, Scholes, and Whittington, 2008). Generally, the strategic function is divided into strategy planning, strategy implementation, and strategy evaluation with the goal of the strategy planning process, in particular, being to formulate a long-term future course of action (Ahlemann *et al.*, 2012; Simon, Fischbach and Schoder, 2014; Kotusev, 2018).

EA-based capabilities are those that organize and use organization-specific resources to align strategic objectives with the use of technology (Kotusev, 2018; Van de Wetering, 2020). In other words, EA-based capabilities promote BITA, and do so by producing EA artifacts that facilitate decision-making on integrating data and standardizing processes, applications, and the IT infrastructure (Ross *et al.*, 2006; Van de Wetering, Kurnia, and Kotusev, 2020). Additionally, EA-based capabilities are a driver for new technological innovations in processes and products (Van de Wetering, Hendrickx, Brinkkemper, and Kurnia, 2021). However, DTs are concerned with changes that occur so rapidly that traditional EA-based capabilities cannot cope with them (Drews *et al.*, 2017). The current digital technologies and the DT era have created a marketplace that demands speed and flexibility (Ross *et al*., 2019), leading to an apparent tension between standardization and flexibility. For this reason, two types of EA-based capabilities have emerged: specifically, a traditional type and a fast type (Drews *et al*., 2017; Ross *et al*., 2019). Traditional type EA-based capabilities aim for operational excellence ensuring stable, secure operations of existing IT systems, while fast type EA-based capabilities aim for improved customer experience developing new value propositions enabled by digital technologies (Drews *et al.*, 2017; Sebastian *et al.*, 2017). However, it is unclear how DT changes the role of EA artifacts (Korhonen and Halén, 2017). Moreover, studies, such as that by Kotusev *et al.* (2020) find it implausible that EA is based on strategy.

3. METHOD

3.1 Systematic Literature Review and Card Sorting

In line with the breadth of our first research question, we used a broad range of sources to establish a list of EA artifacts that facilitate the DT strategy planning process. First, we analyzed popular EA sources; next, we performed a systematic literature review (SLR) and, finally, we organized a Metaplan session with experts to deepen our understanding of the literature review results. Our goal was to synthesize existing knowledge, identify gaps in the current research, and provide a background against which to appropriately position new research activity (Kitchenham, 2007) on EA artifacts that facilitate the strategy planning process for DTs.

As a starting point, we used the following popular EA sources: Zachman (1987), Spewak and Hill (1992), Van den Berg and Van Steenbergen (2004), Ross *et al*. (2006), DoD (2010), Bernard (2012), United States Office of Budget and Management [OMB] (2013), and The Open Group (2018). We analyzed these popular EA sources and synthesized twelve EA artifacts that we believe are relevant for the strategy planning process for DTs.

Following the analysis of these popular EA sources, we performed an SLR using online database searches of scientific databases, assuming that the major research results in books and reports are also described or referenced in scientific papers. We used the ACM Digital Library, AIS, EBSCO Host, IEEE Xplore, Science Direct, Springer Link, and Web of Science databases to perform our search. These seven databases provide access to many journals and publications with high ratings in ranking lists and include the essential articles from journals and proceedings. The AISeL database, for instance, focuses mainly on scholarly publications, and the contents of IEEE Xplore tend to be more focused on practice. We generated search terms based on the research question and then paired the search terms to create appropriate search strings. This led to the search strings “enterprise architecture” AND (“artifact” OR “document”), “enterprise

