Towards an agile and adaptive Enterprise

Holger Cermann[1], Sebastian Kern[2], Florian Bertram[3], Martin Sander[4], Thomas Heimann[5], Rachel Proctor[6]

Abstract: This paper contributes to the challenge of enterprises responding to factors that require a change and transformation. It proposes a concept that can be adopted by enterprises' organizational functions to empower agility and adaptability as a response to this challenge. The concept fills the gap of transformation challenges towards agility and adaptiveness. This is of particular relevance for classic and hierarchical-oriented businesses in a frequently faster-changing world. The main element of the concept describes a stepwise thinking pattern intended to guide a function's adaption process. It builds on industry-wide accepted principles of adaptive enterprises and applies the concept of reference architectures that shows a potential application of the stepwise approach in more detail. This paper builds around industry experiences that have the function of Enterprise Architecture Management (EAM). This is because the EAM function plays a central role in driving its enterprise with transparency and decision support in the process of transformation.

Keywords: Adaptive Enterprise, Agility, Agile Transformation, Change Management, Principles

1 Introduction

The speed at which industries are disrupted and reshaped is increasing. Since 2000 more than half of the companies in the Fortune 500 have been acquired or ceased to exist [Bo15]. A key capability to overcome the challenge of these complex and fast-moving times is the use of digital technologies. There are many cases in which they have already proven to be essential enablers of value. One example is the use of cloud technologies to adapt an organization's infrastructure and become more competitive [CA16]. By maximizing the utilization of servers and requesting infrastructure resources on-demand, enterprises are empowered to reduce their total cost of ownership and build their infrastructure flexibly around the needs of changing business models. In addition to technological enhancements, enterprises are adopting lean and agile workflow and organization models to increase the adaptiveness of the organization itself. These agile models emerged from technology companies that built their strategies and capabilities around digital technologies to facilitate agility, adaptiveness, and a shared way of thinking between business and IT resulting in fast market response. To overcome the challenges of these fast-moving times, political and economic institutions are promoting the development and adoption of digital

[1] Capgemini, holger.cermann@capgemini.com
[2] Capgemini, sebastian.b.kern@capgemini.com
[3] Capgemini, florian.bertram@capgemini.com
[4] Capgemini, martin.sander@capgemini.com
[5] Capgemini, thomas.heimann@capgemini.com
[6] Capgemini, rachel.proctor@capgemini.com

technologies and agile models [Sa03]. However, practical experience and the available body of research show that the adoption of these approaches is challenging for organizations. This is particularly true for classical business models and comes with great differences in risks and expectations among the stakeholders [Su18]. Consequently, it becomes important for enterprises to mitigate the risks when transforming an enterprise towards adaptiveness and agility.

This paper contributes to the digitalization research by proposing a stepwise approach that allows an enterprise to move its business structure towards adaptiveness by going through six phases. The phases allow an enterprise to reduce the risk that is associated with change and transformation efforts. They were developed together with industry experts who are engaging in transformation projects of enterprises in their day-to-day work.

The proposed concept in this paper adds to the growing body of literature on transformation management and digitalization models. It adopts the two rather static concepts of principles and reference architectures and adds the required activity and processing view that enables the desired state of transformation.

2 Implications for Enterprises

The world is changing more quickly than ever, and enterprises must be adaptive to remain viable and retain their competitiveness. This is mainly driven by advancing digital solutions and new flexible business models. Additionally, existing hierarchical companies are facing new challenges and increased competitive pressure from companies that build their business model around digital solutions. To retain a competitive edge, they are required to adapt their business models and integrate digital technologies to enhance their value creation. The classic build enterprise must understand the characteristics of the required change and consider various perspectives cross-cutting multiple domains, businesses, and IT components. This challenge should not be seen as a one-time project but rather an evolutionary approach that can handle emerging requirements in a fast manner to remain competitive while adapting the enterprise. Among others, this includes the adoption of a business strategy that is considering internal and external factors that are driving and supporting this change. For example, the internal structures in an enterprise must be adapted in a way to encourage change. From a business perspective, this includes the development and empowerment of capabilities, e.g. competencies for the execution of agility.

2.1 Principles for an adaptive enterprise

Due to given challenges enterprises need to increase performance, value creation, and time-to-market to remain competitive. In general, enterprises are faced with the challenge

of doing more and better things in less time and at the same time, the context of the enterprise is evolving at a top speed.

