


## RESEARCH ARTICLE

# Strategy on a Page: An ArchiMate-based tool for visualizing and designing strategy

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## Summary

Nowadays, organizations need to be able to adjust more rapidly to the circumstances of their environment, at a strategic, tactical, and operational level. However, most software tools are designed to support the tactical and operational levels, while at a strategic level there are not many options available. In this paper, we propose a software tool which supports modelling of strategic information, covering several well-known strategy techniques, and also facilitates the design of highly customizable management dashboards. To validate our proposed software tools, we perform two case studies, with two inherently different organizations, namely a public university and an investment fund.

## KEYWORDS

ArchiMate, Balanced Scorecard, Business Model Canvas, Strategy on a Page, Visualisation

## 1 | INTRODUCTION

Nowadays, the external environment of organizations is intensifying in terms of competition and globalization of markets (Amagoh, 2008). This, combined with constant technological advancements, creates a more dynamic and unstable environment for organizations. To adapt to these changes, organizations need to design and implement planned change at a quicker rate (Burke, 2013). 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 (Audia, Locke, & Smith, 2000). Furthermore, it is important for organizations to have a clear, unambiguous strategy backed up by sufficiently detailed plans (Acur & Englyst, 2006).

Strategy is a concept that is familiar and influential in the context of organizations (Brock & Barry, 2003). However, just because it is a frequently used term it does not make defining it any easier. The most commonly used definition of strategy is as a plan or action that an organization takes to realize their objectives (Harrell, O'Reilly, & Tushman, 2007). In other words, a strategy represents the understanding of an

organization's assets, position, and their relation to the environment. A strategy must identify, protect, acquire, and sustain critical capabilities, in order to provide mitigation against future uncertainties (Hough, 2011).

This seemingly simplistic conceptual endeavour is actually very complex when applying it to a practical situation, due to uncertainty, complexity of competition, and change, especially in fast-moving markets (Harrell et al., 2007). A great deal of influence on an organization's success has its ability to scan environments, identify opportunities and threats, design appropriate responses, and ensure that these plans are implemented accordingly (Harrell et al., 2007). All these steps can be referred to as the strategy process. Studies have shown that organizations which integrate their strategy process with flexible responses to their changing environments can achieve the best performance (Dibrell, Craig, & Neubaum, 2014; Grant, 2003).

Owing to the importance of organizations being able to formulate, align, and implement their strategies to remain competitive, one can expect that many tools and techniques to support this process have already been introduced. At an operational level, many standards have been developed, which have been implemented in a multitude of

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enterprise engineering software tools; for example, business process management (Dunie, Schulte, Cantara, & Kerremans, 2015) and enterprise resource planning (Guay, Pang, Hestermann, & Montgomery, 2015). Similarly, at a tactical level, business intelligence (Parenteau et al., 2016), enterprise architecture (EA) (Searle & Kerremans, 2017), and other domains have been supported by software tools, some based on academic research and on best practices.

However, when looking at a strategic level, fewer software tools are currently available (Iervolino & Decker, 2016). Of these, most software tools include support for individual strategy techniques, such as the Business Model Canvas (BMC), the strengths, weaknesses, opportunities, and threats (SWOT) analysis, the balanced scorecard (BSC), and so on without considering how they can be integrated with each other and with existing tactical and operational tools which are used within the strategy process.

The importance of providing integrated solutions, which can cover many aspects of the strategy process, has become more apparent in recent years, with many software vendors moving away from providing isolated tools. One such example is the case of EA tools, which over the past few years have moved away from only supporting EA methodologies, frameworks, and modelling languages, to providing an integrated offering which includes aspects of project and portfolio management, governance, risk and compliance, and so on (Searle & Kerremans, 2017).

This trend is also apparent when looking at how the new role of an enterprise architect is defined as a bimodal function (Walker, Burton, & Bolsch, 2016). This implies that an enterprise architect would no longer only focus on optimizing and maintaining the current business model, but they would also actively participate in identifying key trends and helping drive the new business models and strategies of their organization (Walker et al., 2016). Thus, in such an extended role, an enterprise architect would benefit from being able to use a software tool that integrates both the strategic and tactical aspects of their role.

Therefore, the main goal of this paper is twofold. First, we propose our artefact, which integrates knowledge from the strategic and tactical levels, in a way that would facilitate the bimodal role of an enterprise architect. This artefact takes the form of a software tool which can assist with designing, analysing, and visualizing strategies with the help of well-known strategy techniques and ArchiMate-based dashboards. Furthermore, while the main emphasis is not on designing EA models, our software tool (Strategy on a Page) should facilitate the usage and visualization of relevant information from EA models in a way that can be used to discuss with a variety of stakeholders.

This artefact is based on previous research in which several methodologies, frameworks, techniques, and standards are integrated, in the form of a method (Aldea, 2017; Aldea et al., 2015; Aldea, Iacob, Quartel, & Franken, 2013). We use this prior justificatory knowledge (detailed in Section 2) to guide the scope of our artefact, its constructs, and form (detailed in this section and in Sections 2 and 3). Furthermore, throughout this paper, we also provide indications regarding the applicability of the artefact, which is not limited to specific types of organizations, scopes, or types of users, as can be seen in the case study (detailed in Section 4). Moreover, we discuss the mutability of our artefact by highlighting some shortcomings and providing several suggestions for future improvement of the artefact (detailed in Section 5).

Thus, we follow the perspective of Gregor and Jones (2007), who argue that a design theory can be comprised of material artefacts

(e.g. software tool), abstract artefacts (e.g. methods, models), and human understanding of artefacts. While within the aforementioned previous research the focus has been on designing the abstract artefact, in the form of a method, we argue that within this paper the focus lies on designing the material artefact that makes the method executable.

Second, we validate Strategy on a Page with the help of two organizations. During these case studies, we were able to use both Strategy on a Page and its accompanying canvases for a series of different purposes. The results of the case studies have provided a multifaceted view on how our artefact can be used by different types of practitioners, not only limited to enterprise architects. Please note that the term 'canvas' is used to denote the implementation of several strategy techniques in our artefact. Essentially, the canvas represents the area in which a user can interact with the strategy techniques.

We argue that our proposed artefact has multiple theoretical and practical contributions. First, as a theoretical contribution, it facilitates the integration of knowledge, theories, and ideas from multiple fields of research, such as strategic management (SM), capability-based planning, and EA. Second, it is a novel way to use ArchiMate concepts to support the creation of management dashboards by providing building blocks, a mapping between strategic concepts and ArchiMate concepts, and several canvases based on well-known strategy techniques. Third, we propose a software tool which can help organizations integrate strategic and tactical information with the help of a design that can be generalized and is conceptually new.

From a practical standpoint, our proposed artefact provides clear guidelines, flexible functionality, and canvases for practitioners to use when designing strategy. By providing a way to visualize strategic information with the help of ArchiMate, we enable practitioners (with an emphasis on enterprise architects) to create interactive management dashboards, which can stress the strategic value of EA. Also, by facilitating the collection of strategic information in a structured manner, with clear mappings to ArchiMate concepts, we can simplify the process of transferring strategic information into EA models. Finally, our artefact can also help organizations with bottom-up decision-making by improving communication between top management and EA practitioners with the help of interactive dashboards.

The research methodology we used is design science by Peffers, Tuunanen, Rothenberger, and Chatterjee (2007), which has also helped shape the structure of this paper. In this introduction, we have briefly discussed the current issues with software tool support for the strategic level, including the lack of integration with other tools for the strategy process. Section 2 is devoted to the literature review, which is used as a basis for the design of the proposed solution. In Section 3 we introduce Strategy on a Page with all its components and features. Subsequently, we demonstrate the tool through its application in two case studies (Section 4). Finally, in Section 5 we conclude by discussing our proposed solution, and its application to the case study organizations, and give some pointers to future research.

## 2 | BACKGROUND

In this section we present relevant literature that is used as a basis for understanding and designing our artefact. We start by briefly looking

at which strategy techniques are currently being used by organizations. This information is used to determine which of these techniques should be implemented as first in our artefact. Second, we introduce EA as a discipline and focus on shortly introducing the ArchiMate modelling language. Third, we discuss the benefits of software support for strategy techniques. Finally, we present and discuss the prior work on this topic, from both scholars and practitioners.

## 2.1 | Strategy Techniques

Strategy techniques are recognized as helpful and even necessary in streamlining strategy development and execution (Nohria, Joyce, & Roberson, 2003). Organizations nowadays have absorbed standard and iconic strategy techniques which they are using for multiple purposes (Hughes, O'Regan, & Wornham, 2009). This raises the question of what strategy techniques are out there and which of them are being used by organizations.

A study performed by Stenfors, Tanner, Syrjänen, Seppälä, and Haapalinna (2007) investigates which strategy techniques are most used by a sample of the 500 largest companies in Finland. The results indicate that the SWOT analysis, the BSC, scenario planning, and environmental analysis are ranked among the top 10 most used strategy techniques. Furthermore, Phillips (2011) identifies the mission statement, the political, economic, social, technological, environmental, and legal (PESTEL) analysis, the SWOT analysis, and scenario planning as techniques that are very valuable for organizations, based on his own experience with practice.

For the past 15 years, Bain & Company have been performing a study to understand the usage of strategy techniques, which resulted in strategic planning, the BSC, and mission and vision statements ranking among the top 10 most used (Rigby & Bilodeau, 2015). Another interesting finding of this study is that in 2002 the usage of strategy techniques reached its peak, followed by a steady decline over the next few years, until 2014, when signs point to strategy techniques increasing in popularity once more. Providing software support for strategy techniques could prove vital to increasing their usage due to the added value a software tool can provide (Fritscher & Pigneur, 2014).

A more recent study, performed with members of the Open Group, the Nederlands Architectuur Forum (NAF), and the Association of Enterprise Architects (AEA), has shown that the SWOT analysis, the BSC, the strategy map, and the BMC are in the top five most used strategy techniques (Roelfsema, Aldea, Lankhorst, & Franken, 2016). An important aspect of this study is that these results are based on opinions of participants closely affiliated with EA. Thus, we can conclude that these four techniques can be considered as a good starting point for our artefact.

## 2.2 | Enterprise Architecture

EA management is a discipline which focuses on the holistic management of the enterprise, based on elements of an organization's architecture, such as business processes, applications, information, hardware, as well as the relationships between them (Buckl, Matthes, Schneider, & Schweda, 2013). As a discipline, EA needs to help organizations deal with emerging business information technology (IT) capabilities and align them to the existing organizational elements

(Alwadain, Fiel, Korthaus, & Rosemann, 2014). One of the most popular EA frameworks is TOGAF®, which provides an approach for designing, planning, implementing, and managing EAs (Ferrugento & Rocha, 2015). It is an open standard which provides a practical, industry-managed way of designing EAs (Schekkerman, 2004).