architecture" AND "strategic planning," "enterprise architecture" AND "digital transformation", and "digital transformation" AND "strategic planning." Finally, we performed a title search on the four strings in Google Scholar to determine whether we had covered all the relevant articles. The search was conducted between December 7, 2019, and December 13, 2019, and studies were selected through the following processes. First, we performed a search of the databases to identify relevant studies, searching in the title, keywords, and abstract fields, except in Google Scholar, where we searched only the titles. This search resulted in 1,080 articles for the next step in the process. Second, we removed duplicate studies. Third, we scanned all article titles for the likelihood of containing relevant information as described in the inclusion criteria and excluded irrelevant studies based on an analysis of their titles. We also excluded all titles not in English. Fourth, we excluded irrelevant studies based on an analysis of their abstracts, introductions, and conclusions: we scanned the abstracts, introductions, and conclusions of all the articles still included after the previous step for the likelihood of containing relevant information as described in the inclusion criteria. Fifth, we evaluated the selected studies based on a full-text read. Finally, we obtained the primary studies resulting from the fifth step and evaluated each paper, using the questions suggested by Mays and Pope (2000) to assess quality in qualitative research. Our explorative research aims to establish a set of EA artifacts that can be used to facilitate the strategy planning process for DT. Each paper was evaluated by reviewing the clarity of the research aims and objectives, research design, research process, data display regarding interpretations and conclusions, and appropriateness of the method. Finally, 39 articles remained after the quality assessment. From these 39 articles, we extracted the source and full references, the EA artifacts listed in the article, strategy planning process characteristics, and DT characteristics by identifying text segments related to the research questions. Next, we adapted the steps for thematic synthesis recommended by Cruzes and Dyba (2011) to analyze the extracted data: reading each article, then identifying specific text segments that could be relevant to our research question, labeling these segments, reducing overlap and translating the codes into themes. Finally, we analyzed the themes and linked them to the relevant theoretical theme families, i.e., strategy planning, DT, EA, and EA artifacts. The SLR did not produce any additional EA artifacts, but it did add to our understanding of the relationship between different EA artifacts and the strategy planning process for DTs.

As an initial empirical validation and further deepening our knowledge of EA artifacts, we conducted an expert session using the Metaplan method (Metaplan, 2009), a card-sorting technique based on group discussion that facilitates a structured classification process. The team that performed the Metaplan session comprised a full professor, an associate professor, two Ph.D. candidates, and three Master's students, all with considerable knowledge of EA. Before the session, we prepared a document to inform the participants of the goals of the session and give background information on the subject and the findings of the literature review. The session itself was divided into the following phases: (1) Describe the goal; (2) Present the findings of the literature review; (3) Brainstorm EA artifacts that facilitate strategy planning processes for DT; (4) Determine a final list of EA artifacts; (5) Recap and conclude. The Metaplan session resulted in the identification of three additional EA artifacts. We also agreed to rename one artifact in line with the participants' practical experience.

3.2 Multiple Case Study

Next to the Metaplan session, we conducted a multiple case study analyzing the use of EA artifacts for the strategy planning process of DTs. We employed a multiple case study at four large financial services providers headquartered in the Netherlands which allowed cross-case analysis (Yin, 2018).

The principal criterion for the selection of cases was that the organization had undertaken a DT project involving a redefinition of its value proposition. To ensure the homogeneity of results, we selected cases from one specific sector. Four (anonymous) financial services organizations participated in this study. We chose the financial services sector because it is highly dependent on digital technologies and has a relatively mature EA practice.

Following our research protocol, we gathered specific information through semi-structured interviews lasting approximately one hour each. The explorative character of our research resulted in interview questions that avoided being suggestive, so that the interviewee would not respond in a theoretically desirable manner. Through the interviews, we investigated how the strategy planning process for DTs occurred and which EA artifacts were used for what reason.

To strengthen the study reliability, we consulted employees with different roles, such as business executives, product owners, and architects. The interviews were transcribed, and the transcriptions were reviewed and validated by the interviewees. The data was analyzed through a series of readings followed by a combination of In Vivo and Process Coding (Saldaña, 2016). Codes were assigned to the pieces of text that represented important concepts and distinct responses from the interviewees. Two researchers independently analyzed the data to avoid bias and ambiguity. As suggested by Saldaña (2016), the data were conceptualized through a mapping process whereby themes were identified, appropriately analyzed, and then related. The concepts formed through this process were categorized and analyzed for common patterns between the organizations explored in this study. Triangulation with the documentation of the case organizations was carried out to enhance construct validity. The analysis of the four cases took place through the lens of the preliminary conceptualization that resulted from the SLR and Metaplan session.

4. SLR AND CARD SORTING RESULTS

4.1 EA Artifacts from Popular EA Sources

The list of EA artifacts that follows results from our analysis and synthesis of popular EA sources. We synthesized a total of 12 different EA artifacts that facilitate the strategy planning process for DTs and briefly describe their goals and uses here.

