

From Business Strategy to Enterprise Architecture and Back

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Abstract— The environment of organizations is changing more rapidly in recent years, which makes it increasingly more difficult to stay competitive. Organizations need to ensure that when they make transformations, they focus on maintaining and improving their strategic alignment. Strategic alignment is a process of continuous change which focuses on creating a synergy between the position of the organization within the competitive environment and the design of the appropriate structure to support its execution. However, while many developments have been made over the past few decades, there are still some areas which could benefit from further research. One such example is relating high-level strategic information and plans to the detailed enterprise architecture (EA) of an organization. Therefore, in this paper, we choose to explore how several of the most popular strategy techniques can be modeled with the help of concepts from the EA modeling language ArchiMate, in the context of the strategy process. Additionally, we introduce the software tool which was developed to support the modeling of these strategy techniques with the EA modeling language ArchiMate.

Keywords— *Strategic alignment; Strategy process; ArchiMate; TOGAF ADM; Business Model Canvas; Balanced Scorecard; SWOT analysis; PESTEL analysis; Software tool.*

I. INTRODUCTION

The external environment of organizations is becoming more competitive due to radical innovation brought by start-ups and the globalization of markets [1]. This, combined with constant technological advancements (e.g.: Big data, Internet of things, Blockchain, Artificial intelligence) creates a more dynamic and unstable environment for organizations. To keep pace with these developments, organizations need to design and implement planned change at a quicker rate [2]. Organizations that rely on past success and persist with strategies that have worked previously have shown a decline in performance in situations of radical environmental change [3].

Therefore, they need to be able to successfully manage the various aspects of defining and implementing new strategies and business models. [4] argues that strategy formulation and implementation are equally important and that there should not be an established precedence between the two, as they should be intertwined. This is also known as strategic alignment, namely the ability of an organization to create synergy between its position within the competitive environment and the design of the appropriate structure to support the execution [5]. This should be done in such a way that a strategy is developed while

considering the supporting structure and that operational goals and actions are in line with the overall strategy.

Over the years, many theories, techniques and methods have been introduced to support strategy formulation, be it in a deliberate or emergent manner. Some examples of popular techniques are the Business Model Canvas (BMC) [6], SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis [7], Dynamic capabilities [8], etc. While much progress has been made on this front, strategy implementation has seen far less attention from researchers [9]. This can be considered a critical issue since studies have shown that between 50% and 90% of organizations consider that they experience problems with implementing strategies [10-12].

One recent development that could support strategy implementation is the Enterprise Architecture (EA) discipline, defined as an approach to plan and manage organizational change. However, in its current form, EA still has a predominant IT focus: strategy related aspects have been only recently added to the field of EA [13-15], with only a rather limited number of aspects relating to strategy. Therefore, we argue that if the relationship between EA and business strategy can be reinforced, the ability of organizations to achieve strategic alignment by using EA to formulate and implement new strategies and business models can be greatly improved.

To address this, we propose a method to relate several strategy techniques which are used by organizations to formulate their business strategy to the TOGAF Architecture Development Method (ADM) and the ArchiMate modeling language which is used to design and manage EAs. While some studies have already explored ways to relate strategy concepts or techniques to EA (as detailed in Section II.C), they either mainly focus on just one technique or make use of an older version of the ArchiMate standard¹. Additionally, we also develop an ArchiMate-based software tool to support the transition from business strategy to EA models and vice-versa.

The current work includes the following novel contributions. First, we clearly position the TOGAF ADM within the strategy development process and relate it to several well-known strategy formulation and implementation steps. This clarifies the strategic role of EA in organizations. Second,

¹ The distinction between the latest and older version of ArchiMate is essential as far as the modelling of strategic aspects is concerned, as the so-called “strategy extension” was added in the last version of the standard.

we provide a clear mapping between several popular strategy techniques to elements of the ArchiMate standard. This makes possible the integration of strategic aspects in EA models, and thus links strategy to architectural transformation. Third, it provides a formal approach to strategy formulation in which decisions are made and documented in a structured manner. By using this information as a basis for ArchiMate models, inconsistencies and missing information are easier to identify. Lastly, the proposed method is accompanied by a software tool supporting the execution of the various method steps and providing supplementary functionality.

