A Practical Method to Plan Co-Evolution of Business and Information Technology

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Abstract: In our fast-changing digital world, Business-IT alignment is not about reaching an end state where business and IT are aligned but about continuously adapting both IT and business to remain aligned with each other. Currently, managerial instruments for doing so are lacking or disconnected. We aim to provide a light-weight and easy-to-use managerial tool for regular re-alignment and co-evolution of organisational goals and software assets for technical and business-oriented stakeholders. Using a Design Science Research approach, we designed our planning method by conducting exploratory interviews to establish its requirements, reviewing pre-existing instruments, expanding upon them, and integrating them into a single planning process. As a result, we created a 5-step method for collaboratively creating, sharing, and monitoring so-called "evolution plans" and evaluated it in an educational pilot and through confirmatory expert interviews. Our method contributes to emerging research that complements established theoretical models of business-IT alignment with its practical operationalisation.

1 INTRODUCTION

Information technology (IT) is a key business enabler. As organisations adapt their business activities to relentless changes in the commercial, regulatory, and technology landscape, so must they adapt the IT assets on which those activities rely (Visser, 2019). While strategy, rather than technology, should drive these changes (Kane et al., 2015), the business cannot change faster than the IT assets allow (Burden et al., 2018). Therefore, it is crucial that desired business changes can be translated efficiently and effectively to changes in IT assets, which is the domain of business/IT alignment.

The alignment of business and IT has been the object of study for over three decades (Coltman et al., 2015), with a focus on understanding and explaining the alignment as a phenomenon (Henderson and Venkatraman, 1999), measuring the degree to which it has been attained, and identifying its enabling factors (De Haes and Van Grembergen, 2009).Yet, the 'alignment of IT with Business' remains a difficult management issue (Kappelman et al., 2021). As recognized by others (Karpovsky and Galliers, 2015), this is caused in great part by the scarcity of research on concrete *operational methods* that can be used to effectively *establish* or *increase* alignment.

In this paper. we describe a 5-step "evolution planning" method to help operationalize business-IT alignment. To develop the method, we followed a design-science approach where an initial method was refined and evaluated through exploratory and confirmatory interviews and an educational pilot.

We start with related work in Section 2. We outline our research approach in Section 3. Section 4 lists the concrete challenges we identified and hope to mitigate with our method. The method is described in Section 5, and evaluated in Section 6. We conclude with a summary and future work in Section 7.

2 RELATED WORK

Theoretical models have been proposed to *understand and explain* the alignment phenomenon on the level of entire organizations, most notably the seminal Strategic Alignment Model (SAM) of Henderson

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and Venkatraman (1999). SAM describes interrelations among four business and IT components (i.e., business strategy, IT strategy, business infrastructure and processes, and IT infrastructure and processes). Luftman (2004) has proposed to *quantify* business/IT alignment through a strategic alignment maturity assessment, to measure its effects on firm performance (Luftman et al., 2008), and has attempted to *identify inhibiting and enabling factors* for alignment (Luftman et al., 1999).

While it is valuable to understand and explain business/IT alignment, these insights do not provide concrete operational tools to establish or increase alignment. An early exception is the work by Avison et al. (2004), who have expanded on SAM with a 'unified framework' to *assess, monitor, and modify* alignment levels. This framework amounts to a project prioritisation process, taking project proposals or reports as input, that allows management to assign or adjust project resources to enhance alignment. Still, Karpovsky and Galliers (2015) identified the lack of operationalisation as an important remaining challenge if alignment research is to have demonstrable practical relevance.

Arguably, Enterprise Architecture (EA) frameworks can been seen as (collections of) instruments to achieve business/IT alignment. Specifically, EA is intended to facilitate communication between business and IT stakeholders. However, EA frameworks are experienced as theoretical, rather than practical, and their full implementation is often seen as inadvisable and infeasible (Gerber et al., 2007; Evernden, 2015; Buckl et al., 2009). Kotusev et al. (2017) confirmed this view in a study among practitioners. Thus, EA does not offer ready-to-use operational methods for business/IT alignment.