Future development will be affected by the anticipation of the emerging technologies, software/hardware products, and skills expected to be available within a given time frame. The purpose of the **technology and skills forecast** artifact is to facilitate a reduction in the dependence on legacy systems and technologies, to improve the technical efficiency and reliability of the IT landscape, to make use of newly available possibilities, and to provide input for SWOT analyses (DoD, 2010; Bernard, 2012; OMB, 2013; Kotusev, 2018).

A **SWOT analysis** is a view of the organization's position in terms of strengths, weaknesses, opportunities, and threats and provides a foundation for the strategic plan (Bernard, 2012; OMB, 2013). This analysis analyzes internal and external factors to determine the areas on which the enterprise should focus to exploit strengths and take advantage of opportunities, and the areas where the enterprise should reduce threats and weaknesses (Bernard, 2012).

A **strategic plan** is a document containing the mission, vision, and strategic goals of an organization (Zachman, 1987; Spewak and Hill, 1992; DoD, 2010; Bernard, 2012; OMB, 2013; Kotusev, 2018; The Open Group, 2018). The overall vision for transformational endeavors provides a strategic context for a DT with a high-level scope. Furthermore, the strategic plan ensures conceptual consistency between the general business and its IT components. It also presents the composition of and relationships between the different actors in the organization (organizational model), business drivers, and competitor analysis. Thus, the strategic plan provides input for a high-level operational concept and a business function development plan.

A **high-level operational concept** is a high-level graphical and/or textual description of the future state of the operational concept, including the organizational context, role, or other relationships among organizations (Zachman, 1987; Spewak and Hill, 1992; Van den Berg and Van Steenbergen, 2004; Ross *et al.*, 2006; DoD, 2010; Bernard, 2012; OMB, 2013; Kotusev, 2018; The Open Group, 2018). This is a one-page picture with a high-level view of processes, data, and technologies. It is used primarily to plan the implementation of new solutions and their integration into the current environment and is periodically updated to reflect the evolution of the organizational landscape—for example, after new IT systems are deployed. It provides a common context for discussions between business and IT leaders and facilitates strategic dialog and alignment. Furthermore, a high-level operational concept helps architects to understand, analyze, and modify the enterprise landscape structure.

A **capability development plan** provides a structured view of all the organization's business capabilities on a single page, sometimes together with other supporting information such as business strategy, objectives, main customers, and partners (Spewak and Hill, 1992; DoD, 2010; Kotusev, 2018; The Open Group, 2018). Its purpose is to facilitate the alignment of strategic business goals with the priorities for IT investment, thereby improving strategic business and IT alignment.

The purpose of an **operating model** is to determine the levels of business process integration and standardization necessary for delivering goods and services to customers (Ross *et al.*, 2006). The operating model describes how a company aspires to thrive and grow by providing a more stable and actionable view of the company than the strategy; it drives the design of the foundation for execution.

Common or infrastructural components are tackled by joint developments that deliver results in specific capabilities. To enable these, a form of overall enterprise architecture is needed in the form of an **enterprise portfolio** (Zachman, 1987; Spewak and Hill, 1992; Van den Berg and Van Steenbergen, 2004; Bernard, 2012; OMB, 2013; Kotusev, 2018; The Open Group, 2018). An enterprise portfolio provides information about the architecture as a whole, including the interrelations between the various components involved. This artifact aims to align developments based on their content, controlling the duplication and reuse of IT assets and facilitating analysis of the IT landscape and its overall organizational fitness.

A **conceptual data model** contains abstract definitions of the main data entities that are critical to an organization's business and relationships (Zachman, 1987; Spewak and Hill, 1992; DoD, 2010; Kotusev, 2018; The Open Group, 2018). This artifact aims to improve global data consistency and the uniform handling of information in all IT systems.

Principles and guidelines are high-level, global guidelines that influence all decision-making and planning in an organization, and IT-specific, implementation-level prescriptions applicable to narrow, technology-specific areas or domains (Kotusev, 2018; The Open Group, 2018). This artifact facilitates the reuse of proven best practices and reduces the overall technical complexity of the IT landscape. Additionally, principles and guidelines promote consistent approaches to IT and facilitate an improved conceptual homogeneity in IT-related decision-making.