The research methodology we follow in this study is Design Science (DS) by [16], which we also use to shape the structure of the paper. Thus, Section 2 covers the literature that constitutes the theoretical foundation for our paper, identifies the problem to be addressed and defines requirements for a solution (steps 1 and 2 of DS). In section 3, we introduce and illustrate our method by means of a sample case, which covers DS's steps 3 and 4. In section 4, we briefly discuss the evaluation of our method (step 5 of the DS). We conclude the paper with section 5, by discussing some limitations of this research and giving pointers to future work.

II. BACKGROUND AND RELATED WORK

Within this section, we detail the results of our literature review with a focus on the research regarding the strategy process, strategy techniques, EA, and related studies.

A. Strategy process and strategy techniques

The strategy process is often divided into two main phases, namely, strategy formulation and strategy implementation. Strategy formulation has been the focus on many studies over the years, which has led to its further specification in several steps, such as: defining a clear mission and goals; analyzing the internal and external environment; evaluating alternatives based on scenarios; formulating strategies in line with the mission, vision, and business model; detailing the chosen strategy into objectives, expected results, and plans; evaluating and controlling the implementation [17-21]. In terms of strategy implementation, when looking at EA, we can consider the TOGAF ADM iteration cycles as strategy implementation steps: implementation design (based on architecture development cycle), business transformation planning (based on transition planning cycle), and governance of the implementation (based on architecture governance cycle) [22].

Throughout the years, a myriad of tools and techniques have been created for the sole purpose of helping managers master the strategy process [23]. We investigated which ones are considered by practitioners as useful, and therefore, are applied in their organizations [12]. The results indicate that strategy techniques, such as SWOT analysis, Balanced Scorecard (BSC), PESTEL (Political, Economic, Socio-cultural, Technological, Environmental, Legal) analysis, Scenario planning, BMC, Environmental analysis, etc. [12, 19, 24, 25] are recognized as very helpful in streamlining strategy development and execution [23]. Therefore, for the purpose of our paper, we choose to focus on the following strategy

techniques: BMC, PESTEL analysis, Porter's Five Forces, SWOT analysis, TOWS (Threats, Opportunities, Weaknesses, Strengths) matrix, Strategy map and BSC.

B. ArchiMate language

ArchiMate is a language used to model and describe EAs, as well as their motivation and rationale [26]. Its ultimate purpose is to model the structure of an organization, with the help of several elements: Strategy elements (courses of action, capabilities and resources which can be used to model the strategy of an organization); Business elements (products and services offered to customers, the business processes that help create them, the actors that took part in the processes, etc.); Application elements (applications, application services, data objects, etc. which support the business); Technology elements (infrastructure nodes, devices, software, etc. that support the applications); Physical elements (facilities, equipment, distribution networks and materials); Implementation and migration elements (programs, portfolios, project management, and plateaus that can be used in gap analysis); Motivation elements (goals, requirements, drivers, stakeholders, etc. that can be used to model the motivation behind organizational change). However, not all the elements of the ArchiMate language are necessary for the modeling of the strategy and planning techniques defined in the previous section. For many of these techniques Strategy, Motivation and some Business elements are sufficient. TABLE I presents the mapping between the strategy techniques and ArchiMate concepts, partially based on the papers by [14, 27]. This mapping is used as a basis for the implementation of the strategy techniques in the software tool we have developed (Section IV).

TABLE I. MAPPING OF STRATEGY TECHNIQUES TO ARCHIMATE

ARCHIMATE CONCEPTS STRATEGY TECHNIQUES	GOAL	C. OF ACTION	PRINCIPLE	CAPABILITY	RESOURCE	ACTOR	ROLE/STAKEHOLDER	VALUE	OUTCOME	INTERFACE	COLLABORATION	ASSESSMENT	DRIVER	METRIC	PRODUCT	SERVICE
Vision	x															
Mission		x														
Organiz. values			x													
BMC				x	x	x	x	x	x	x	x				x	x
SWOT												x				
PESTEL												x				
Porter's 5F												x				
TOWS		x														
Strategy map	x															
BSC	x	x													x	
Capability map				x												

C. Related work

[28] have proposed a method for supporting the strategy process which combines aspects of strategic management literature and EA. We extend this approach in our current work by addressing some of its main limitations, such as, strategy execution not being detailed at the same level as strategy formulation (one phase versus eight phases), lack of a detailed conceptual mapping between the strategy techniques and the ArchiMate language, and the use of the ArchiMate 2.1

version of the standard (NB: this version does not include strategy elements).