In a more recent step towards the operationalisation of IT/Business alignment, Kotusev (2020) introduces a decision-making pipeline with 5 phases that are increasingly operational and detailed: positioning, focusing, prioritizing, assessing, and implementing. These phases are reconstructed on the basis of interviews with 29 IT planners, and descriptions are given of actors, activities, and documents relevant in each phase. Compared to this pipeline, our 5-step method introduced below provides further operationalisation.

For operational methods that can contribute to business/IT alignment, we can also look to components of agile software development methodologies. While, historically, agile methodologies were focused on software development activities *per se*, the alignment of these activities with business needs is also addressed, especially by frameworks for large-scale agile development such as Large Scale Scrum (LeSS) and the Scaled Agile Framework (SAFe). For example, SAFe offers the notions of 'portfolio vision' and 'strategic themes' that are intended to connect the agile development activities to the larger business context. While these notions give high-level guidance, an operational method specifically focused on the joint planning of (agile) business, and IT changes is currently lacking. Furthermore, Conboy and Carroll (2019) found that scaled agile frameworks are rarely fully adopted, and even partial adoption typically entails ample organisation-specific customisation of the adopted elements. Thus, scaled agile frameworks are in practice used as toolkits from which organisations use those elements that suit them most.

Thus, while traditional Business/IT alignment research still suffers from lack of concrete operationalisation, Enterprise Architecture and large scale Agile software development fail to adequately fill this gap.

3 RESEARCH APPROACH

In our study, we have taken a design science research approach, where the ambition is to design and evaluate an artifact (Hevner et al., 2004; Peffers et al., 2007, 2006). Here, an artefact is for instance a model, a method, a system, or any designed object that embodies the solution to a problem. Within the IS field, design science has been applied in a wide variety of research areas, including (service-oriented) systems development (Keith et al., 2013), information security education, training, and compliance (Silic and Lowry, 2020), and also in the context of strategic alignment (Bourdeau et al., 2018). In our instantiation, the artefact is a planning method and our research activities followed the 6-step design science process model of Peffers et al. (2007).

1) Problem Identification and Motivation and 2) Definition of the Objectives for a Solution: To sharpen our problem understanding and reach our solution objectives, we performed seven exploratory interviews with practitioners (application context) and reviewed relevant literature (knowledge context). For the interviews, we selected people with medium to high experience in roles on the interface of business and IT. Given the exploratory nature of the interviews, we aimed for a diversity of perspectives, rather than representativeness. We invited 20 people from our own professional network, of whom 7 were ultimately found to be suitable and available. Two interviewees had IT roles (Senior IT architect and DevOps engineer), and 5 had more business-oriented roles (e.g., IT strategy consultant). The work experience of five interviewees ranged between 4 and 6 years, while the

other two had about 17 years of experience.

After the interviews, transcripts were analysed through qualitative coding, to interpret, organise, and structure the recorded information. The results were summarised in two main parts: challenges in organisations regarding business and IT integration (problem identification), and ingredients and constraints for possible solutions that organisations use or think can be useful for solving these challenges (solution objectives). Apart from the solution directions identified in the interviews, we reviewed the literature for solution elements that could be used as building blocks for our planning method.

3) Design and Development: We set out to design a new planning method with several constraints in mind. Firstly, we want the method to enable communication and collaboration between IT and business-oriented roles. Therefore, it must be usable and understandable by a broad range of stakeholders. Secondly, we want the method to be light-weight, i.e., executable with relatively low effort and in a short time-span. This allows the method to be used quickly and often, hence doing justice to the agility that organisations currently are pursuing. Finally, we want the method to be applicable within a wide range of companies, which means it cannot be tied to a specific business or technology domain, or to a specific framework for business and IT development.

The first design of the method was created by the last author and then improved by the first author by providing more detail to several elements, adding new elements, and clarifying terminology. In the remainder of the paper, we will describe the final, improved method and only occasionally, when relevant, refer to the first version of the method.

4) Demonstration and 5) Evaluation: We did the evaluation phase in two steps to confirm that our method achieved its intended purpose. Firstly, the (first version of the) method was piloted in an educational setting. A total of 42 students were asked to apply the method as part of two instances (2020 and 2021) of a course on "Managing Software Evolution" which is part of the master program *ICT in Business and the Public Sector*. The pilot served to test the understandability and feasibility of applying the method.