A **security and privacy plan** provides both high-level and detailed descriptions of the security program applied throughout the enterprise (Bernard, 2012; OMB, 2013), including physical data, personnel, and operational security elements and procedures. It encompasses the agency's enterprise security and privacy programs, policies, and procedures and aims to improve security, compliance, and overall conceptual consistency.

A **stakeholder communication plan** is a plan that elaborates the "what, when, how, and by whom" of communicating the architecture, in order to facilitate correct, complete, and timely communication with all relevant stakeholders (Van den Berg and Van Steenbergen, 2004; The Open Group, 2018). Its purpose is to foster the effective communication of targeted information to the relevant stakeholders at the appropriate time.

A **technology standards list** is a list of all the technologies used in an organization. It includes generic reusable solutions to commonly occurring problems in the design of IT systems (Spewak and Hill, 1992; DoD, 2010; Bernard, 2012; OMB, 2013; Kotusev, 2018; The Open Group, 2018). This artifact aims to reduce technical risks, heterogeneity and complexity in the IT landscape, and improve technological consistency.

4.2 SLR Results

Although the SLR led to no additional EA artifacts, it did produce insights into the strategy planning process for DTs and its relationship to EA routines. We synthesized the strategic planning process for DTs based on Johnson *et al*. (2008), Ahlemann *et al*. (2012), Simon e*t al*. (2014), Chanias, Myers and Hess (2019), Ross *et al*. (2019) and Vial (2019). This process starts by sensing disruptions, then creates or adjusts the DT strategy and ends with conceptualizing DTs. In line with other scholars, we name these processes 'sensing', 'seizing', and 'transforming' (Teece, 2007; Shanks *et al.*, 2018; Van de Wetering, 2020). The EA routines are based on Drews *et al.* (2017), Korhonen and Halén (2017), Sebastian *et al.* (2017), and Chanias *et al*. (2019). Three EA routines facilitate the strategy planning process for DT. The first routine is surveillance, technology watch, and business watch. This process leverages technology to sense and make sense of information to support and facilitate a strategic response. This first EA routine is achieved through technology and business foresight, continuous supervision of signals, identification of events, data synthesis, and evaluation (Drews *et al.*, 2017; Korhonen and Halén, 2017). The overall process—surveillance, technology watch, and business watch—facilitates the sensing of disruptions and delivers input for creating or adjusting a DT strategy. The second EA routine comprises impact analysis and simulation. This process runs impact analyses and simulations on hypothetical change scenarios (Korhonen and Halén, 2017; Chanias *et al.*, 2019) and facilitates the design aspect of creating or adjusting a DT strategy and conceptualizing DTs. Finally, the third EA routine consists of distributed decision-making facilitation. Rules, guidelines, and principles support decision-making to make flexible use of promising and unexpected opportunities as they present themselves (Drews *et al.*, 2017; Korhonen and Halén, 2017; Sebastian *et al.*, 2017). This process facilitates decision-making in creating or adjusting a DT strategy and conceptualizing DTs.

4.3 Metaplan Session Results

The Metaplan session resulted in one change in the name of an EA artifact and three additional EA artifacts.

The participants of the Metaplan session agreed that, in practice, the term 'function' is more common than the term 'capability'. Therefore, we changed the name of the **capability development plan** to the **business function development plan**.

Furthermore, we added the **impact and risk assessment** EA artifact. New facts may come to light that invalidate existing aspects of the architecture, and this EA artifact assesses the current EA for identifying the changes that should be made and their implications in terms of impact and risks. Risks can be regarded as additional constraints on the architecture engagement, such as imminent organizational changes, other programs and initiatives running in parallel, or the use of unproven technology.

A **governance structure document** specifies decision-making responsibilities and accountability with the aim of encouraging desirable behavior (Ross *et al*., 2006). We did not recognize this EA artifact as relevant for the strategy planning process for DTs from our literature review. However, the participants in the Metaplan session proposed its inclusion because of the importance of transparency in decision making and accountability.

Finally, the **services and products overview** maps the lifecycle of each revenue-producing service or product that the enterprise produces, for business lines that support one or more phases of the service/product life cycle. We did not recognize this EA artifact as relevant for the strategy planning process for DTs as a result of our literature review. Nonetheless, the Metaplan session participants proposed its inclusion because it allows the enterprise to see where the vertical and horizontal (crosscutting) business service/product activities are located and helps define the ownership of these processes.