In the strategic management literature, several scholars have studied adaptations of existing strategy techniques and methods to include IT aspects. For example, [29] developed an adaptation of the Balanced Scorecard (BSC) to include IT measurements and extend the coverage of the IT domain. Another example is the work of [30], that define a model transformation between the Business Model Canvas (BMC) and the EA modeling language ArchiMate.

From an EA perspective, [31] suggest that the discipline's development to incorporate strategic aspects can be seen as a way to improve strategic alignment. Therefore, it comes as no surprise that in the past few years several studies have focused on extensions of some facets of EA, reflected by the evolution of the ArchiMate modelling language standard. Thus, academic research has led to the extension of the ArchiMate language with concepts describing motivations (e.g., goal, requirement, driver, etc.; [32]) and strategic aspects (e.g. resource and capability; [13, 33]). Both the Motivation extension and the Strategy extension have become official parts of the ArchiMate language specification as of 2013 and 2016 respectively.

Other relevant studies are the ones of [34] which define a model transformation between the BMC and ArchiMate language, [15] which propose a mapping of several strategy concepts to the ArchiMate language, and [27] which relates several strategy techniques to the ArchiMate language (including the BSC, SWOT analysis, BMC, etc.). While these studies consider similar aspects, they either focus on a limited number of strategy techniques or use aspects of the ArchiMate language in order to relate the strategy techniques to each other, rather than a complete integration to the ArchiMate language.

Besides studies combining strategy techniques and EA, we have considered research concerning Capability-based planning (CBP). The main motivation for this is that capabilities are seen as means to improve strategic alignment [33, 35]. This view is in line with Strategic management literature which argues that Capabilities are a means for organizations to gain and maintain a competitive advantage in a turbulent environment [8]. Furthermore, it reflects the current developments in EA, with TOGAF including a chapter on CBP, and the ArchiMate language introducing the concept in their latest specification.

III. MODELING STRATEGY TECHNIQUES WITH ARCHIMATE

To illustrate how to go from business strategy to EA and back, we refer to the steps of the strategy process (Fig. 1), determined based on the paper by [28] which details several strategy formulation steps in relation with strategy techniques and EA, and the iteration cycles of the TOGAF ADM which cover three strategy implementation steps, as detailed in literature review of Section II.A.

To demonstrate the modeling involved in strategic alignment, and their relation to EA we use the case of the ArchiPharma organization. ArchiPharma is a large international pharmaceutical organization (anonymized here due to confidentiality reasons) with offices in New York, London, and Amsterdam. ArchiPharma is the result of many mergers and

take-overs. ArchiPharma's management is aware of the necessity to continuously change and improve to reach the vision of becoming the leading provider of pharmaceutical services in the world. To realize it, the organization shifted from a focus on product leadership to a focus on operational excellence with product leadership still present in the background. The main issues the organization is facing are compliance with many governmental regulations which change regularly, and operational inefficiencies influencing interactions with customers. To deal with these issues, ArchiPharma is planning a large transformation.

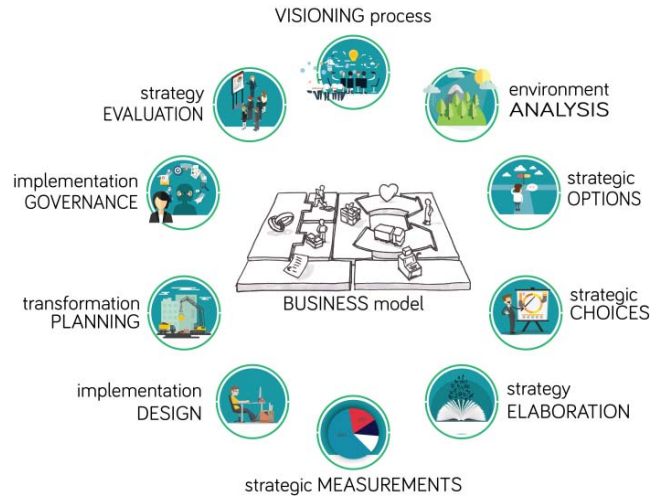


Fig. 1. Steps of the strategy process

A. Visioning process

This process entails defining clear organizational values (the core philosophy of an organization), a mission (what an organization does), and a vision (what an organization wants to achieve in the future) that would help the organization stay on track. This phase is usually performed by top management and is essential for establishing the core of why an organization exists and what it should accomplish in the future. The visioning process phase is specific to Strategic management but can provide valuable insights and guidelines for designing and transforming an organization, both of which are core aspects of EA. To model these aspects, we consider the guidelines by [15] to model the vision of the organization by using the ArchiMate Goal concept, and the Organizational Values with the help of the Value concept. However, we consider that the new Course of action concept introduced in the ArchiMate 3.0 version of the language is more suitable to model the Mission of the organization, which is also in line with the Business Motivation Model by [36]. Additionally, while the paper by [15] argues that organizational value should be modeled using the concept of Value, we consider that Value is more suitable to model the value of business services and products to a stakeholder [37]. Thus, we choose to use the concept of Principle to model organizational value, as it is intended to be used to define guidelines for behavior, similar to organizational values, as can be seen in Fig. 2.