Secondly, we evaluated our method in semi-structured confirmatory interviews with four of the participants of our exploratory interviews. We prepared a presentation of the method elements for these interviews, interleaved with a worked-out example (demonstration) that includes all elements. Each element with accompanying example was presented during the interview, followed by a number of structured questions and an unstructured conversation.

The structured questions were drawn from various technology acceptance models, focussing on determinants for acceptance as found significant in a review of multiple methods by Riemenschneider et al. (2002): *ease of use* (is using the element free of effort?), *compatibility* (is using the element consistent with current ways of working?), *subjective norm* (is using the element accepted by others, such as colleagues, supervisors, clients?), *usefulness* (does using the element enhance the interviewee's job performance) and *intention* (would the interviewee use the element when an opportunity arises?).

6) Communication: A description of the method and the template for its deliverable have been made available under a permissive license in an open repository. The process of designing and validating the method have been published in a master's thesis (Nodehi, 2022) and this paper.

4 ALIGNMENT CHALLENGES AND SOLUTIONS

Exploratory interviews were held with seven experts. Analysis of the interview transcripts through qualitative coding provided us insights into challenges that exist in organisations regarding business and IT integration, and possible solutions that organisations use or think can be useful for solving these challenges. Here we summarise the identified challenges.

- **Lack of Strategy Implementation:** Many interviewees reported a persistent gap between formulating a (digital) strategy and the reality of strategy implementation. After a strategy is formulated, its execution, i.e., translation to concrete actions and desired outcomes, is experienced as highly challenging.
- **Autonomous IT Teams' Culture and Dominance of Business Teams:** Several interviewees indicated that some IT teams give their own objectives precedent over the cooperation with business stakeholders and over overall organisational goals. This can result in overly sophisticated features or over-engineered technical solutions that are not useful or necessary. Conversely, interviewees report that business teams often want to pursue short-term financial goals, constantly pushing and asking the IT team to implement new features and functionalities while disregarding less urgent technical improvements. Over time, overruling the IT people may cause problems and result in low-quality systems. We recognize this phenomenon as technical debt (Li et al., 2015).

- **Diversity of Stakeholder Expectations:** While the involvement of stakeholders is recognised as important and has increased, several interviewees indicated difficulties in managing and aligning the diversity of stakeholder expectations. This may lead to misunderstanding or even ignoring some stakeholder viewpoints, or to adopting disjoint objectives from multiple stakeholders within a single strategy without appropriately connecting or merging those objectives into a shared ambition.
- **Lack of Digital Technology Awareness:** Several interviewees mentioned the challenge for organisations to remain sufficiently updated about technological developments. The rapid pace of technological development makes it difficult to become aware and gain sufficient knowledge of new technologies as they arise, and to be able to take timely advantage of them.
- **Lack of Central Coordination:** Several interviewees mentioned a lack of central organisation, ensuring coherence and a certain level of control over the multitude of projects and initiatives that are being considered or conducted throughout the organisation. Lack of coordination leads to miscommunication, delays, and redundant activities.
- **Lack of Situation Analysis:** Before starting new projects organisations must look at the present state of their business within the marketplace. Though most organisations understand the necessity, many are unable to perform such situation analyses in sufficient depth and at the right time.
- **Need for Structural Changes:** Some well-known frameworks and models such as SAFe and "the Spotify model" exist to remove the gaps between business and IT teams. But implementing these models and frameworks is not an easy task and requires structural changes in organisations.
- **Problems Defining a Clear, Focused, Shared Goal:** The importance of goal setting is evident to every organisation. Organisations not only need to set goals, but they also need to align individual goals to team goals and team goals to organisational goals. Differences in goal definition between individuals and teams may cause conflicts in some organisations and prevent them from improving.
- **Problems in Strategy Formulation:** Organisations must formulate their strategy correctly to achieve their goals and measure their level of attainability. Since the world is changing rapidly and emerging technologies are being entered into the market faster than ever before, it is hard for some organisations to adapt their strategy formulation to the dynamic changes in the market, which prevents them from being sustainable in the market competition.

Apart from the above-mentioned challenges, interviewees mentioned some possible solution directions for some of them, such as centralised strategy formulation, defining organisation-wide KPIs, providing training for employees to increase their awareness, and translating strategic objectives to team-specific targets. Some of these suggested solution directions served as input for our method design.