4.4 Preliminary Conceptualization

Following the SLR and Metaplan session, we constructed a preliminary conceptualization of EA artifacts facilitating the strategy planning process for DTs which is explained below.

A SWOT analysis and a technology and skills forecast can both help with sensing disruptions. Moreover, these two artifacts provide input for creating or adjusting a DT strategy.

Furthermore, the DT strategy, which is created in the DT strategy creation or adjustment sub-process as part of the strategy planning process, is assumed to consist of a strategic plan, a high-level operational concept, and a business function development plan. In addition, an impact and risk assessment helps to make explicit the impacts and risks of DTs. Those EA artifacts that are outputs of the DT strategy creation or adjustment sub-process guide developers by establishing boundaries. Moreover, these four artifacts are products of the impact analysis and simulation EA routine and provide input for the DT conceptualization sub-process within the strategy planning process.

Finally, the majority of the theoretically conceptualized EA artifacts facilitate distributed decision-making to enable development teams to conceptualize DTs. The enterprise portfolio facilitates alignment among different development teams. Principles and guidelines provide best practice and help to manage the complexity of the IT landscape. Additionally, the governance structure provides clarity on who can make particular decisions; the conceptual data model assures the enterprise-wide use of the correct data definitions; the security and privacy plan

defines the security and privacy rules to which the development team needs to adhere, and the services and product overview informs teams about who owns which services and or products.

Moreover, the technology standards provide a toolbox for developers to use, and the stakeholder's communications plan helps to involve the right stakeholders at the right time. Hence, all the EA artifacts from the distributed decision-making facilitation process contribute to enabling emergent, bottom-up strategic planning. Figure 1 shows our conceptualization of the EA artifacts, EA routines, and strategy planning process for DTs.

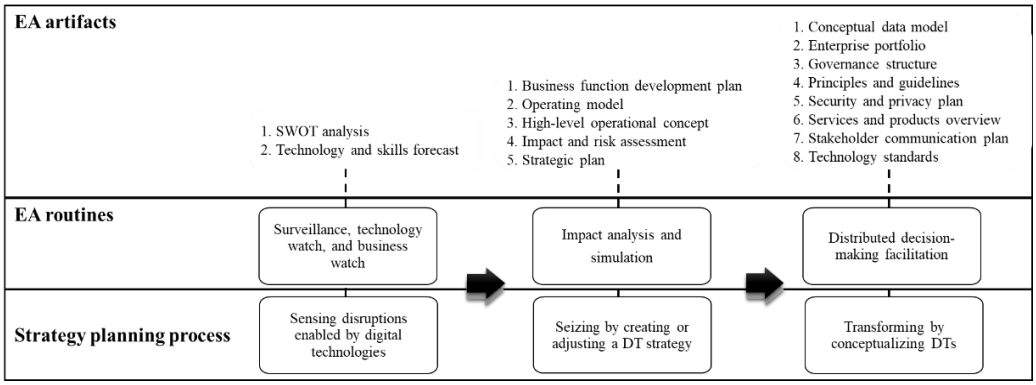

Figure 1. Preliminary conceptualization of EA artifacts, EA routines, and the strategy planning process

5. MULTIPLE CASE STUDY OUTCOMES

This section presents the four selected cases. All four case organizations—anonymized to organizations Alpha, Beta, Gamma, and Delta—belong to the financial services sector, in which DT disrupts the market. Digital technologies present considerable potential for the financial services sector, as demonstrated by new value propositions such as contactless payments, or the use of a banking app to contract a mortgage.

Organization Alpha is a publicly-traded financial services organization with more than 15,000 employees. Alpha is active in Australia, Asia, Europe, North America, and South America and, in 2020, had an operating income of almost 8 billion euros. We conducted a cross-analysis of six interviews and nine relevant EA artifacts at Alpha.

Beta is a financial services provider with a net income of 760 million euros and approximately 91 billion euros in assets under management in 2020. The organization employs 3,000 employees and operates in Asia, Europe, and North America. We conducted a cross-analysis of six interviews and more than twenty relevant EA artifacts at Beta.