However, while TOGAF offers viewpoints, techniques, and reference models, it does not contain a modelling language. Therefore, it has been used in combination with the ArchiMate standard. ArchiMate is a language that is used to model and describe EAs over time, as well as their motivation and rationale (The Open Group, 2016).

The ArchiMate language can be used to model the structure of an organization, which is represented in three layers (following TOGAF): a business layer (products and services offered to customers, the business processes that helped create the offering, and the actors that played a part in the business processes), an application layer (application services which support the business layer), and a technology layer (infrastructure services that support the applications). Over time, the ArchiMate standard has added several new concepts in the form of motivation elements (focus on the motivation behind enterprise change), implementation and migration elements (focus on the programs, portfolios, project management, and plateaus that can be used in gap analysis), strategy elements (focus on the strategy in the form of courses of action, capabilities, and resources), and physical elements (focus on facilities, equipment, distribution networks, and materials). Each of the concepts in the language is part of a layer, has a specific notation, and can have several relations with other concepts between and within layers.

As mentioned before, one recent trend in EA research and practice is characterized by the extended role of an enterprise architect, which should be able to balance optimizing and maintaining the current business model of their organization with identifying key trends and helping drive the new business models and strategies. One example of this is the continuous extension of the ArchiMate language with new strategic and motivational concepts that can be used by enterprise architects to model the strategic intent of their organizations (The Open Group, 2016). These developments in the language are preceded by both proposals from scholars (Aldea et al., 2015; Iacob, Quartel, & Jonkers, 2012) and practitioners within the Open Group.

## 2.3 | Benefits of Software Support for Strategic Techniques

The lack of support for design and analysis aspects pertaining to SM is also recognized by Osterwalder and Pigneur (2013), who argue that information systems research could provide beneficial guidance on this topic in three areas. First, such an approach can help provide a common language, conceptual frameworks, and visual schemas that can help with understanding and designing strategy techniques. Current SM research is mostly focused on observing, classifying, and describing strategy techniques (Osterwalder & Pigneur, 2013).

Second, it can help transform the strategy process into a design activity, in which prototyping, exploring alternative solutions, and validating ideas play a central role. Currently, the strategy process is mostly focused on decision-making and does not consider a trial-and-error-based learning process for using strategy techniques (Osterwalder & Pigneur, 2013).

Third, computer-aided design (CAD), which has played an important role in transforming the EA discipline, can also be used at a strategic level to assist managers and executives with designing and selecting strategic options. Currently, SM research does not provide enough knowledge on how CAD can be used to support strategy techniques. According to Osterwalder and Pigneur (2013), SM could benefit greatly from cross-domain research in this area.

Teece (2010) argues, when looking at business modelling, that there is little support for designing and analysing business models, which can lead to poor understanding of an organization and, ultimately, to commercial failure. Business modelling and strategy are two aspects of SM that are strongly related within the strategy process. The business model has a strong contribution to the kinds of strategies an organization can formulate; and vice versa, the strategy of an organization can limit the kinds of business models that are designed (Aldea et al., 2013).

## 2.4 | Previous Work

Over the years, both scholars and practitioners have contributed, to varying degrees, on this topic. One of the first serious scholarly attempts to bring strategy techniques beyond just a paper-based tool comes from Iacob et al. (2014), who proposed a way to link the BMC to EA in order to facilitate (quantitative) analyses of business models and of cross-model information. Furthermore, this direct relationship between the strategic and tactical level, as argued by the authors, can help improve the traceability of strategic decisions and goals into EA models. This traceability can be used to determine the impact of strategic decisions on the EA of organizations and with making cross-model analysis. Nonetheless, the authors did not design and develop software support for their proposed approach.

One of the most notable CAD implementations, based on a strategy technique, is the web-based version of the BMC. This implementation of the BMC supports users in a multitude of ways that could not be provided by a paper-based version, such as unlimited space for prototyping, built-in help function, and the possibility to export the canvas to other applications such as PowerPoint and Excel, just to name a few (Fritscher & Pigneur, 2010). However, while the authors are able to conclude that using CAD to support a paper-based technique such as the BMC is promising, the results of their study also show that users need more incentives to use such a tool.

When looking at available commercial and non-commercial tools, there are several categories which can be identified. First, there is an abundance of free web-based<sup>1</sup> and template-based<sup>2</sup> (for Excel, Word, PowerPoint) alternatives for many of the most well-known strategy techniques. These are designed to mimic as closely as possible the original design of the techniques they are based on. However, they offer little in the form of additional features, besides some basic ability to drag-and-drop elements and use of colour coding. This also is the case for many commercial tools, which only offer isolated support for these techniques.<sup>3,4</sup> Furthermore, in most cases these tools are not supported by a

metamodel or any kind of additional logic which could be used to relate to an EA model.

However, there are also some commercial software tools which integrate these techniques in a way that would help users traverse through multiple steps of the strategy process. One such example is StrategyBlocks,<sup>5</sup> which guides users through a multistep process in which they use techniques, such as the PESTEL analysis, stakeholder analysis, and Porter's five forces, in a predefined sequence, to generate a multifaceted result regarding the external environment of an organization. However, while this tool does integrate multiple strategy techniques, it also forces the user to apply them in a predetermined order, which suggests a low level of flexibility that might not be suitable for all situations and organizations. Additionally, this tool does not offer support for relating to EA models.

There are also several commercial software tools, such as the ones provided by provided by Sparx,<sup>6</sup> Software AG,<sup>7</sup> and Avolution,<sup>8</sup> that offer both support for strategy techniques and EA modelling. While these tools offer support for relating strategy techniques to ArchiMate concepts, they do not offer a way to present this information in an integrated manner. Thus, while these types of commercial software tools offer a good basis, they are still lacking functionality similar to Strategy on a Page, which can be used to facilitate the communication between management and EA practitioners.

The importance of this kind of artefact is also recognized by advisory firm Gartner, which considers the idea of a one-page strategy as a useful tool for connecting the business strategy to the IT strategy (Colella, 2017). Thus, they advise chief information officers and other IT professionals to use this kind of approach for supporting their business-related storytelling, which would represent a more effective way to communicate with non-technical stakeholders (Colella, 2017).

Therefore, we consider that while there are different levels of software support for strategy techniques, one key aspect is still missing from the current software tools, namely support for combining strategic and tactic information and presenting it in a way which is also relatable to non-technical stakeholders. Thus, while some aspects of our artefact can be found in other software tools (the canvases based on strategy techniques), we argue that our novel contribution is Strategy on a Page.

## 3 | MANAGEMENT DASHBOARD TOOL: STRATEGY ON A PAGE

The management dashboard tool Strategy on a Page can assist organizations with designing, analysing, and visualizing strategies with the help of well-known strategy techniques and ArchiMate-based dashboards.

Strategy on a Page's main application is to visualize the most important aspects of this information in a compact manner, similar to a dashboard. Furthermore, Strategy on a Page relies on concepts and relationships modelled in ArchiMate models. The main reason for this is that Strategy on a Page is envisioned as a tool that can be used by ArchiMate users (such as enterprise architects) to present the

information from EA models in a manner that is more familiar and relatable to managers and other decision-makers.

To guide the design of our artefact, we use the task–technology fit (TTF) models of Goodhue and Thompson (1995) and Zigurs and Buckland (1998), which focus on describing the fit between generic types of tasks and technology characteristics, in the context of performance. The two models are fairly similar in their explanation of the TTF, by both focusing on the task and technology characteristics, which need to be aligned. The main difference is related to the perspective they focus on, which in the case of Goodhue and Thompson (1995) is the individual, and in the case of Zigurs and Buckland (1998) is a group of individuals. We argue that, in the case of organizations, both types of users can be found; therefore, we choose to focus on both, while making a distinction between the types of tasks and technology that are most common in each situation (detailed in Sections 3.1 and 3.2).

Additionally, we use the knowledge detailed in Table 1, of the mappings between strategy techniques and ArchiMate concepts, some of which have already been proposed by Aldea et al. (2013, 2015). By defining a mapping between these techniques and ArchiMate concepts, we can determine which kinds of strategic concepts and information can be included in Strategy on a Page. Furthermore, by relating these strategy techniques to EA concepts, we can provide EA practitioners with a good starting point for translating strategic documents into EA models. Moreover, by identifying what kind of information managers are used to receiving from the specific strategy techniques, we can facilitate the creation of management dashboards based on information in the EA of an organization. Additionally, we can determine how these techniques can be related to each other, which could prove valuable when trying to relate the information gathered from different techniques in ArchiMate models.

Besides Strategy on a Page, we have also implemented support for several of the techniques detailed in Table 1. More specifically, we have created canvases in which ArchiMate concepts can be used in a way that mimics the normal usage of these techniques.

In the following sections, we present in more detail the prototype for Strategy on a Page (Section 3.1), and its accompanying canvases based on well-known strategy techniques (Section 3.2). Furthermore, in Section 4, we present how Strategy on a Page was applied in two case studies.

### 3.1 | Prototype

The initial design of Strategy on a Page was done as a PowerPoint mock-up in which different elements of the tool were simulated. The result is a 40-slide presentation that behaves like an interactive dashboard that allows the user to highlight relationships between concepts. The objective of this mock-up was twofold. First, it was aimed at getting a better idea of what Strategy on a Page should look like, how it should behave, and also what kind of information it should contain. Second, it was intended to be used as a demonstration of the Strategy on a Page concept, to receive feedback and initial reactions from possible users. The mock-up has been shown to several BiZZdesign consultants with varying degrees of

familiarity to strategy design and EA (research consultants, business consultants, and EA consultants).

Based on the positive reactions received on the mock-up, we have developed our prototype for Strategy on a Page in the BiZZdesign Enterprise Studio<sup>9</sup> software tool. Features and changes to the Strategy on a Page concept were implemented based on discussions with several of the consultants that had seen the mock-up. Figure 1 illustrates an example of the Strategy on a Page, as implemented in our artefact.

To design the look of Strategy on a Page, we adapted the concept of a building block introduced by the BMC of Osterwalder and Pigneur (2010). The very popular strategy technique has been appreciated by both scholars and practitioners for its simple design, which can help focus the user on several important topics. We keep the purpose of the building blocks as a container for concepts of the same type (e.g., key resources, key activities), but generalize it to be applicable to any type of concept.