5 THE PLANNING METHOD

Before designing our method, we reviewed existing instruments, concepts, and techniques that may be usable as components for our method. The existing methods that we reused include: stakeholder analysis (Kennon et al., 2009), SWOT and TOWS analysis (Weihrich, 1982), gap analysis (Marra et al., 2017), design moves (Woodard et al., 2013), risk management (Ahmed et al., 2007), roadmap (Kostoff and Schaller, 2001) and logframe (Sartorius, 1991) . Since these individual instruments are valuable and well-known, our design approach has been to integrate them into a coherent planning method.

Our planning method consists of a *5-step planning process*, conducted by a *planning team* through various interactions with relevant stakeholders, leading to a deliverable, called an *evolution plan*. An overview of the process and the resulting deliverable are shown in Figure 1. The evolution plan is created incrementally in the first three steps of the process, then validated in the fourth and disseminated in the final step. This plan typically takes the form of a set of presentation slides, or a written report.

5.1 Planning Team

To lead the planning effort, a small team of about 2-4 members is formed. This team is tasked with driving the planning process, interacting with various stakeholders, and delivering the final evolution plan. The planning team members must be able to bridge business and IT and have good interpersonal, analytical, and communication skills. Product owners, product managers, business analysts, and IT strategy consultants are typically well-suited for this role.

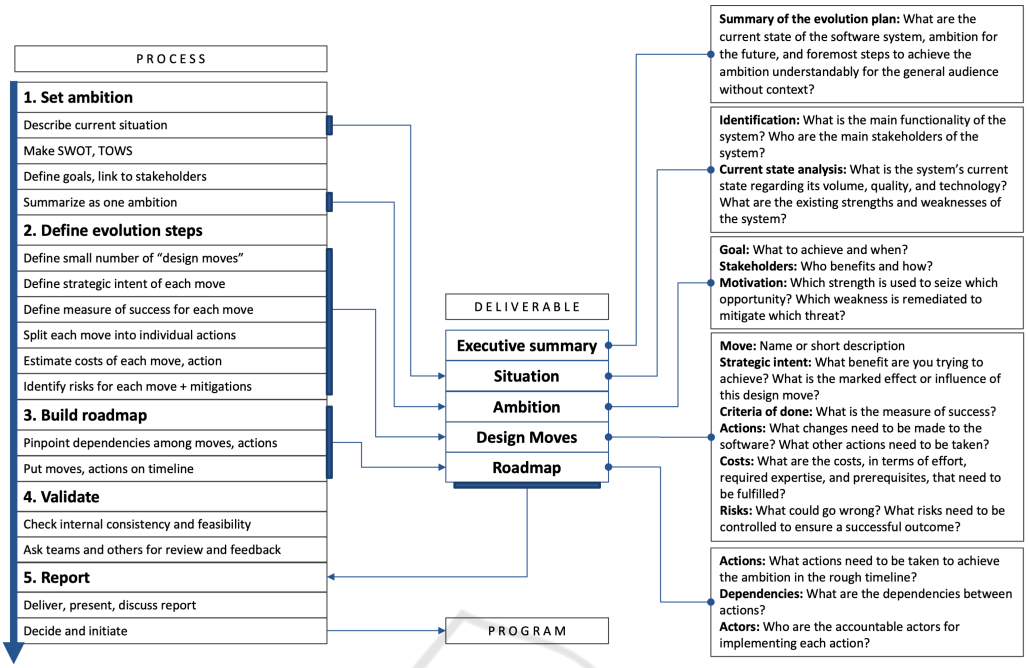

Figure 1: The planning method. An Evolution Plan is created, validated, and disseminated in a 5-step process (left). The deliverable (center) consists of various components (right), as illustrated with labels and questions.

5.2 Step 1: Set Ambition

In the first step of the planning process, the ambition of the evolution needs to be set. The planning team first assesses the current situation through interviews, document review, and possibly technical inspection of current systems and processes to derive the ambition. This leads to a succinct description of the current situation in organisational terms (e.g., key stakeholders, cost and revenue of current services, competitive position, regulatory concerns) and technical terms (e.g., system architecture, technical debt, quality of development and deployment processes).