Gamma is a financial services organization with more than 58,000 employees and a net income of approximately 17 billion euros in 2020. It is active in Asia, Europe, North America, South America, and Oceania. We conducted a cross-analysis of five interviews and seventeen relevant EA artifacts at Gamma.

Delta is a Dutch multinational financial services provider with an income of over 10 billion euros in 2020. It is active in Asia, Europe, North America, South America, and Oceania with a total of over 43,000 employees. We conducted a cross-analysis of seven interviews and ten relevant EA artifacts at Delta.

In order to be able to compare the four cases, EA artifacts with a different name having the same informational contents were aggregated into a single EA artifact. E.g., a business roadmap was found in most case organizations, however Alpha referred to that artifact as a high level roadmap, Beta referred to it as a strategic initiative roadmap, and Gamma referred to it as an integrated business roadmap. Table 1 shows the EA artifacts facilitating the strategy planning process for DT found in our four case organizations.

Table 1. EA artifacts facilitating strategy planning processes for digital transformation at Alpha, Beta, Gamma, and Delta

EA Artifact	*EA artifact description*	*Alpha*	*Beta*	*Gamma*	*Delta*
External and internal analysis	An analysis of market trends to sense opportunities and threads and an analysis of the internal organization to find strengths and weaknesses.		X	X	
SWOT analysis	A description of the areas on which the enterprise should focus to exploit strengths and take advantage of opportunities and areas where the enterprise should reduce threats and weaknesses.	X	X	X	X
Options assessment	An explicit assessment of strategic options provided by the SWOT analysis.		X		
Strategic plan	A document containing the mission, vision, and strategic goals of an organization.	X	X	X	X
Product portfolio	An overview of the products and services the organization offers.				X
Capability model	A structured view of all organizational business capabilities.	X	X	X	
Principles	High-level global guidelines that influence all decision-making and planning in an organization.	X	X		X
Future state architecture	A long-term vision with a time horizon of around 3 years containing the design of the enterprise architecture.	X	X	X	X
Current state architecture	The current design of the enterprise architecture.		X		
Business roadmap	A plan containing deliverables for the business.	X	X	X	
IT roadmap	A plan containing IT deliverables.	X	X	X	
Integrated business & IT roadmap	An integrated plan of business and IT deliverables.		X	X	X
Reference architecture	A generic architecture that provides guidelines and options for making decisions in the development of more specific architectures (The Open Group, 2018).	X			
Guidelines and standards	Standards and guidelines that prescribe the IT products that must or should be used for certain solutions.	X			X

EA Artifact	*EA artifact description*	*Alpha*	*Beta*	*Gamma*	*Delta*
Impact and risk analysis	A document that identifies the changes that should be made and their implications to identify the impacts and risks of an architectural adjustment.		X	X	X
Business case	The justification for an initiative, supported by data, such as a cost-benefit analysis.	X	X	X	X
Project start architecture	The architectural design of a specific initiative.	X			X

6. DISCUSSION

In this section, the four cases are compared and analyzed, based on the combined analysis of our empirical findings and our preliminary conceptualization. Table 2 provides a cross-case comparison, comparing our preliminary conceptualization with our empirical findings.

Table 2. Comparison of the preliminary conceptualized EA artifacts and the EA artifacts used in the strategy planning process for digital transformation in the case organizations

Preliminary conceptualized EA artifacts	*Alpha*	*Beta*	*Gamma*	*Delta*	*Total*
SWOT analysis	X	X	X	X	4
Technology and skills forecast			X		1
Business function development plan	X	X	X		3
Operating model					0
High-level operational concept					0
Impact and risk assessment		X	X	X	3
Strategic plan	X	X	X	X	4
Conceptual data model					0
Enterprise portfolio	X	X	X	X	4
Governance structure			X		1
Principles and guidelines	X	X	X	X	4
Security and privacy plan	X			X	2
Services and products overview				X	1
Stakeholder communication plan					0
Technology standards	X		X	X	3

The findings shown in Table 2 suggest a significant difference between theory and practice and between EA routines in different EA practices. Only four of our fifteen conceptualized EA artifacts were found in all the case organizations. Additionally, all four organizations used a business case and roadmap as EA artifacts, which were not included in our preliminary conceptualization. These findings extend those of Kotusev (2019), confirming that the practical use of EA artifacts is markedly different from the use prescribed by EA frameworks, such as TOGAF. Hence, generalizing our findings from the empirical findings results in the pattern shown in Figure 2.