To meet these requirements the concept of principles has evolved and matured through various research and industry applications. Principles are general rules and guidelines to serve the fulfillment of an enterprise's strategy and mission. They may be established at various abstraction levels, both horizontally and vertically, and may be linked in a hierarchical set that forms a structured composition towards a common and pre-defined goal. For example, from generic to specific architectures, business to technology, or strategy to operations. Because of their strategic nature, which is spanning wider time horizons, they are intended to be long-living and have a holistic and general intention. The instance of a principle is a statement that is tied and applied to an action or thinking process – it can be seen as the frame around an action that has a secondary implication to the processing view of an enterprise on how to implement an action. As a result, the output of the executed action or thinking is directly guided towards the overall goal. A principle can be described in a textual form containing a name, statement, rationale, implication, and link to other principles to build up a hierarchical structure.

Principles are long-living and last for several years. Various research and industry applications have proven the effectiveness of principles for enterprises. This concept has also been adopted by enterprises in the view of transformation and adaptiveness. However, little research has been made around how these principles can be applied by a specific organization considering the current increasing demand for adaptiveness.

3 Implications for Enterprise Architecture

Due to the increasing use of digital technologies and agile models to handle transformation challenges, organizational functions that are integrated at the intersection of business/IT and strategy/operation become more important to align these elements. One of these interdisciplinary functions is the Enterprise Architecture Management (EAM) function. EAM functions are used by enterprises to enable goals like transparency standardization, business-IT alignment, and management support on multiple levels such as the strategy, portfolio, project, or operational level. Additionally, various frameworks, methodologies, and working practices that were developed in research-industry collaborations, and have gained industry-wide acceptance, are supporting the execution of the EAM function. Agile methodologies are already adopted by the Enterprise Architecture function to deliver increments according to their business value [Cb18]. The following are examples of how these goals are enabled through the capabilities of the EAM function: First, transparency is enabled by modeling representations of, e.g., the enterprise's as-is application landscape cross-cutting business-process-views. Secondly, standardization is enabled, e.g., by using architectural principles across the IT organization that are in alignment with the strategic direction of the enterprise. Thirdly, business-IT alignment is enabled, e.g., by communicating an enterprise-wide and context-specific glossary that allows for a common

language across relevant stakeholders. Finally, management support is enabled e.g., by creating a reporting and measurement system that provides input for pre-defined quality gates.

Enterprises usually expect a faster time to market, increased ability to innovate, increased quality, effective risk mitigation, and a reduction of costs. The following picture depicts the described sequence and effect through the implementation of the EAM capability in an enterprise:

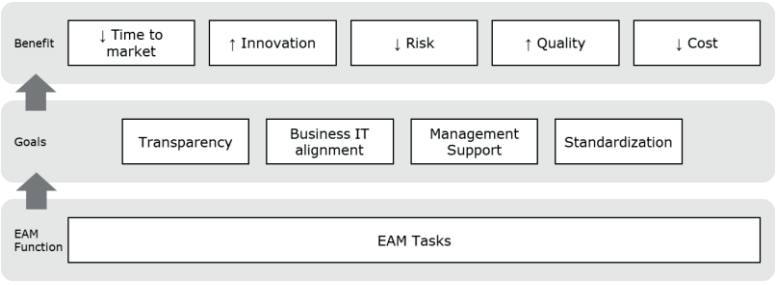

Figure 1: Desired effect by implementing an EAM function

Given the EA effect, capabilities, toolset, deliverables, processes, and industry-wide acceptance of the EAM function, an enterprise might use it to support transformation challenges with IT business participation. Further, the concept of principles, which is adopted by enterprises in the light of transformation, is already embodied in the capabilities of the EAM function. Therefore, the EAM function may support transformation efforts in multiple ways. EAM can enable transparency to find the right level of adaptiveness and agility for the different parts of an enterprise. And it can enable a standardized and stepwise procedure to approach an enterprise's adaptiveness. Furthermore, it can provide insights that are relevant for decision-making and alignment of business and IT in the light of transformation.

This paper will provide a concrete example of how the stepwise approach will be rooted in and executed by the EAM function. It depicts the transformative concept of AI and shows how the capabilities of EAM can put the use of AI into an enterprise-wide context, hence enabling desired business goals. The capabilities of EAM are related to multiple layers of an enterprise and can be tied to multi-domain entities. Therefore, it can provide solution approaches for the use of AI in an enterprise-wide context. AI has already proven its effectiveness in various business domains. Concepts are already used in different areas to increase adaptivity. These include, for example, using AI Ops to improve operations and security, or monitoring networks combined with predictive maintenance to reduce costs and mitigate risks. The concept for AI aligns with the requirement of an EA function to address the transparency of an enterprise holistically. This means that an enterprise is sliced and diced into horizontal and vertical layers that allow stakeholder-specific views to address their given concerns. The IAF Framework is an industry-wide accepted

framework that addresses the representation of architectural blocks and their relation to each other to achieve transparency in an enterprise. In the following section, the paper makes use of Aspect Areas and Domain-specific views from the IAF. Aspect areas are represented horizontally, and Domain-specific views are represented vertically in the capability map depicted as Figure 2.