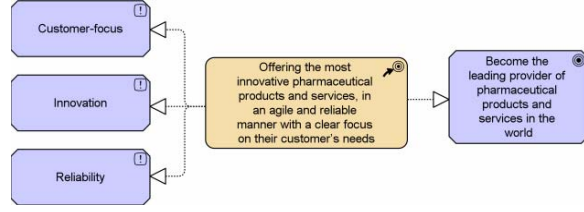


Fig. 2. Mission, Vision and Values

B. Business Model

The business model is a high-level expression of how an organization is structured. It describes how an organization creates, delivers, and captures value [6]. The business model of an organization should be in line with their mission, vision, and values. There are several viable strategy techniques that can be used to support business modelling. One of the most popular ones is the BMC. The BMC can be used as a shared language for describing, visualizing, assessing, and changing business models [6]. The concepts of the BMC can be related to the EA of an organization, according to guidelines provided by [34].

However, we build upon this initial mapping by not including several concepts which we consider to not be a complete match (e.g.: Goal concept to model the Value proposition, Contract concept to model Key partners, etc.), and by adding the possibility to use new concepts included in the ArchiMate 3.0 version of the specification (e.g.: Outcome concept to model Cost structure and Revenue streams). Fig. 3 illustrates the BMC of ArchiPharma, modeled with the help of ArchiMate concepts. The relations included in Fig. 3 illustrate one of the main benefits of mapping these kinds of strategy techniques to the ArchiMate language, namely that it facilitates a more detailed insight into the intricate relations and dependencies between the different aspects of a business model.

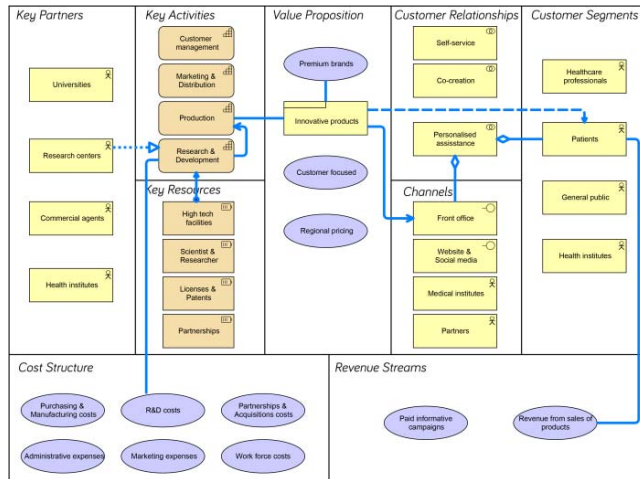


Fig. 3. Business Model Canvas with ArchiMate concepts

Since the information filled in the BMC is done with the help of the ArchiMate language concepts, from this we can generate a normal ArchiMate model, as can be seen in Fig. 4.

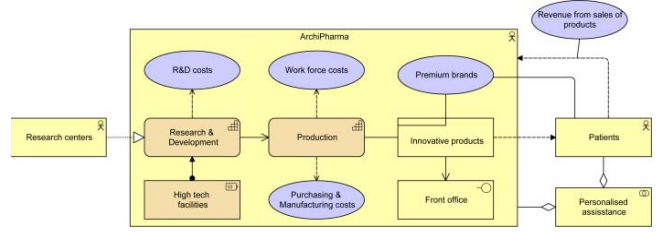


Fig. 4. ArchiMate model based on BMC information

C. Environmental analysis

There are several strategy techniques which deal with evaluating the environment of an organization. The PESTEL analysis (or any of its variations) is a popular technique which is used to assess the macro-environment of an organization from the point of view of several types of factors, such as political, economic, socio-cultural, technological, environmental, legal, etc. [19]. The Five Forces of Porter [38] is another famous technique which can be used to assess the position of the organization within its market and industry. In terms of the ArchiMate language, the factors can be modeled with the help of the Driver concept, while their assessment can be modeled with the help of the Assessment concept.