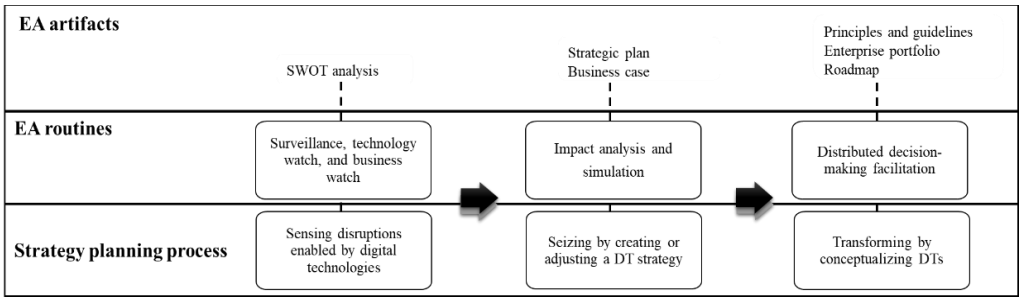

Figure 2. Empirically generalized conceptualization of EA artifacts, EA routines, and the strategy planning process

In all cases we found that the strategy planning process for DTs starts with sensing disruptions enabled by digital technologies, followed by the process of seizing opportunities and dealing with threats, and ends with transforming by conceptualizing DTs. A SWOT analysis includes possibilities enabled by new digital technologies and facilitates sensing disruptions. The creation or adjustment of a DT strategy is documented in a strategic plan. Moreover, transformation and the conceptualization of DTs is facilitated by principles and guidelines, an enterprise portfolio, a roadmap and business cases.

The findings of the empirical research allow for an extension of the preliminary conceptualization shown in Figure 1 of Section 4. All case organizations used a roadmap and a business case in the strategy planning process for DTs. Therefore, we extended our preliminary conceptualization with these artifacts. Furthermore, in the three cases in which we found a business function development plan, these plans were all called a capability development plan. Hence, we renamed the business function development plan back to its original name that we found on the basis of our analysis of popular EA sources, namely the capability development plan. The adjustments based on the findings of the multiple case study have been incorporated into the conceptual model shown in Figure 3.

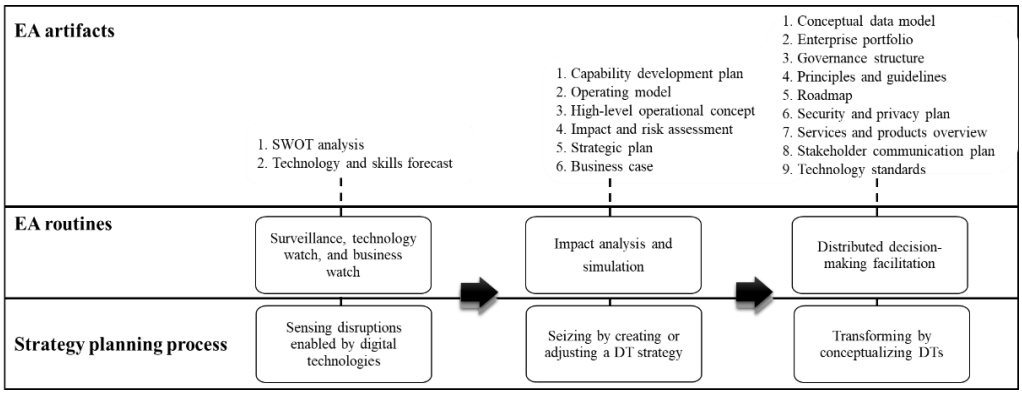

Figure 3. Extended conceptualization of EA artifacts, EA routines, and the strategy planning process