Secondly, the team conducts a SWOT (and possibly TOWS) analysis in collaboration with selected stakeholders to clearly identify and describe strengths, weaknesses, opportunities, threats, and their interconnections. Typically, the SWOT is created through short workshops, which are initiated by reflection on the described situation. Thirdly, a list of (strategic) goals is drafted, where each goal relates to elements of the SWOT, and is linked to specific benefits for specific stakeholders. Also, for each goal, the gap with the current situation is analysed. This is done by describing the gaps, categorising them as performance gap, profit gap, market gap, etc., and listing possible solution directions. Finally, (a selection of) the goals are summarised into a single ambition statement. The ambition statement should preferably be a single sentence, formulated to be understandable to all stakeholders. Also, the ambition should be quantified (measurable) and time-bound. The defined horizon for the ambition will typically be between 12 and 18 months, depending on what is appropriate in a given organisational context.

5.3 Step 2: Define Evolution Steps

In the second step, the planning team defines a (limited) set of course-grained evolution steps from the current situation to a to-be situation that fulfills the overall ambition. These evolution steps take the form of *design moves* in the sense of "discrete strategic actions that enlarge, reduce, or modify a firm's stock of [digital artifact] designs" (Woodard et al., 2013). To define design moves, the team may reflect upon the gap analysis and possible solution directions for each gap. Examples of design moves are adding a new functional module to a software system, adding an interface, separating out core functionality into a reusable library, exposing configuration parameters to users, deployment onto a new infrastructure, or removing support for little-used export/import formats.

A design move is given a short name for future reference, and is defined by a concise description and a number of attributes. Its *strategic intent* explains its rationale in relation to the ambition and/or the formulated goals. Its *measure of success* is a quantitative

'definition of done', i.e., a criterion or metric that clarifies what constitutes successful completion of the design move. Also, a design move is decomposed into a set of actions that can be assigned to specific roles or teams. A *cost estimation*, is given of required effort and possibly other resources (e.g., purchase of a software licence) or inputs (e.g., agreement with a business partner). Finally, *risks and mitigations* discuss adverse events that may impede the completion of the design move with an estimate of their likelihood and possible mitigating actions.

The responsibility for defining the design moves lies with the planning team, who must do so on the basis of input from stakeholders. This is a design activity that is best conducted in an interactive or iterative fashion, where design moves are drafted on initial input, then presented for discussion and review, adjusted based on feedback, until a satisfactory set of design moves has emerged. Care must be taken to define design moves at a course level of abstraction. A good heuristic is about 3-7 design moves, where each design move comes with up to 5 associated actions.

5.4 Step 3: Compose the Evolution Plan

The third step of the evolution planning process is to compose the complete evolution plan out of the elements that have been defined so far. From the various design moves and their constitutive actions, a roadmap is derived, where evolution steps are put onto a timeline. The items on the roadmap can be the design moves themselves, their constituting actions, or a combination of these. Building a timeline starts with analysing dependencies between roadmap items. These dependencies then determine whether items can occur simultaneously, or must be executed consecutively. Also, required effort and resource availability are taken into account to determine the place of each item on the timeline.

Optionally, the roadmap can be supported with two additional overviews: (i) a risk mitigation matrix, where risks and the effects of mitigating actions on their impact and likelihood are displayed in a matrix, and (ii) a benefit mapping that shows for each design move and/or action which stakeholders are benefited and which carry responsibility for their realisation. Once the roadmap has been defined, all elements of the evolution plan are in place and supplemented with a (single-slide) executive summary.

5.5 Step 4: Validate the Evolution Plan

In the fourth step of the evolution planning process, the evolution plan is distributed and/or presented to various stakeholders for review, validation, and possible adjustment. This wide-loop explicit validation step comes on top of any tight-loop validation activities carried out throughout the earlier steps. In case validation leads to uncovering fundamental problems in the plan, the process needs to return to the start. Otherwise, minor imperfections can be ironed out before proceeding.

5.6 Step 5: Facilitate Initiation and Monitoring

The last step of the planning process is to set the evolution plan in motion. The planning team delivers the final report of the plan to the decision-making unit (DMU), followed by a presentation and a discussion of the plan with the DMU. This allows the DMU to approve the plan and commit to its execution, typically by initiating a dedicated project or program, or requesting the plan to be merged into ongoing transformation activities. Optionally, a logframe is constructed to facilitate monitoring of progress, results, and benefits during the execution of the plan.