The SWOT analysis is one of the most popular strategy techniques that organizations can use for analyzing both their internal (strengths and weaknesses) and external (opportunities and threats) environments [7]. The analyses produced with the help of the PEST analysis, Porter's Five Forces can be included in the SWOT analysis as part of opportunities and threats quadrants. Fig. 5 illustrates how the SWOT analysis can be modeled with the help of the ArchiMate Assessment concept. The two concepts which can be seen at the top of Fig. 5 are intended to showcase the relationship between the assessments which can be done with a SWOT analysis, and the actual concepts which are analyzed (e.g.: key resources and capabilities identified with the help of the BMC in Fig. 3).

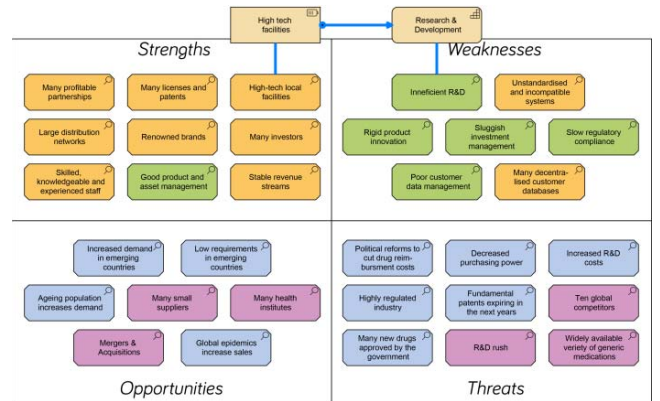


Fig. 5. SWOT analysis with ArchiMate concepts

D. Strategic options

[39] argues that alternative strategies can be defined by combining the strengths (S), weaknesses (W), opportunities (O), and threats (T) of an organization which resulted from a SWOT analysis. This suggested approach overlaps with the ideas of the Confrontation Matrix, also known as TOWS matrix

[40]. The TOWS matrix facilitates the formulation of several types of alternative strategies (SO, ST, WO, and WT) based on SWOT analysis. In the case of ArchiPharma, the organization has three alternative strategies, formulated based on factors from their internal and external environment. For each of these strategies, with the help of CBP, we can determine which capabilities and resources are needed to realize them. Fig. 6 illustrates some examples of alternative strategies, defined with the help of the TOWS matrix. Fig. 6 also shows how the capabilities and resources of an organization can be related to strategies defined in the TOWS matrix.

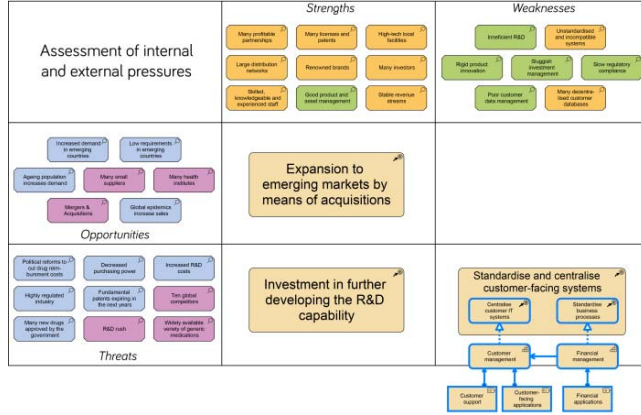


Fig. 6. TOWS matrix with ArchiMate concepts

From an EA point of view, it can help to consider inside-out types of alternative strategies which can be linked to the internal perspective of SWOT and TOWS. Therefore, an organization can formulate strategies that take advantage of its underlying strengths or that improve on certain weaknesses.

E. Strategic choices

The main goal of this phase is to determine the best course of action for an organization, based on its available strategic alternatives. [39] has suggested that alternative strategies should be evaluated based on the best match of opportunities and capabilities. One technique focusing on the high-level assessment of organizational capabilities is the capability map [33]. This technique can help organizations assess the impact of the transformation (e.g.: high, medium, or low) caused by the implementation of each strategic alternative on the capabilities of the organization. Figure 5 illustrates with the help of an excerpt from the capability map of ArchiPharma, how its capabilities are impacted, based on the selected strategy.