Another finding from our study was ambiguity surrounding the definition of EA artifacts. Enterprise architects do not create artifacts such as a strategic plan and a SWOT analysis. Although enterprise architects provide input for these documents, they are not responsible or

accountable for them. A more complete definition of an EA artifact than the one presented in the introduction would be that EA artifacts are documents that describe the current, future, or transitional EA, along with the principles governing its design and development to optimize BITA. Hence, EA artifacts aim to document decisions that achieve optimal functional integration between business and IT, and achieve optimal strategic fit between strategies and the infrastructure and processes of organizational and information systems. Therefore, artifacts such as strategic plans are not EA artifacts although they may serve as input for them. Enterprise architects need to gather a range of information in making an EA design and strategic goals are one type of information necessary to assess and explain how an EA design helps to achieve strategic goals. However, the current state of EA could limit strategic possibilities; therefore, enterprise architects provide input into the strategy planning process with EA information. This study, therefore, indicates that the use and value of EA artifacts need further investigation.

7. CONCLUSION

7.1 Theoretical and Practical Implications

This study explored EA artifacts that facilitate strategy planning processes for DTs using an SLR and multiple case studies. EA seems to be a practical and theoretical field of interest, popular in both the scientific and popular press, and a hot topic on the agenda of many CIOs. The EA function has become a must-have function in facilitating the strategy planning process because business and IT strategies can no longer be seen as separate due to the integration of IT in almost all business models. Our research contributes in various ways to the accumulation of scientific knowledge on EA.

First, a literature review was conducted to find out what is currently known about the EA artifacts facilitating strategic planning processes for DTs. This study contributes by synthesizing a large number of sources into one conceptual model. We identified fifteen EA artifacts, namely: *a SWOT analysis, a technology and skills forecast, a business function development plan, an operating model, a high-level operational concept, an impact and risk assessment, a strategic plan, a conceptual data model, an enterprise portfolio, a governance structure, principles and guidelines, a security and privacy plan, a services and products overview, a stakeholder communication plan, and technology standards.*

Second, we derived a strategy planning process for DTs and related that process to the EA artifacts. This process starts with sensing disruptions, followed by creating or adjusting the DT strategy and ends with conceptualizing DTs. These findings extend those of Kotusev (2019), by explicitly relating EA artifacts and EA routines to the strategy planning process for DTs.

Third, the theoretically synthesized EA artifacts were empirically investigated through a multiple case study within the financial services sector. The EA artifacts we obtained from our cases show that the practice of EA artifacts in reality is as fragmented as the theory. Only four of the fifteen EA artifacts we expected from our preliminary conceptualization were found in all four case organizations, indicating that the 'real' practice deviates substantially from theoretically conceptualized prescriptions. Moreover, all four case organizations used a business case and roadmap as EA artifacts, which we had not included in our conceptual model. Therefore, given the consistency of the use of these EA artifacts, we expanded our conceptual model with these two EA artifacts.

Finally, the definition of EA artifacts was found to be ambiguous. Artifacts such as a strategic plan and a SWOT analysis do not fall within the responsibilities or accountability of the enterprise architect and would perhaps, therefore, be better not labeled EA artifacts. However, components of those artifacts are essential in designing the EA, and the EA may be used as input for the strategic plan and SWOT analysis. Future research should investigate the building blocks or information components of EA artifacts and the value they create.

Our study contributes to providing an improved managerial understanding of EA artifacts and their role in the strategy planning process for DTs. We found that in practice organizations sense disruptions by developing a SWOT, seize opportunities and deal with threats by adjusting or creating a strategic DT plan, and transform by conceptualizing DTs using principles, an enterprise portfolio, a roadmap and a business case. Organizations wishing to improve their EA function to facilitate the strategy planning process may use these findings to build effective EA routines. More specifically, our conceptualization combined with our empirical findings may help identify improvements on a path towards continuously optimizing BITA.

7.2 Limitations and Future Research

This study has some limitations. Since the four cases are all within the financial services sector and concern large organizations headquartered in the Netherlands, the generalizability of our findings across other situations cannot be ensured. Exploring how EA artifacts facilitate the strategy planning process for DT across other sectors, organization sizes, and geographical locations would allow for a more comprehensive insight. Furthermore, we have not clearly investigated the value of EA artifacts.

The empirical findings shed some light on the differences in EA practice between organizations. Future studies should focus on systematically synthesizing how EA artifacts or their building blocks are used in best practice. This will further increase knowledge of the success factors in EA artifacts and thereby help managers to build effective EA routines.

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