To support the evolution planning process, we have created a number of supporting resources, available under CC-BY-SA licence[1], such as a multi-tab spreadsheet that supports incremental data collection, a template report which includes presentation guidelines and instructions on how to instantiate the template, an example report of a fictional case and a manual explaining how to conduct the evolution planning process and use the various resources throughout.

The planning method that we propose addresses a number of the alignment challenges mentioned in Section 4. *Lack of strategy implementation* is addressed by the explicit linking of proposed design moves and actions to the overall ambition, and by specifying benefits for each stakeholder, motivating their involvement. *Autonomous IT teams and the dominance of business teams* are addressed by the collaborative nature of the planning process, where a cross-functional planning team helps to balance both sides. The *diversity of stakeholder expectations* is managed through stakeholder analysis and the mapping of benefits to stakeholders. Shared evolution plans improve central coordination. *Lack of situational analysis* is counteracted through analysis of the current situation supported by stakeholder and SWOT analysis. Using the planning method does not rely on the implementation of a comprehensive framework that requires *structural organisational changes*. The formulation of a shared ambition in an evolution plan

[1] https://github.com/jstvssr/evolution-plans

establishes a *clear, focused, and shared goal*. Finally, evolution plans help with *strategy formulation* in a dynamic environment, as the method is light-weight and can be conducted rapidly and frequently.

6 EVALUATION

We first evaluated *understandability* and *feasibility to apply* our planning method by piloting it in an educational setting. Some optional elements of the method were not included in the pilot, such as TOWS analysis, stakeholder analysis, and gap analysis. A rubric was used to grade the evolution plans delivered by the students, covering the correct application of each method element, internal consistency of the entire evolution plan, and presentation clarity. According to our observations, students quickly understood and applied the method in a limited time with good results, which supports its understandability and feasibility.

Secondly, during confirmatory expert interviews, we presented and demonstrated all the method elements to the interviewees, and their qualitative and quantitative feedback was collected based on the technology *acceptance* criteria mention in Section 3.

According to our observations, interviewees perceived most elements such as SWOT, TOWS, the stakeholder analysis, risk mitigation matrix, and the executive summary as *easy to use*. They found the ambition and roadmap less easy to use, and the monitoring element (logframe) somewhat difficult to use.

Most of the elements were found *compatible* with interviewees' current working styles, and interviewees thought other people in their organisations would also accept using them (*subjective norm*). In general, they thought that the ambition element would not be accepted in their organisations. Possibly, stating an ambition in a concise and high-level manner is feared to be too confronting in complex corporate environments. A tactic by employees or consultants in these environments may be to lay low and not state the ambitions quite as unitary, but rather state multiple goals such that multiple stakeholders can recognise their own ambition in the list. Given the challenges enumerated in Section 4, we however posit that crisp ambition setting is a key success factor for alignment.

Although interviewees mentioned that most elements directly would improve their performance (*usefulness*), they thought that some elements such as ambition, stakeholder benefits, and monitoring matrix would not make them more effective. They expressed mostly strong *intention* to use all elements except ambition and monitoring.

In short, while the education pilot demonstrated the feasibility of our method, the confirmatory interviews provided indications that the overall method is deemed to be useful, though some elements (e.g., monitoring matrix) are considered hard to use or not very compatible with current ways of work, and other elements having low usability (e.g., ambition). Further evaluation is needed to follow up on these results.

7 CONCLUSIONS

We designed and evaluated a concrete *lightweight operational method* for planning the co-evolution of business and information technology, with the aim of bringing the Business/IT alignment field forward from abstract, macro-level insights to pushing forward the micro-foundations of the field. We have initiated the evaluation of our method, now however still limited to an educational pilot and expert interviews. The interviews were limited in the role and number of interviewees, lack of internationalization, and gender bias. Therefore, further evaluation is required to capture a broader range of perspectives. Currently, we are setting up case studies in various organisations to evaluate the method's applicability in the field, to shed a light on the actual *effects* of using the method, where the question arises whether businesses or business units that employ the method can achieve improved alignment, as measured e.g., by the strategic alignment maturity model of Luftman (2004).

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