Second, we create two types of building blocks; namely, one that displays information in a textual format, and one that displays the information in a graphical format. We allow for this distinction to be made to facilitate users to create whatever types of custom views they consider appropriate. Similarly, we allow for the size and position of each building block to be adjusted according to preference. Additionally, to display several of the analyses supported, such as heat mapping and gap analysis, colour coding is necessary. In this case, the graphical building block can be used for displaying both the information and the corresponding colour.

Third, since one of the main features of Strategy on a Page is to emphasize the underlying relationships between concepts, some form of highlighting needs to be supported. Furthermore, users should be able to toggle this highlighting feature on and off in an easy and intuitive manner. Therefore, the feature is assigned to the concept that the user is highlighting, and is toggled by clicking on the concept. The prototype can support more advanced features, such as customizing how many related elements will be highlighted, if only direct relationships or also indirect ones will be highlighted, and the colours that will be used for highlighting. Additionally, concepts can be added to building blocks from existing EA models, with a drag-and-drop function. In this case, the highlighting is based on the underlying relationships from the EA models that contain the concepts used in Strategy on a Page.

Fourth, to design Strategy on a Page, we considered what kind of information should be included in each building block. Essentially, any type of concept can be included in the building blocks, with no restrictions to a specific layout or type of concept that can be displayed. However, users are recommended to include only the most relevant information in these building blocks to fit on just one page, either landscape or portrait.

Finally, the prototype supports relationships with the native enterprise portfolio management (EPM) module of the software tool with the help of cross-model relations. Once a relationship is established between two elements, one from each type of model (EA and EPM), the highlighting function can also be used to make explicit which program, project, application, and so on from a portfolio is related to a goal, initiative, outcome, and so on. Since portfolios of

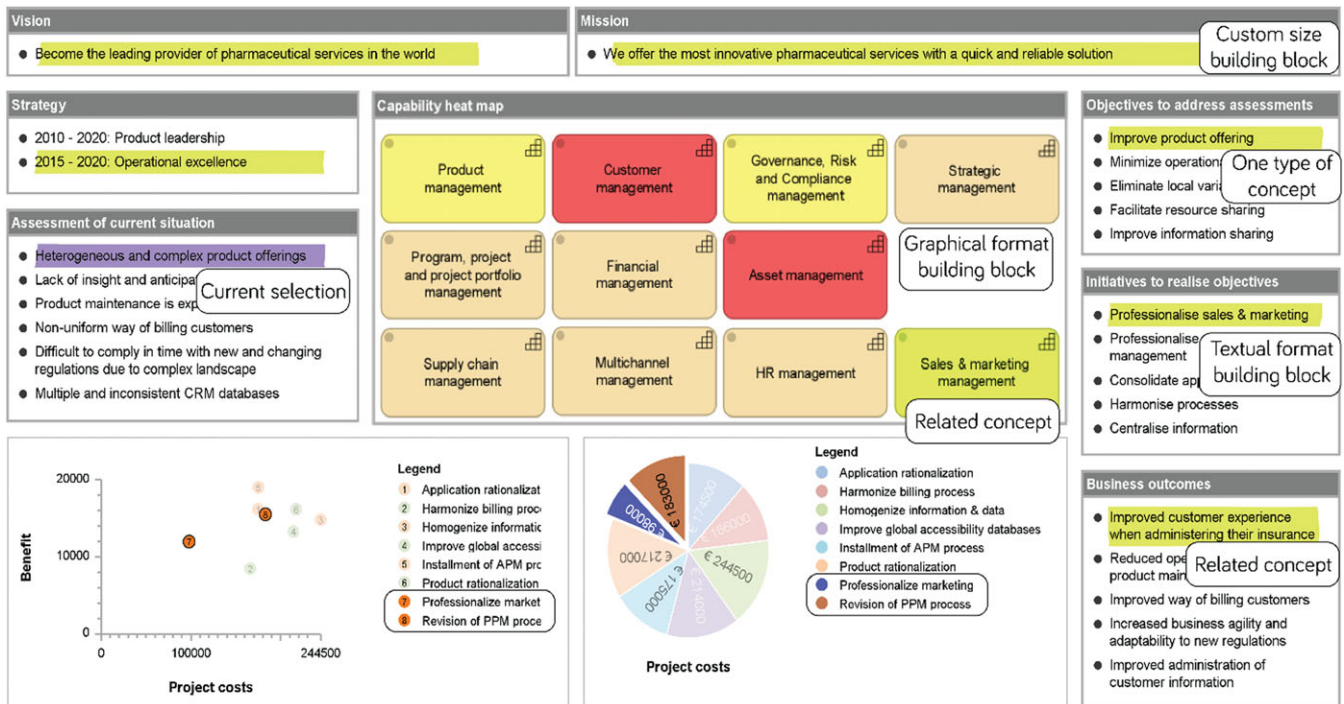
**TABLE 1** Mapping of strategy techniques and techniques to ArchiMate 3.0 specification concepts

	Goal	Course of action	Capability	Resource	Actor	Value	Interface	Collaboration	Assessment	Driver	Metric	Product	Service	Work package	Requirement	Outcome
Vision	x															
Mission		x														
BMC			x	x	x	x	x	x				x	x			
SWOT			-	-	-	-		x		-						
PESTEL										x						
BSC	x	x									x					x
TOWS		x						-		-						
Brainstorming		x								x						
Porter's five forces					-					x						
Risk analysis									x							
ERRC		x				-				-						
Strategy canvas						-			x							
Six paths framework					-	-			x			-	-			
Value proposition			-	-		x							x			
Capability map			x													
Resource map				x												
MoSCoW	-														x	
Value disciplines		x														
Strategy map	x															
Gap analysis			-	-		-			x							
MCDA						-					x	-				
Kanban board	-				x				x		x			-		

ERRC: eliminate, raise, reduce, create; MCDA: multi-criteria decision analysis; MoSCoW: must, should, could, would; TOWS: threats, opportunities, weaknesses, strength.

'x' indicates the existence of a concept included in the techniques that generates an output usable by another technique; '-' indicates concept included in the technique that needs input from another technique.





**FIGURE 1** The Strategy on a Page prototype

projects usually contain several analyses (e.g. cost/benefit analysis), these can be included in Strategy on a Page in order to emphasize the financial implications of strategies.

In terms of the TTF (Zigurs & Buckland, 1998), the generic Strategy on a Page can support fuzzy tasks in which there is no predetermined goal or focus, and the user spends effort on understanding what information should be included and how it should be structured. The main reason for this is that the generic Strategy on a Page dashboard is very versatile and can support any type of task goal owing to its customizable building blocks, which can be used to structure information in many different ways. According to Zigurs and Buckland (1998), tool support for fuzzy tasks requires a high communication support and information processing, combined with a medium structuring of the process. Strategy on a Page supports the gathering, aggregation, evaluation, and structuring of information (information processing), which can be done by any person that has access to the tool, in an individual or collaborative manner via the team platform (communication support), and can be used to structure the process of discussion and decision-making with the help of the building blocks and highlighting (process structuring). We have used Strategy on a Page in two case studies, integrating information from multiple strategy techniques (see Section 4).

### 3.2 | Canvases

To support the modelling of strategic information directly in our artefact, we have added several canvases, based on well-known strategy techniques. These canvases include BMC, SWOT analysis, the TOWS matrix, PESTEL analysis, the strategy map, and BSC. We have selected these six techniques based on what literature indicates as the most used in practice, as explained in Section 2. Support for more

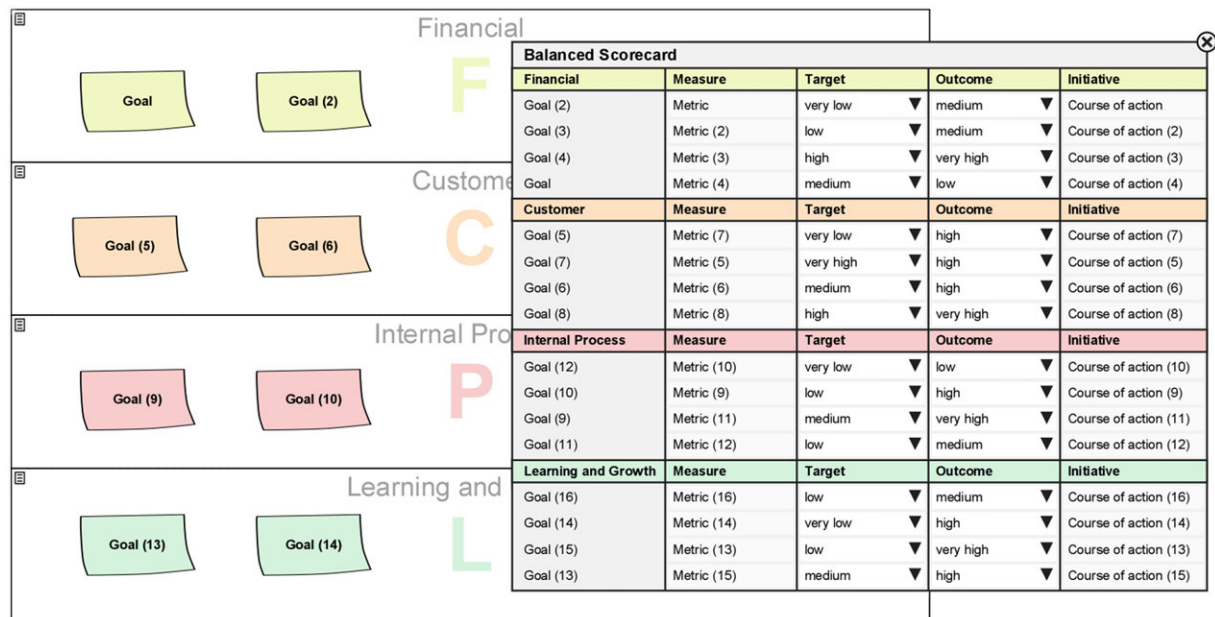
techniques is intended to be added soon, based on feedback gathered from practitioners.

Similar to Strategy on a Page, for these canvases we have also used the mapping to ArchiMate concepts as a basis for designing them. In this way, we can ensure that any information that is filled in these canvases can also be used for creating dashboards with Strategy on a Page, and for enriching existing ArchiMate models with strategic information.

Figure 2 illustrates the canvas for the strategy map and the BSC, and the ArchiMate concepts they are mapped to. In this figure, we can see both the strategy map (left side) and the BSC (right side), which are combined into one canvas with two levels of detail/complexity. The strategy map is the basic canvas in which users can define the objectives of their organization with the help of the four perspectives. For more advanced details, users can click the icon in the top left corner of each perspective, which reveals a BSC table. This table is automatically filled in with the objectives filled in the Strategy map.