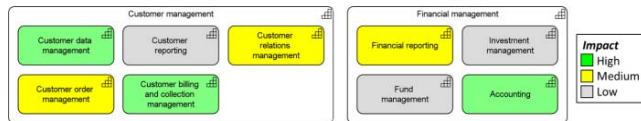


Fig. 7. Capabilities impacted by strategies

Complementary, an organization can make a more in-depth impact analysis with the help of EA, especially analyzing the impact strategy choices have on the business processes, systems, infrastructure, etc. Essentially, each alternative strategy will affect the architecture of an organization in a different way and can be a reason for choosing one strategy

above another. For example, for an organization that does not want to undergo a big transformation, a strategy that is related to minor changes in the EA might be chosen above an alternative which implies big changes. Furthermore, the costs involved to upgrade the infrastructure might be overlooked when neglecting to involve EA.

F. Strategy elaboration

In this phase, the strategy(s) that has been chosen is specified into achievable objectives. [41] propose that strategy should be specified into objectives linked by cause-and-effect relationships to improve clarity and focus, and possibly also strategic alignment. The Strategy map is one of the strategy techniques that can support the specification of strategy into objectives which are grouped into four perspectives: financial, customer, internal, and learning and growth [41]. These perspectives are the same ones which are used in the BSC. In terms of the ArchiMate language, these objectives can be modeled with the help of the Goal concept, and the relations between them can be modeled by using the Influence relation (Fig. 8).

These objectives can be used as a starting point to determine the architectural vision of the organization, which corresponds to phase A of the TOGAF ADM standard. Based on this information, the enterprise architect can start preparing their vision for the enterprise transformation that will enable the realization of the business objectives. At this point, the relevant stakeholders should also be identified.

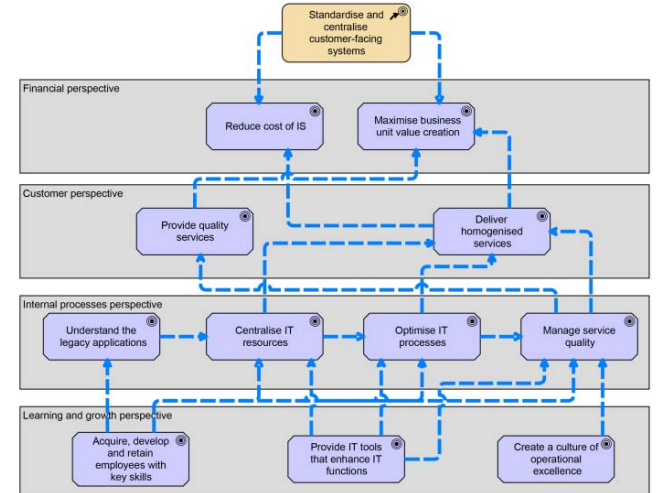


Fig. 8. Strategy map with ArchiMate concepts

G. Strategic measurements

The purpose of this phase is to determine the key performance indicators which can be used to monitor the performance of the strategy implementation and to evaluate the result of the implementation [21]. Furthermore, in this phase, the strategic objectives of an organization are specified into traceable and implementable initiatives. To this end, the BSC [42] can be used. The role of the BSC is to provide organizations with a framework in which they can define for each objective key performance indicators, specify targets, and

determine the initiatives that help realize the chosen strategy. If a Strategy map has been used by the organization to determine its objectives, the same objectives can also be used with the BSC, as is the case for ArchiPharma.

In terms of the ArchiMate language, the BSC is one of the most difficult strategy techniques to model. The main reason is that the current version of the standard does not provide support for modelling metrics and their values. However, by using the ArchiMate language extension mechanism, we introduce the concept of Metric as a specialization of Driver to measure the performance of certain objectives [33]. Furthermore, in the case of the values measured for these performance metrics, we can define a profile which contains two attributes in the form of the target value and the actual realized value (outcome). Finally, in terms of initiatives, we can use ArchiMate 3.0's new Course of action concept to define what the organization is planning on doing or has done to achieve its planned performance improvement.

H. Implementation design

This is the first phase that deals with strategy implementation. The main goal of this phase is to design the transformation of the organization based on the chosen strategy, its capabilities and the supporting architecture Fig. 9. Multiple iterations are suggested to determine the best implementation solution.