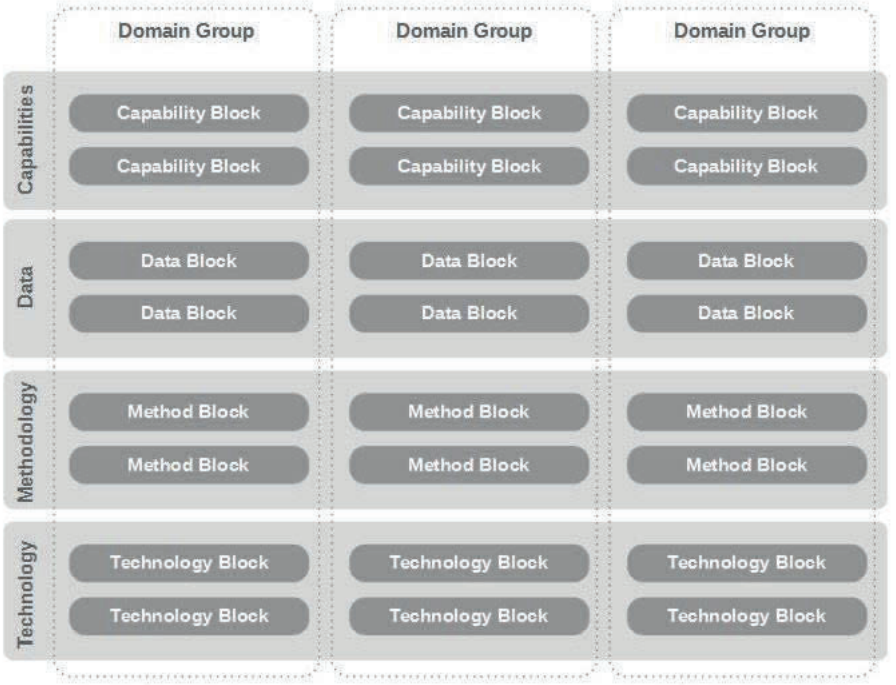

Figure 2: Domain map of architecture blocks adopting IAF Aspect Areas

4 Six phases to transform an Enterprise towards adaptiveness

Enterprises are facing transformation challenges and demand their organizations to be more adaptive towards change. Principles have already been used by enterprises to give direction to the creation of adaptive capabilities. The EAM function provides capabilities at the intersection of IT/business and strategy/operation. Principles are general rules and guidelines with the goal of serving the fulfillment of an enterprise's strategy and mission. Figure 3 depicts the general process, which will be detailed in the next sections.

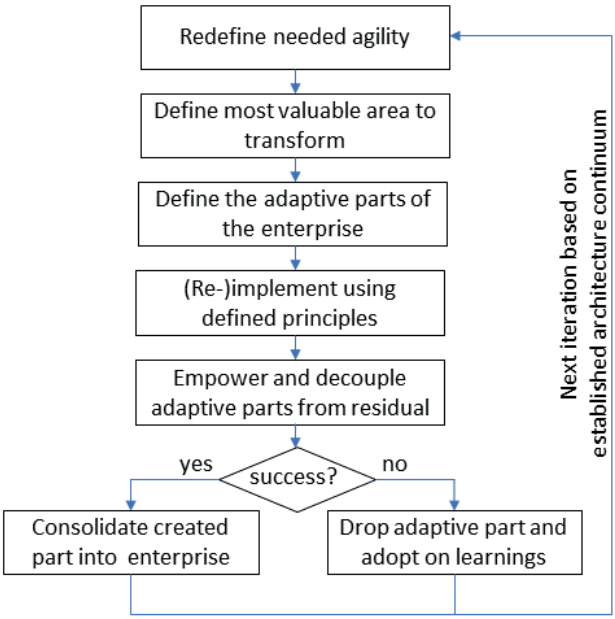

Figure 3: Six phases approach towards an enterprise's adaptiveness

4.1 Redefine needed agility (Phase 1)

Agility comes with a price, and productivity reduces in the first stages. But on the other hand, agility comes with value. Over time it increases productivity, enables the organization to be innovative, and establishes a culture in which work is experienced as positive, highly purpose-driven, and providing pleasure [Ri12].