To model these objectives, the ArchiMate Goal concept is used. Similarly, the whole BSC is also mapped to ArchiMate concepts as follows: the metric is used for measures, the values for the metric are used to fill in the target and outcome columns, while the initiative is mapped to either a course of action or a work package. This mapping can also be seen in Figure 2, by looking at the header of the columns and at the names of the elements filled in the table rows. The remaining four canvases are created in a similar manner.

With these canvases, we can facilitate the creation of underlying links in between the different strategy techniques, and the strategic concepts modelled in them. From an EA point of view, this aspect is very important, and is often missing from strategic documents. The main reason for this is that strategic documents are usually intended to give an overview of the direction an organization is heading in,



**FIGURE 2** Example canvas for the strategy map and BSC included in our artefact

which is done, in many cases, without explicit links between different aspects such as objectives, requirements, initiatives, and metrics. Since in the case of EA, and especially of ArchiMate, such relationships are crucial for creating coherent models and analyses, this implies that, usually, EA practitioners might need to make assumptions to translate strategic information into ArchiMate models. Therefore, we consider that these canvases could facilitate the collaboration between EA practitioners and strategists.

Moreover, with the help of software support for these strategy techniques we can add advanced features that can give a new depth to these techniques. These advanced features could be used by strategists to help design their strategies and plan their strategies in an easy and intuitive way.

One example of such features is the ability to reuse elements that have already been defined on a previous occasion. Therefore, a user does not need to define an element twice, but rather can just drag-and-drop the element in the new canvas from a list of already defined elements. This type of feature is very common in software tools that support the ArchiMate language. Additionally, elements included in ArchiMate models can also be reused in these canvases, by using the same features.

Another example of advanced features is the ability to make changes to the naming of an element in one canvas or ArchiMate model that are immediately and automatically applied to every occurrence of that element. This can help keep coherence between the different canvases that share the same elements.

Owing to the flexibility of the software tool, it will be possible in the future to extend Strategy on a Page with further analytical features. A few examples of such analyses which are considered to be implemented include performance analysis with heat/tree mapping, gap analysis, cost/benefit analysis, and stakeholder analysis.

In terms of the TTF model by Zigurs and Buckland (1998), within a group setting, these canvases are intended for simple tasks, in which

communication plays an important role (e.g. for brainstorming sessions), and which have just one desired outcome, reflected in the individual purposes of the strategy techniques. However, in an individual setting, these canvases can be used for gathering, aggregating, evaluating, and structuring information, which makes them more suitable for problem tasks. We have applied the software tool canvases in two case studies, in which they were used for multiple purposes, as detailed in Section 4.

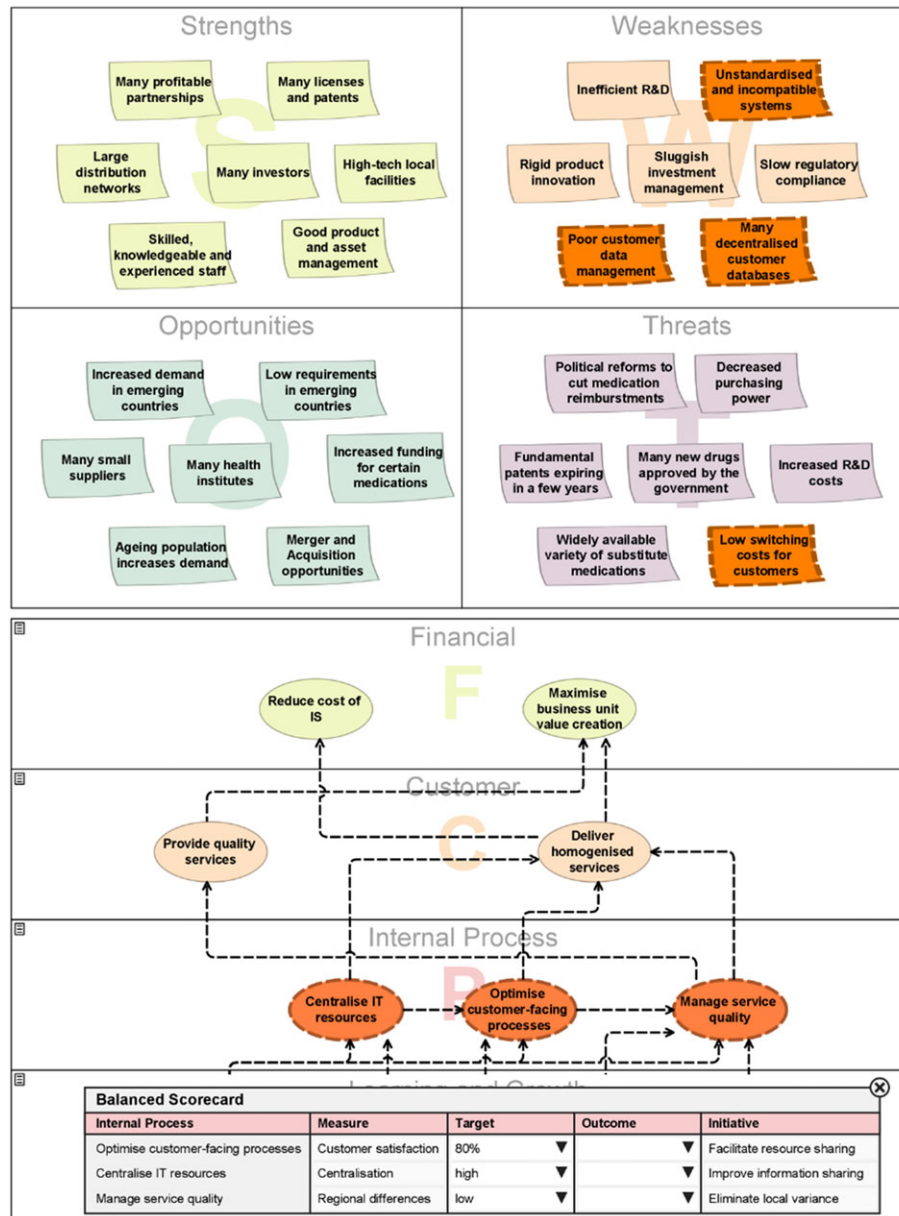
### 3.3 | Example Integration of Strategic, Tactical, and Operational Information

In this example we illustrate how some of the canvases we introduced in Section 3.2 can be related to EA models supported by the ArchiMate language. The main purpose of this example is to show the benefits of using strategy techniques that have a strong relation to EA models, through a predefined ArchiMate mapping.

For this purpose, we use the ArchiPharma example case, as detailed by Aldea (2017). ArchiPharma is a large international pharmaceutical organization (which has been anonymized for confidentiality reasons) that has many geographically spread locations, such as New York, London, and Amsterdam, as a result of several mergers and acquisitions. The organization is aware of the necessity to continuously change and improve to reach their vision of becoming the leading pharmaceutical provider in the world. However, to be able to fulfil this vision, the organization needs to identify several key areas that need to be improved and plan their transformation.

To start this transformation process, ArchiPharma performs an environmental analysis with the help of SWOT analysis, which helps the organization identify key influencing factors from their internal environment (strengths and weaknesses) and their external environment (opportunities and threats). Figure 3 illustrates the result of the ArchiPharma's SWOT analysis. Based on this, the organization decides





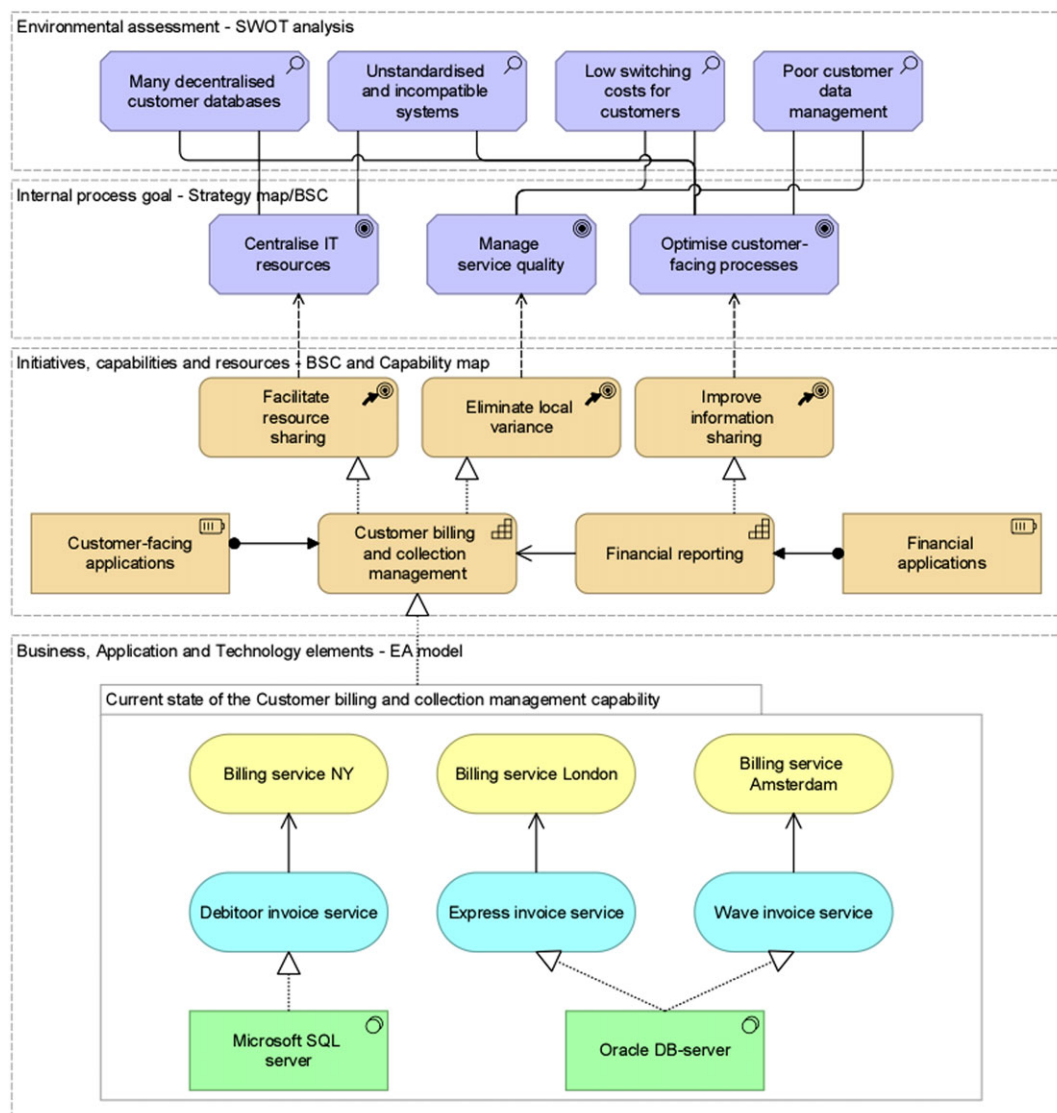
**FIGURE 3** Example ArchiPharma SWOT analysis (top) and strategy map/BSC (bottom)

to address several weaknesses and threats that are affecting their interaction with their customers (highlighted in orange). Consequently, several goals are formulated, with the help of a strategy map. For each of these goals, measures, targets, and initiatives are defined (Figure 3).