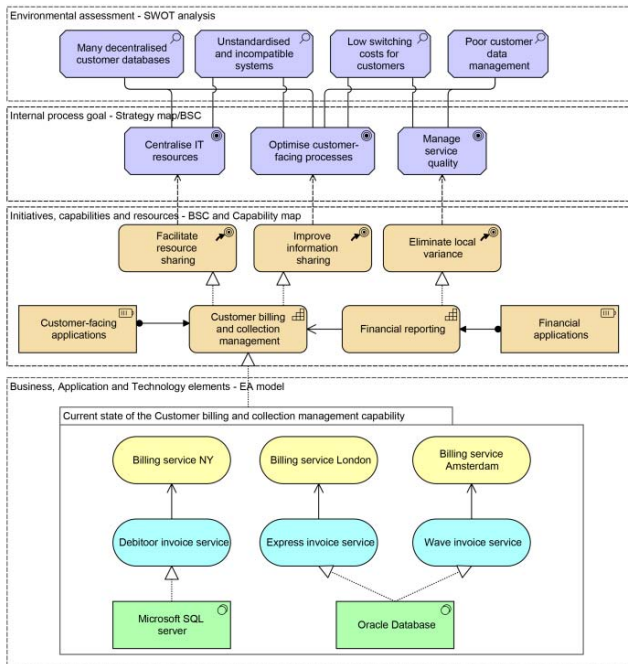


Fig. 9. Implementation design based on information from strategy techniques

I. Business transformation planning

The goal of this phase is to develop the implementation roadmap at the different levels (goals, capability, architecture, and project). This is a complex phase in which important decisions need to be made regarding implementation aspects to be pursued and their sequencing.

From the point of view of strategy techniques, business cases can be used to create the goal roadmap and to influence the project roadmap. With the help of a Business case, an organization can ensure that every approved project or portfolio of projects is in line with the organizational goals and has balanced levels of costs and risks. Furthermore, these business cases support the development of organizational capabilities which is typically planned in smaller increments, over time [22]. A capability roadmap can be used to sequence and plan these capability increments [33]. A capability roadmap can also be used to communicate the implementation plans with the management. In our example, ArchiPharma has four capabilities that need to be improved: "Customer data management (CDM)", "Customer order management (COM)", "Customer billing and collection management (CB&CM)", and "Accounting (Acc)" (Fig. 10).

Phase F of the TOGAF ADM deals with detailing the migration plan from the baseline architecture to the target architecture, to realize the organizational goals, objectives and strategies. In this phase, an implementation roadmap is established together with the portfolio and project managers, to have an alignment between the planned architectural changes and the actual projects that will be realized within the organization. Similarly, the implementation roadmap is checked against the higher-level roadmaps, such as the capability development plan and the goal roadmap.

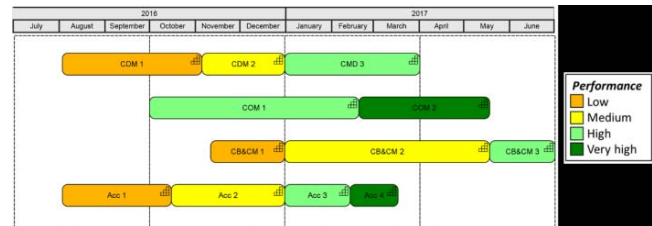


Fig. 10. Capability roadmap with ArchiMate concepts

J. Business transformation planning

The focus of this phase is to monitor and ensure the alignment between the implementation roadmap and the actual execution. This can be done with the help of guidelines, principles, and accountability of the parties responsible for the implementation. Phase G of the TOGAF ADM standard refers to the governance of the implementation and creates a link between the EA and implementation organization. The outcome of this phase should be the actual implementation of the organizational change. Therefore, this phase is typically characteristic for disciplines such as, Project Portfolio Management, which can provide a good overview of the status of the implementation, by abstracting from specific details and focusing on the most relevant aspects. These overviews facilitate decision-making based on aspects such as, which projects to start first, which IT systems to phase out etc.

K. Implementation governance

This is the final phase of the method in which the concerned and results of the strategy implementation. After the

implementation is complete, an evaluation can be performed. The key performance indicators established with the help of the BSC can be used to compare the target outcome to the realized outcome of the implementation. If the implementation is successful, the realized outcomes should be at least equal, if not better, to the target outcomes. In the example of ArchiPharma, one of the targets was achieved, and two were not. It is recommended that this assessment is made continuously during the implementation process, to prevent that the targets are not met. If deviations are detected during the implementation process, several recommendations can be made for improvements.