The goals highlighted in orange and their respective initiatives are used as a basis for planning the transformation of ArchiPharma's EA. Since the canvases use ArchiMate concepts (as explained in Section 3.2), the elements that are created in them can be easily reused in an EA model. As shown in Figure 4, the four assessments from the SWOT analysis are used as a starting point for defining high-level architectural goals, with the help of the strategy map. These are further refined into initiatives (from the BSC), modelled with the help of courses of action, which are related to the capabilities and resources needed to realize them. Finally, each of the identified resources and capabilities of the organization is investigated from the point of view of the business, application, and technology elements that help realize

them. It should be noted that Figure 4 is an excerpt, and thus does not show all the elements of ArchiPharma's EA.

Once the EA models are created and related to other types of information, such as application, technology, and project portfolios, these results can be presented with the help of Strategy on a Page. In Figure 5 we can see the example of the ArchiPharma Strategy on a Page dashboard, which shows information from the SWOT and strategy map/BSC canvases that is enriched with the relations from the EA model. However, these relations are not shown graphically, but their logic is represented with the help of highlighting. Furthermore, since the elements of the EA model are related, in this case, to both technology and project portfolio information, the dashboard also highlights the relations between the strategic intent of the organization (initiatives) and the project and technology costs. Based on this combined information presented in the dashboard, ArchiPharma can have a multifaceted and interactive overview of their upcoming transformation.



**FIGURE 4** Example (excerpt) EA model related to elements defined in the canvases

## 4 | CASE STUDIES

As previously mentioned, Strategy on a Page has been developed as part of a larger research project in which we design a method for improving strategic alignment with the help of knowledge from SM, EA, and capability-based planning. During this research, we have performed multiple case studies, and in two of them we were able to apply the Strategy on a Page dashboards and several canvases.

In the following sections we provide a small presentation of the context of the two case studies (Section 4.1), we detail the data collection methods used (Section 4.2), and we illustrate the usage of the software tool canvases (Section 4.3) and Strategy on a Page (Section 4.3).

### 4.1 | Context

As mentioned before, we have performed several case studies during our research. We have selected two of these, namely a public university (PU) and an investment fund (IF), to present in this paper. However, owing to the confidentiality agreements with the case study

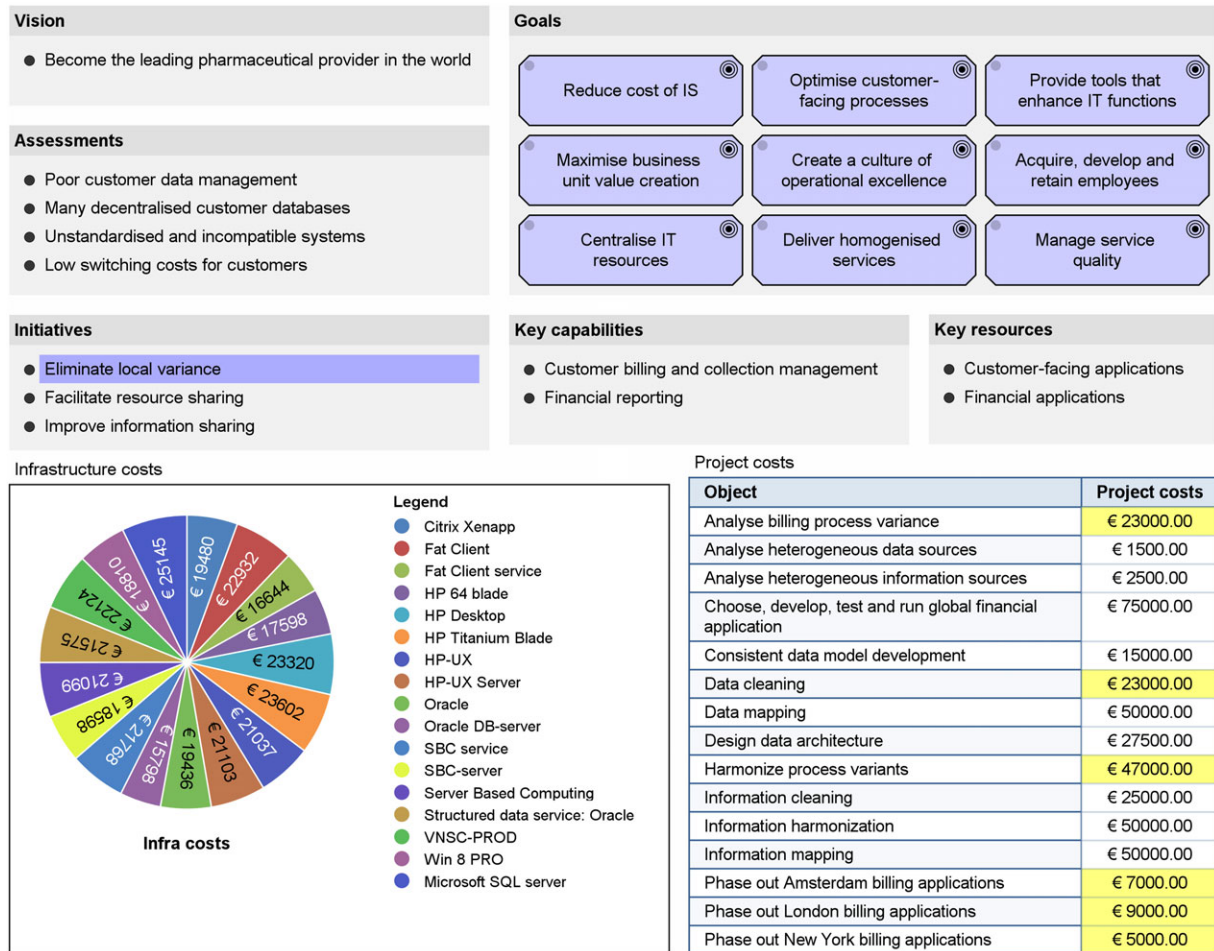
organizations, the information that is presented in this section is anonymized and generalized. Furthermore, the more sensitive information that could not be generalized and anonymized has not been included in this paper.

#### 4.1.1 | Public University Case Study

The main scope of the PU case study was to help them improve the alignment between their high-level strategic plans and their information strategy (called i-Strategy), their application landscape, and their project portfolio. Therefore, the case study has two related focuses: (i) using aspects of capability-based planning to translate the strategic intent into more actionable information, such as projects, and (ii) modelling the strategic and capability-related information with the help of the ArchiMate standard. During this case study, we collaborated with an information manager from the university.

#### 4.1.2 | Investment Fund Case Study

Our role in the IF case study was to help the members of the IF to design their strategy, since it had not been done until that point. To



**FIGURE 5** Example Strategy on a Page combining strategy and EA elements

do this, we provided assistance and guidance in three different instances; namely, strategy elaboration, new business idea, and impact analysis. Strategy elaboration refers to stating and detailing the strategy of the IF, both long term (mission, vision) and short term (objectives, initiatives, measures). The new business idea relates to assisting the organization with specifying, in more detail, one of their ideas for organizing events to attract and interact with potential customers. Lastly, the impact analysis instance refers to analysing the impact of a particular challenging decision that the IF was facing at that time; namely, reducing the loan threshold in order to attract more potential customers. During this case study, we collaborated with all the members of the IF, but had a strong cooperation with the president of the IF.

## 4.2 | Data Collection Methods

To gather the necessary information, we used multiple data collection methods, as suggested by Yin (2009). We used semi-structured interviews to gather relevant information regarding the context of the organizations and their requirements regarding the case study. The semi-structured interview was mostly used in the first meeting with the representatives from the two case study organizations.

Furthermore, we used the documentation provided by the PU representative to gain a better understanding of their organizational context. We used the information gathered from these documents as

input for demonstrating how strategic and capability-related information can be modelled with the help of the ArchiMate language. In the case of the IF, since the organization was still in the start-up stage, no documentation had been created until that time. Nevertheless, we had access to the knowledge possessed by the president of the IF, who was able to provide a complete picture of the organization.

Moreover, with the help of several workshops, we discussed our results with the PU representative to receive relevant feedback regarding our progress. Also, during these workshops, the PU representative presented how they had made use of our intermediate case study results since the previous meeting. However, in the case of the IF, we organized several workshops in which we applied multiple strategy techniques together with the IF representatives.

Finally, we used direct observations to study the response and general behaviour of the PU and IF representatives throughout the workshops. We have used this information to assess which aspects of our collaboration were considered satisfactory or required more attention.

## 4.3 | Case Study Results: Canvases

In both case studies, we were able to use the canvases included in the software tool to get an overview of the current or desired situation of the two organizations.

### 4.3.1 | Public University Case Study

To get a better understanding of the context of the PU, we were provided with several documents containing information about their strategic intent, which we used to fill in several canvases, such as the BMC, SWOT analysis, BSC, and so on. As an example, for the PU we were able to identify several strengths (e.g. strong entrepreneurial identity, modern research facilities), weaknesses (e.g. weak international appeal, diminishing brand), opportunities (e.g. emphasis on societal and environmental contributions through research, new regulations that urge universities to have a more distinct profile), and threats (e.g. new regulations that reduce governmental funding, strong competition from other universities in the country) that could be plotted in a SWOT analysis (Figure 6).

The SWOT canvas represents one of the most simplistic canvases available in the software tool, in which all elements are essentially modelled with the assessment concept of ArchiMate. The main distinction is that the elements modelled in each quadrant have a different profile, representing the four types of assessment possible with the SWOT analysis.

Even though we did not participate in the design of the PU's strategy, with the help of these canvases we were able to get a clear overview of what the PU was planning to achieve. When creating these canvases, we could take advantage of reusing elements defined in previous canvases, which helped highlight the underlying relationships between canvases.

### 4.4 | Investment Fund Case Study

In the case of the IF, we used several strategy techniques. One example is the BSC and the strategy map, which were used to elaborate the strategy of the IF into more actionable initiatives, as part of the IF's

strategy elaboration goal. Figure 7 illustrates these two techniques, as defined in the canvas available in the software tool.

The strategy map and BSC of the IF were initially defined by using Microsoft Excel, and were later translated in the canvases of the software tool. The canvas in the software tool helped identify that not all objectives, measures, and initiatives were defined in the same manner, and therefore needed some adjustment to ensure that decisions could be made based on a clear overview. Furthermore, we could use this information, at a later time, to create a management dashboard that gives an overview of the strategy elaboration pursuit of the IF.

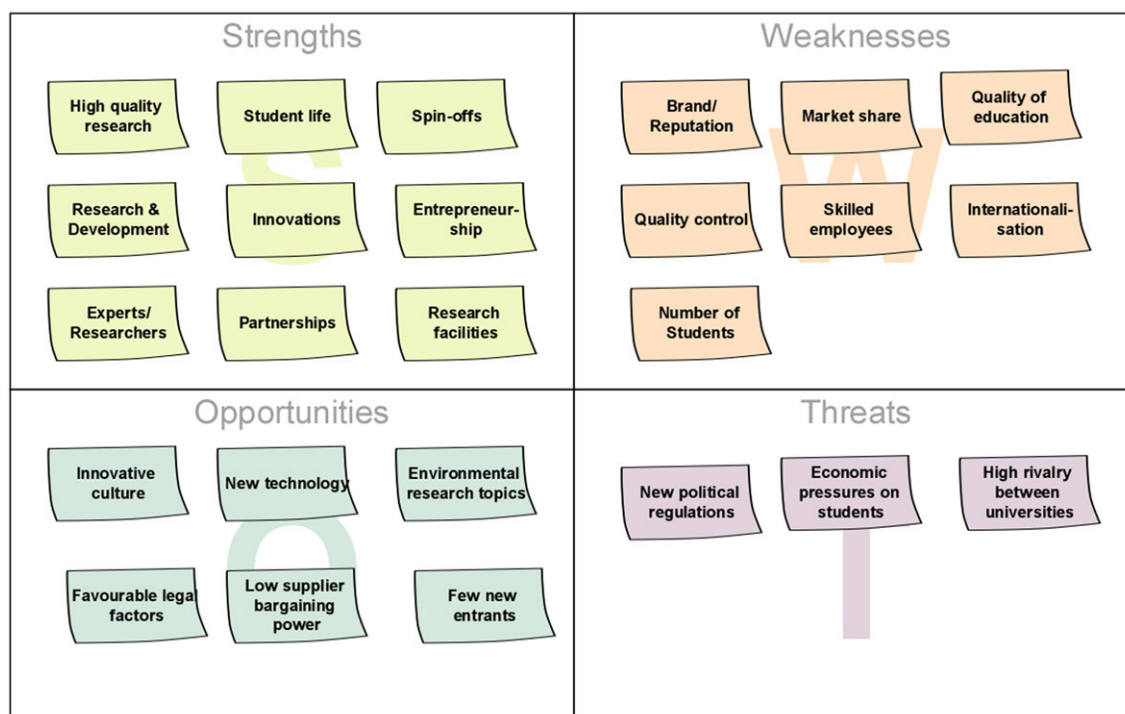
### 4.5 | Case Study Results: Dashboards

In both case studies, we were able to use the Strategy on a Page dashboards, but for fairly different purposes. In the case of the PU we created one dashboard, while for the IF we created three dashboards, each addressing a distinct goal of the organization.

#### 4.5.1 | Public University Case Study

In the case of the PU, we used Strategy on a Page to link information from three different domains in a logical manner, namely information about their i-Strategy, capabilities, and projects. The i-Strategy is created by the management board, while the capabilities were developed with the information manager, and the projects were managed by a program manager. This dashboard was used to provide an overview that can be used for discussions, and further strategy design (Figure 8).

This dashboard illustrates the most simplistic feature provided by Strategy on a Page; namely, the highlighting based on the direct underlying relationships between elements. Furthermore, we also can see the two different types of building blocks used. In the case



**FIGURE 6** Example SWOT analysis canvas (PU case)



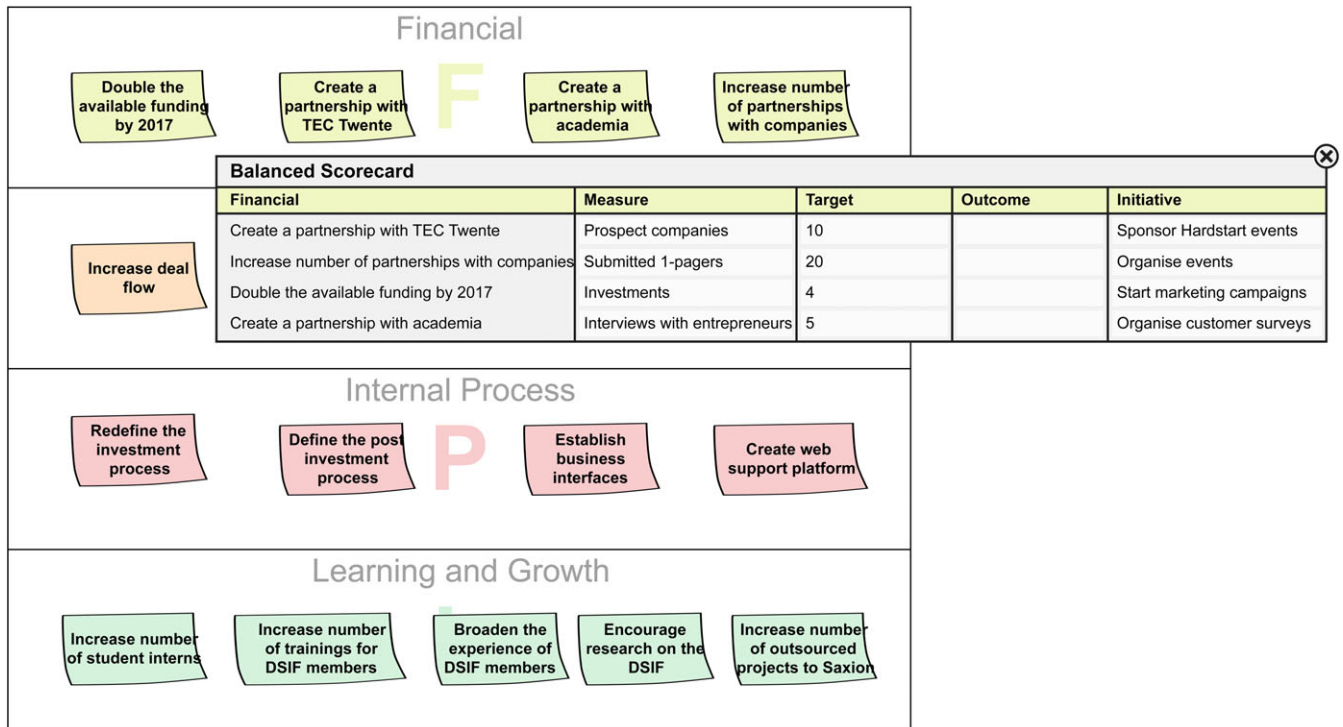


FIGURE 7 Example strategy map and BSC canvas (IF case)

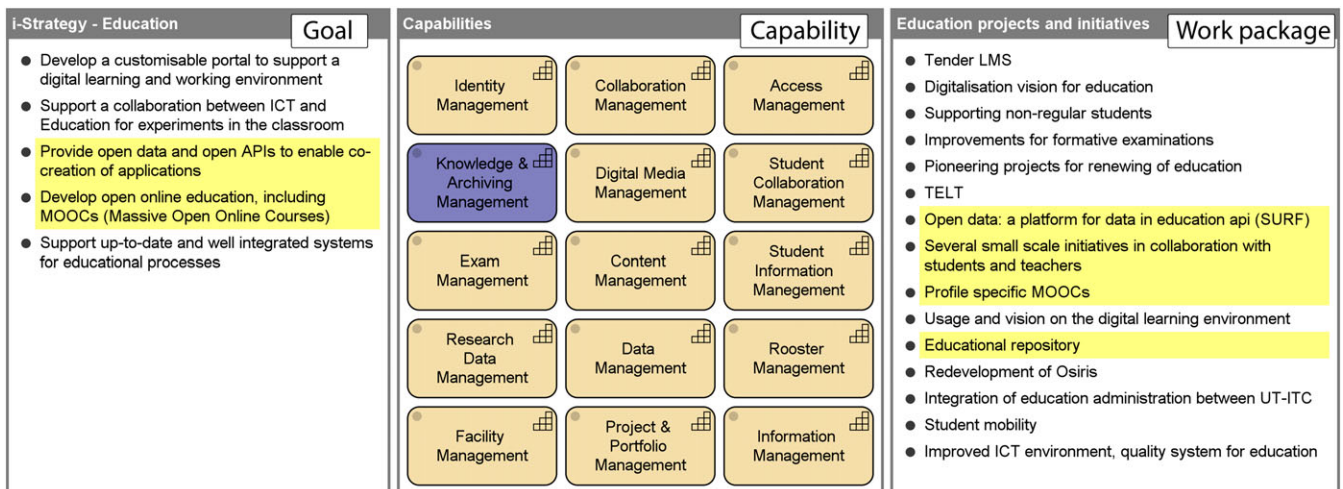


FIGURE 8 Example management dashboard for the PU

of the i-Strategy and the projects and initiatives building blocks, we have used the textual format, while in the case of the capabilities building block we have used the graphical format. The main reason for this is that we have performed multiple types of analyses based on capabilities, for which we used colour coding to illustrate performance levels, impact levels, relevance, and so on. This type of colour coding is more suitable for the graphical format building block than it is for the textual one.

#### 4.5.2 | Investment Fund Case Study

In the case of the IF, we have used Strategy on a Page to, at first, determine what kind of information needs to be generated based on the goals of the organization for the case study. Therefore, we selected

several strategy techniques to be used during the workshops, as detailed in Table 2.

Based on the information gathered with these strategy techniques, we have created three interactive management dashboards with the help of Strategy on a Page, supported by ArchiMate concepts and relationships. These dashboards are designed to fulfil three goals of the organization, as follows:

- To elaborate their mission and vision into clear and measurable objectives. During a 3 h workshop, the mission and vision of the IF were defined, followed by a choice in which value discipline the fund would pursue, and ending with the elaboration of a full BSC.