IV. TOOL SUPPORT AND EVALUATION

To support the modeling of strategy and planning techniques with the ArchiMate language, we have extended the functionality of an existing EA modelling tool². However, since the tooling does not constitute the focus of this paper, we only briefly mention some of its characteristics: the implementation of each strategy technique resembles the idea of viewpoint from the ArchiMate language (selection of concepts that can be used to model a view, serving a specific purpose); each strategy technique has its own metamodel fragment which is used to determine which concepts are allowed to be used; the concepts used for the strategy techniques can be reused in ArchiMate viewpoints and vice versa (Fig. 11).

Lack of tooling for strategy techniques has been also identified by other studies as an issue in the design and analysis of business strategies [43]. The main arguments in favor of strategy software tools range from providing a common language, conceptual frameworks, and visual schemas to help understand and design strategies and business models, and transform the strategy process into a design activity, in particular when defining and selecting strategic options [44].

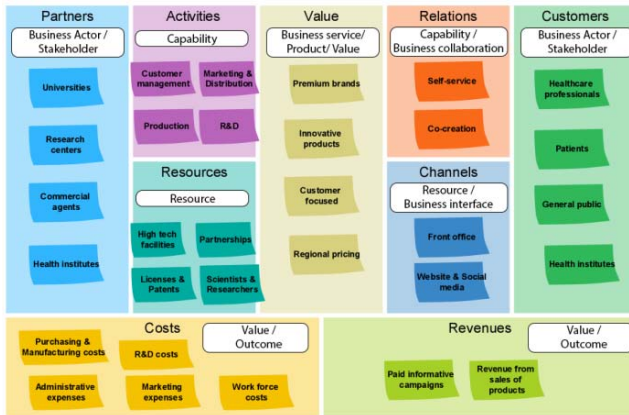


Fig. 11. BMC implemented in the software tool

As an example, in Fig. 11 we can see the implementation of the BMC in the software tool. While this bears resemblance to the original paper-based version, there are several key differences: the elements from existing ArchiMate models can be used to populate the BMC and vice-versa, the elements

created in the BMC can be reused in ArchiMate models. Additionally, relationships between canvas elements are supported to give more detail about their dependencies. Furthermore, properties can be assigned to each element (e.g.: values for each cost in the Cost structure) which enables further analyses of the BMC. It should be noted that constraints exist as to which types of ArchiMate concepts can be used in each building block of the BMC. This ensures the quality and reusability of the information. Finally, the tool has a simple interface which hides all the complexity of the ArchiMate metamodel from the user.

The method, as presented in Section III, and its implementation in the software tool have both been developed in an iterative manner, according to the guidelines of Action Design Research by [45]. Thus, there have been several iteration rounds in which it has been tested and evaluated in terms of functionality, user-friendliness, usefulness, coherence, and contribution to solving customer problems by BiZZdesign practitioners having different roles, such as CTO, Product owner, Business and Technical consultants, Sales representatives, Research consultants, and Software developers. Additionally, over the course of two case studies (public university and investment fund), we have applied parts of the method and of the software tool implementation with positive results [46]. These results combined with the positive evaluation within BiZZdesign has led to the inclusion of the strategy technique views in the production version of the BiZZdesign Enterprise Studio software tool.

V. CONCLUSION

In this paper, we presented a method for relating the business strategy to EA models, and vice-versa. We argue that this relationship plays a crucial role in the ability of organizations to gain and maintain a competitive advantage by facilitating their transformation to new business models and strategies. We advance the current State-of-the-Art, by contributing a method to map strategic information to the ArchiMate language, and corresponding tooling for supporting the integration of strategy techniques with ArchiMate models. We have demonstrated that these two aspects combined can support organizations with managing the current gap between high-level strategic goals and detailed EAs.

Our research also has some limitations worth mentioning. First, while the initial results of the evaluation of the method and its software tool have been very promising, further research is needed to determine its practical value. Since the software tool is now available for organizations to use, we expect to be able to perform more case studies in the near future. Second, while our method provides a way to map strategic information to the ArchiMate language, it does not address the issue of different abstraction levels. Usually, strategy and business models are defined at a rather high abstraction level when compared to EA models which means that EA practitioners still might need to further refine strategic information. In future research, we will investigate how this difference in abstraction levels can be addressed. Another interesting research direction could focus on including model-based quantitative analyses to assess non-functional

² <https://www.bizzdesign.com/enterprise-studio>

characteristics of both business strategy and the EA supporting it, in particular for decision-making purposes.

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