**TABLE 2** Concepts, models, and techniques used in the three dashboards

Strategy elaboration	New business idea	Impact analysis
Mission & Vision	Resource assessment (relevance)	Resource assessment (impact)
Value disciplines	Capability assessment (relevance)	Capability assessment (impact)
Strategy map	MoSCoW analysis	Boston Consulting Group matrix
BSC	Mission & Vision	Pareto analysis
	Strategy map	Problem & Objectives
	Morphological schemas	Gap and solution analysis

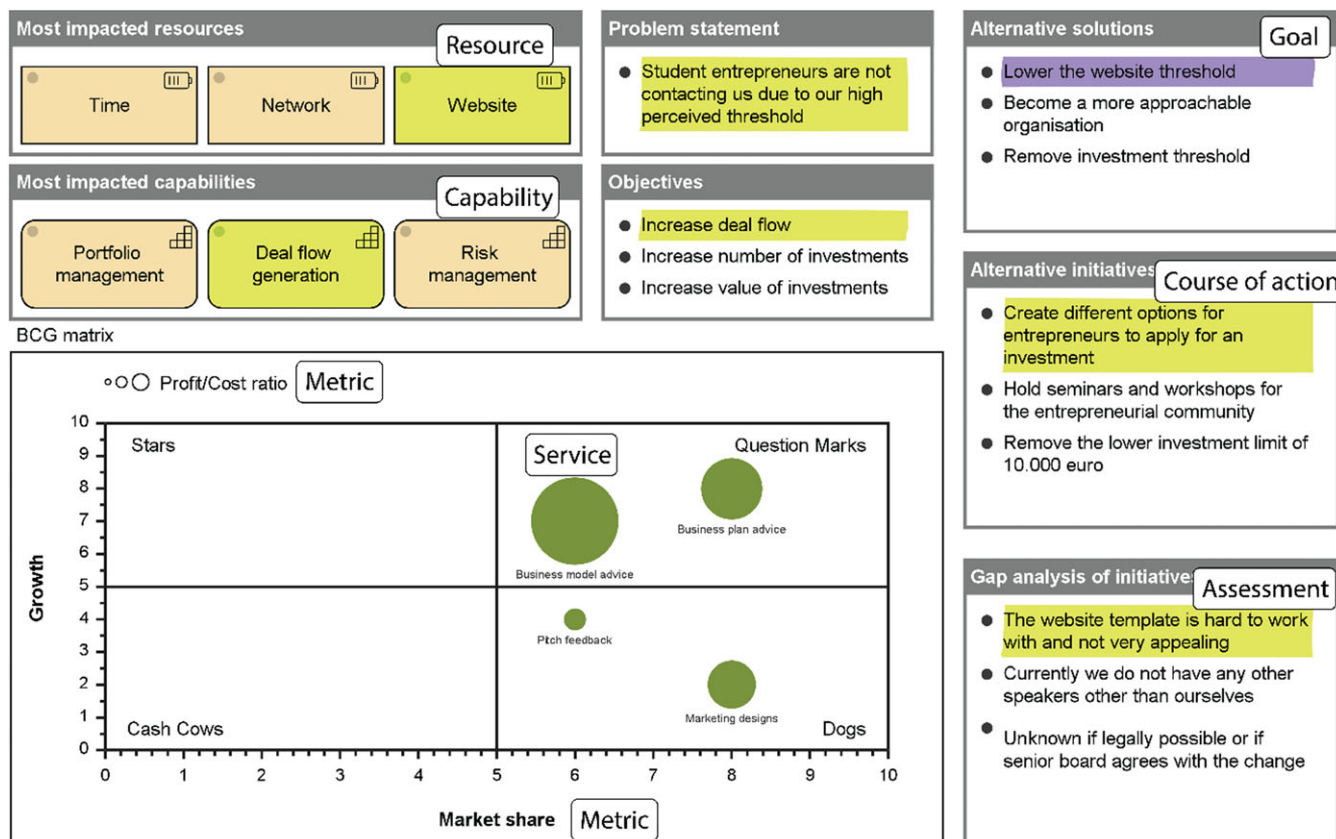
- To refine a new business idea that would help them generate more deals by organizing events to attract and interact with potential customers. This involved a definition of the vision and mission for this idea, an assessment of resource and capabilities based on their relevance to the idea, an identification of several MoSCoW principles, a definition of several goals, and a selection of appropriate requirements.
- To analyse the possible impact of removing the lower investment threshold of €10,000 based on the observation that their target market might require a lower investment threshold. This involved clearly stating the problem, identifying several objectives for addressing this problem, assessing resources and capabilities based on which ones would be impacted, analysing the

current services offered by the IF, and, based on this, defining several alternative solutions, initiatives, and their current implementation gap.

The dashboards that were created for each of these goals were fairly similar. The main difference lies in the types and number of blocks that were used to visualize the information. Thus, we choose to focus on the last dashboard created in this case study (impact analysis), which can be seen in Figure 9, since it presents the most variety in blocks used and it also presents differences to the dashboard of the PU.

One difference which can be seen is that many building blocks can be used at the same time, with different sizes, number of elements, textual length, and types of elements. The only limitation is that the building blocks should still be readable on a computer screen or when printed. This is a design choice, where the creator of the dashboard decides what would help convey the desired message in the most suitable manner, based on the preferences of their intended audience.

Figure 9 also illustrates one of the last features of Strategy on a Page; namely, the addition of charts. These charts are created in a different module of the software tool that deals with EPM, which is also defined with the help of ArchiMate concepts. Therefore, we can copy these charts from the EPM module, and paste them in the management dashboard, without any effort. Similarly, we can copy and paste any other type of information that is defined in the software tool, and which uses the ArchiMate language as a basis. Thus, ArchiMate

**FIGURE 9** Example management dashboard for Impact analysis (IF case)

functions as a common transformation language for the integration of three disciplines: SM, EA, and EPM.

## 4.6 | Evaluation

The formal evaluation we performed during both case studies was part of a larger study having as the main goal the development and validation of a formal method for improving strategic alignment. Hence, the evaluation was focused on multiple aspects: assessment of the results of the case studies, of the proposed method, and of the method's tool support (i.e. Strategy on a Page and its supporting canvases). With respect to the last one, we documented the opinions of the PU and IF representatives regarding our proposed artefact.

In the case of the PU, the Strategy on a Page dashboard was presented to the PU representative with whom we collaborated during the case study. The main scope of this dashboard was to demonstrate how it is possible to use EA and operations at a strategic level. The highlighting feature has been used to emphasize the contribution of projects to the capabilities and ambitions of the PU. The general opinion of the PU representative was positive, which was reflected in his interest to further experiment with Strategy on a Page. Additionally, the PU representative mentioned that he intends to use the dashboard to show our results to other colleagues.

In case of the IF, the management dashboards were presented to the IF president, who found the highlighting feature very helpful for emphasizing the most important relationships between elements. Furthermore, another aspect that was appreciated was the flexibility of the building blocks, which allow for the definition of custom containers of information based on specific needs. Moreover, having only the most relevant information presented in one page was seen as very useful, even in the case of a start-up organization that does not have much information. It is worth noting that we have worked closely with the president of the IF on defining what should be included in these management dashboards. Therefore, they were tailored to the type of information he considered as suitable to get a good overview of the IF plans.

At the moment of writing, a follow-up session with the representatives of the two organizations had not yet been scheduled. However, such a session is considered to be highly beneficial for providing additional insights into the usefulness of our artefact. Moreover, owing to the positive response of both the case study participants and of the initial testers, Strategy on a Page and its accompanying canvases will be included in a production version of the BiZZdesign Enterprise Studio software tool by December 2017. This will make our proposed artefact available to a larger audience, which can provide more feedback and insights into the usefulness of such a tool.

One other aspect worth noting is that, in the case of Strategy on a Page, users might need to have at least basic knowledge of the ArchiMate language, to create the elements that are included in the building blocks. However, this is not required if another user predefines the required elements and relationships. In this case, the user that creates the Strategy on a Page dashboard only needs to drag-and-drop the relevant information from a list into the building blocks. Nonetheless, knowledge of the ArchiMate language should not be considered as a limitation, since Strategy on a Page is intended to be used by EA

practitioners, to help present strategic, tactical, and operational information in a simple manner with advanced features.

The canvases, on the other hand, can be utilized by any type of user, since the connection to ArchiMate is hidden under a very simplistic façade. The users do not need to know what kind of concept they need to model in each part of a canvas, since this selection is already made for them, based on the purpose of the canvas and what ArchiMate elements it should allow. The only thing that a user needs to do is to select the generic element, such as assessment in the case of SWOT analysis, place it on the canvas where it should be positioned, and name it with the desired terminology.

## 5 | CONCLUSIONS

We have proposed a software artefact to help organizations design, present, and discuss their strategy, in a structured yet simplistic manner, with the help of several canvases (based on well-known strategy techniques) and a customizable dashboard (called Strategy on a Page).

Strategy on a Page is designed to facilitate an explicit link to EA, with the help of a mapping to ArchiMate concepts, since it is intended to be used by both strategists and EA practitioners alike. In the case of strategists, the artefact can facilitate the design and planning of organizational strategies with the help of well-known strategy techniques and advanced features. In the case of EA practitioners, the artefact can help visualize EA models in a management-friendly way, by including a limited amount of information and displaying it in a dashboard-like manner.

Additionally, Strategy on a Page supports the highlighting of relationships between the different elements included in the dashboard, to provide more information about the motivation of certain choices. This highlighting is supported by relationships defined in the ArchiMate models which contain the information that is eventually displayed in the dashboard. Additionally, Strategy on a Page is very flexible, which makes it very suitable for creating custom dashboards for any type of purpose or stakeholder.

Our artefact also contains several canvases for several popular strategy techniques available, such as SWOT analysis, BMC, and BSC. The main purpose of these canvases is to help practitioners that are not familiar with the ArchiMate language to provide strategic information in a way that can be directly reused within Strategy on a Page and ArchiMate models. Also, these canvases can be used by EA practitioners to engage in strategic conversations, as part of their extended role.

Furthermore, the canvases included in our artefacts are very similar in visualization to their paper-based counterparts, which makes them very recognizable. They also use very simplistic features to support the creation of information that can be used for decision-making or just for getting a better overview of a situation. Additionally, the information that is filled in one canvas can be reused in another canvas, provided that the two canvases are compatible with each other. One such example is in political, economic, social, and technological analysis, which provides information regarding the external environment of an organization, which can be reused in the context of SWOT analysis, where this information is categorized into opportunities and threats.

The two case studies in which we were able to apply both Strategy on a Page and the canvases helped provide us with valuable insights into how our artefact can be used. However, there are also a few aspects that were not addressed, which we consider as limitations to our study. First, within the case studies, we did not fully validate the usage of the canvases from the point of view of decision-making. We mostly used them to document strategic information and to provide an overview of decisions that have been made. For future research, we intend to explore the suitability of the canvases for decision-making.

Second, we could apply Strategy on a Page in two fairly distinct case studies and in collaboration with two different roles within the organizations. However, we could not evaluate how the representatives would design such dashboard themselves. Nonetheless, we can argue that this limitation only applies in the case of the PU representative, which in his role as an information manager could be tasked to create such a dashboard. In the case of the IF representative, we do not expect that such a role, namely president, would have to design a Strategy on a Page, but rather that he would use it to have discussions and make decisions. Nevertheless, future research should focus on investigating how roles such as EA practitioners, information managers, and others, may use Strategy on a Page to create a dashboard.

Third, the current version of our proposed artefact does not contain advanced analytical features. Although this is not a limitation, we do consider that it would enhance the usage of advanced dashboards for decision-making. Furthermore, such analytical features should not only be localized in one model or technique, but should be used to generate insights based on the underlying cross-model relationships, as also proposed by Iacob et al. (2014). Therefore, for future research, we intend to explore how advanced analytical features can be added to our tool, to facilitate cross-model analysis and traceability, based on the linked information from strategy techniques, EA models, and EPM charts.

## ENDNOTE

- <sup>1</sup> [https://www.mindtools.com/pages/main/newMN\\_STR.htm](https://www.mindtools.com/pages/main/newMN_STR.htm).
- <sup>2</sup> <https://www.smartsheet.com/14-free-swot-analysis-templates>.
- <sup>3</sup> <https://strategyzer.com/>.
- <sup>4</sup> <https://balancedscorecards.com>.
- <sup>5</sup> <https://www.strategyblocks.com/>.
- <sup>6</sup> <http://sparxsystems.com/>.
- <sup>7</sup> <http://www2.softwareag.com/nl/>.
- <sup>8</sup> <https://www.avolutionsoftware.com/>.
- <sup>9</sup> <http://www.bizzdesign.com/enterprise-studio>.

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## REFERENCES

- Acur, N., & Englyst, L. (2006). Assessment of strategy formulation: how to ensure quality in process and outcome. *International Journal of Operations & Production Management*, 26(1), 69–91.
- Aldea A. 2017. Enterprise strategic alignment method: a cross-disciplinary capability-driven approach. PhD thesis, University of Twente.
- Aldea, A., Iacob, M.-E., Quartel, D., & Franken, H. (2013). *Strategic planning and enterprise architecture*. In Proceedings of the First IEEE Conference on Enterprise Systems: ES 2013. (pp. 1–8). Cape Town, South Africa: IEEE.
- Aldea, A., Iacob, M.-E., van Hillegersberg, J., Quartel, D., Bodenstaff, L., & Franken, H. (2015). Modelling strategy with ArchiMate. In *Proceedings of the 30th Annual ACM Symposium on Applied Computing* (pp. 1211–1218). New York: ACM.
- Alwadain, A., Fielt, E., Korthaus, A., & Rosemann, M. (2014). A critical realist perspective of enterprise architecture evolution: conditioning and outcomes. *Australasian Journal of Information Systems*, 18(3), 213–226.
- Amagoh, F. (2008). Perspectives on organizational change: systems and complexity theories. *The Innovation Journal: The Public Sector Innovation Journal*, 13(3), 1–14.
- Audia, P. G., Locke, E. A., & Smith, K. G. (2000). The paradox of success: an archival and a laboratory study of strategic persistence following radical environmental change. *Academy of Management Journal*, 43(5), 837–853.
- Brock, D. M., & Barry, D. (2003). What if planning were really strategic? Exploring the strategy–planning relationship in multinationals. *International Business Review*, 12(5), 543–561.
- Buckl, S., Matthes, F., Schneider, A. W., & Schweda, C. M. (2013). Pattern-based design research in enterprise architecture management. In X. Franch, & P. Soffer (Eds.), *Advanced Information Systems Engineering Workshops. CAiSE 2013* (Vol. 148) *Lecture Notes in Business Information Processing* (pp. 30–42). Berlin: Springer.
- Burke, W. W. (2013). *Organization Change: Theory and Practice*. Thousand Oaks, CA: Sage Publications.
- Colella H. 2017. The art of the one-page strategy. <https://www.gartner.com/doc/3092222> (accessed 7 March 2018).
- Dibrell, C., Craig, J. B., & Neubaum, D. O. (2014). Linking the formal strategic planning process, planning flexibility, and innovativeness to firm performance. *Journal of Business Research*, 67(9), 2000–2007.
- Dunie R, Schulte WR, Cantara M, Kerremans M. 2015. Magic Quadrant for intelligent business process management suites. <https://www.gartner.com/doc/3009617/magic-quadrant-intelligent-business-process> (accessed 7 March 2018).
- Ferrugento, A., & Rocha, Á. (2015). Evolution of methodological proposals for the development of enterprise architecture. In Á. Rocha, A. M. Correia, S. Costanzo, & L. P. Reis (Eds.), *New Contributions in Information Systems and Technologies* (Vol. 353) *Advances in Intelligent Systems and Computing* (pp. 351–359). Cham: Springer.
- Fritscher, B., & Pigneur, Y. (2010). Supporting business model modelling: a compromise between creativity and constraints. In D. England, P. Palanque, J. Vanderdonck, & P. J. Wild (Eds.), *Task Models and Diagrams for User Interface Design. TAMODIA 2009* (Vol. 5963) *Lecture Notes in Computer Science* (pp. 28–43). Berlin: Springer.
- Fritscher, B., & Pigneur, Y. (2014). Business model design: an evaluation of paper-based and computer-aided canvases. In B. Shishkov (Ed.), *Proceedings of the Fourth International Symposium on Business Modeling and Software Design* (pp. 236–244). Luxembourg, Luxembourg: Scitepress.
- Goodhue, D. L., & Thompson, R. L. (1995). Task–technology fit and individual performance. *MIS Quarterly*, 19(2), 213–236.
- Grant, R. M. (2003). Strategic planning in a turbulent environment: evidence from the oil majors. *Strategic Management Journal*, 24(6), 491–517.
- Gregor, S., & Jones, D. (2007). The anatomy of a design theory. *Journal of the Association for Information Systems*, 8(5), 312–335.
- Guay M, Pang C, Hestermann C, Montgomery N. 2015. Magic Quadrant for single-instance ERP for product-centric midmarket companies. <https://www.gartner.com/doc/3177020> (accessed 7 March 2018).
- Harreld, J. B., O'Reilly, C. A., & Tushman, M. L. (2007). Dynamic capabilities at IBM: driving strategy into action. *California Management Review*, 49(4), 21–43.
- Hough, J. (2011). Supporting strategy from the inside. *The Journal of the Operational Research Society*, 62(5), 923–926.

- Hughes, T., O'Regan, N., & Wornham, D. (2009). Let's talk: getting business and academia to collaborate. *Journal of Business Strategy*, 30(5), 50–56.
- Iacob, M.-E., Meertens, L. O., Jonkers, H., Quartel, D. A. C., Nieuwenhuis, L. J. M., & Van Sinderen, M. J. (2014). From enterprise architecture to business models and back. *Software & Systems Modeling*, 13(3), 1059–1083.
- Iacob, M.-E., Quartel, D., & Jonkers, H. (2012). Capturing business strategy and value in enterprise architecture to support portfolio valuation. In *2012 IEEE 16th International Enterprise Distributed Object Computing Conference* (pp. 11–20). Los Alamitos, CA: IEEE Computer Society.
- Iervolino C, Decker JEV. 2016. Magic Quadrant for strategic corporate performance management solutions. <https://www.gartner.com/doc/3333617> (accessed 7 March 2018).
- Nohria, N., Joyce, W., & Roberson, B. (2003). *What Really Works: The 4+2 Formula for Sustained Business Success*. Oak Brook, IL: AudioTech Business Book Summaries. AudioTech.
- Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Hoboken, NJ: John Wiley & Sons.
- Osterwalder, A., & Pigneur, Y. (2013). Designing business models and similar strategic objects: the contribution of IS. *Journal of the Association for Information Systems*, 14(5), article 3.
- Parenteau J, Sallam RL, Howson C, Tapadinhas J, Schlegel K, Oestreich TW. 2016. Magic Quadrant for business intelligence and analytics platforms. <https://www.gartner.com/doc/3200317> (accessed 7 March 2018).
- Peffer, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems*, 24(3), 45–77.
- Phillips, L. D. (2011). What is strategy? *Journal of the Operational Research Society*, 62(5), 926–929.
- Rigby D, Bilodeau B. 2015. Management tools & trends 2015. <http://www.bain.com/publications/articles/management-tools-and-trends-2015.aspx> (accessed 7 March 2018).
- Roelfsema, M., Aldea, A., Lankhorst, M., & Franken, H. (2016). How about strategy? A survey into the pitfalls of strategic alignment. *Journal of Enterprise Architecture*, 12(1), 7–18.
- Schekkerman, J. (2004). *How to Survive in the Jungle of Enterprise Architecture Frameworks: Creating or Choosing an Enterprise Architecture Framework* (2nd ed.). Trafford Publishing.
- Searle S, Kerremans M. 2017. Magic Quadrant for enterprise architecture tools. <https://www.gartner.com/doc/3723436> (accessed 7 March 2018).
- Stenfors, S., Tanner, L., Syrjänen, M., Seppälä, T., & Haapalinna, I. (2007). Executive views concerning decision support tools. *European Journal of Operational Research*, 181(2), 929–938.
- Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning*, 43(2), 172–194.
- The Open Group (2016). *ArchiMate 3.0 Specification*. Zaltbommel: Van Haren Publishing.
- Walker MJ, Burton B, Bolsch M. 2016. Vanguard enterprise architects will lead bimodal Mode 2 innovations. <https://www.gartner.com/doc/3185629> (accessed 7 March 2018).
- Yin, R. K. (2009). *Case Study Research: Design and Methods*. Thousand Oaks, CA: Sage Publications.
- Zigurs, I., & Buckland, B. K. (1998). A theory of task/technology fit and group support systems effectiveness. *MIS Quarterly*, 22(3), 313–334.

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