Levers in positive as well as negative directions will occur in the enterprise's transformation towards agility. Depending on need and context, the levers are to be analyzed independently. Negative resulted levers can be, for example:

- Less long-term planning capabilities in the context of highly regulated and externally embedded processes.
- Needed changes also on interfacing company parts (people and IT)
- Different (and case-wise not optimal) planning methods in adaptive enterprise parts embedded in traditional enterprises.
- Amount of recurring adaptions/changes needed due to adopted target picture.

This evaluation will change over time – with upcoming adaptiveness in the overall enterprise and interconnections. In this phase, the enterprise defines the scope of agility.

Concrete business cases with coupled value propositions can help to understand and redefine the degree of the required agility. Although the transition towards adaptiveness and agility will be worth it in most of the identified business cases [MC09], different parts of the organization will have different potential to move towards adaptiveness. Therefore, the enterprise needs to understand that moving towards an adaptive enterprise comes with a price and a definition of the needed agility helps to prioritize the use of resources that is required for the move towards adaptiveness.

4.2 Identify where the enterprise needs to be most adaptive (Phase 2)

For architectural partitioning, TOGAF proposes to use time, breadth, and level as dimensions [Og18]. In the context of this publication, we focus on Subject Matter (breadth) and organizational structure. The rationale for this lies in the people dimension, which is embedded in the line organization: Adaptive enterprises require adaptive and agile mindsets that are built around people. We propose to make the "people dimension" a key in the transformation approach. And a stepwise transformation must always include a stepwise transformation of the people behind it (team training / upskilling, team rotation, team change). One reason is that most successful changes must include multi-perspective change elements rather than being delivered in a top-down or bottom-up approach itself with an extensive pre-defined plan [Mc09]. And especially for people management, a stepwise and adaptable approach is important to anchor new approaches deeply into the organization's culture [Jc96]. Furthermore, organizational units of an enterprise vary in their scope and relation to the enterprise, thus requiring different levels of transformation. Proposed levels of transformation might be (ordered in decreasing size):

- Partially decoupled sub-organizations (i.e. small startups) in the enterprise.
- Divisions/Departments with already existing interfaces to the organization.
- Existing or upcoming project, program, or line management teams/departments.
- Agile parts of an existing department focused to take over business processes from the embedded department in an evolutionary process.

In this phase, the enterprise identifies the parts of the organization and its boundaries which shall be in the focus of moving towards adaptiveness. Furthermore, a special emphasis must be given to the breadth and organizational structure with particular attention to the influence coming from the dimension of people. After this phase, the enterprise should have created an awareness and understanding about where and to what extend the move towards adaptiveness is necessary for the respective boundaries and parts of the organization.

4.3 Define the adaptive parts of the enterprise (Phase 3)

Systemic approaches help enterprises to mitigate risks and be more successful with managing changes [Gc04]. As described in the previous chapter, the move towards

adaptiveness requires various considerations regarding the change. To increase the chances of success and value creation when applying this concept, a more detailed structure to go through two critical dimensions in a two-step process is proposed in this phase of the concept:

- Evaluation process on needed adaptiveness: Organisation view
- Evaluation process on needed adaptiveness: Process view

As described in Phase 2, organizational boundaries (and given Conway's law also other structural areas including IT) are proposed to be a key delimiter in this approach. To address the different levels explained in Phase 2 (Suborganisation, Division, Department, Program, Process) a tree-based scanning method can be applied, where – starting at the sub-organization level – the evaluation can be applied. For the evaluation itself, a target company-specific criteria list needs to be applied. Ubiquitous criteria candidates could be:

- Change frequency of the underlying business domain and IT landscape
- Need for differentiation in given domain (in relation to competitors)
- Current strategic business fit
- IT backlog size in terms of demanded business change
- Potential for IT-driven change in business domain (including AI opportunities)

In section three, this paper describes the capability of the EAM function to create transparency in an enterprise by modelling Aspect Areas and Domain-specific views by applying the IAF framework. Picking up the example of AI, which is a transformation-supportive digital technology, this phase can iterate through the EAM function to elicit information from the enterprise that supports decision-making for the definition of the adaptive parts. As an example of how the EAM function may model the use of AI to support decision making, the following picture shows a model instance and domain view of potentially relevant architectural AI blocks cross-cutting the IAF Aspect Areas in the context of adaptiveness.

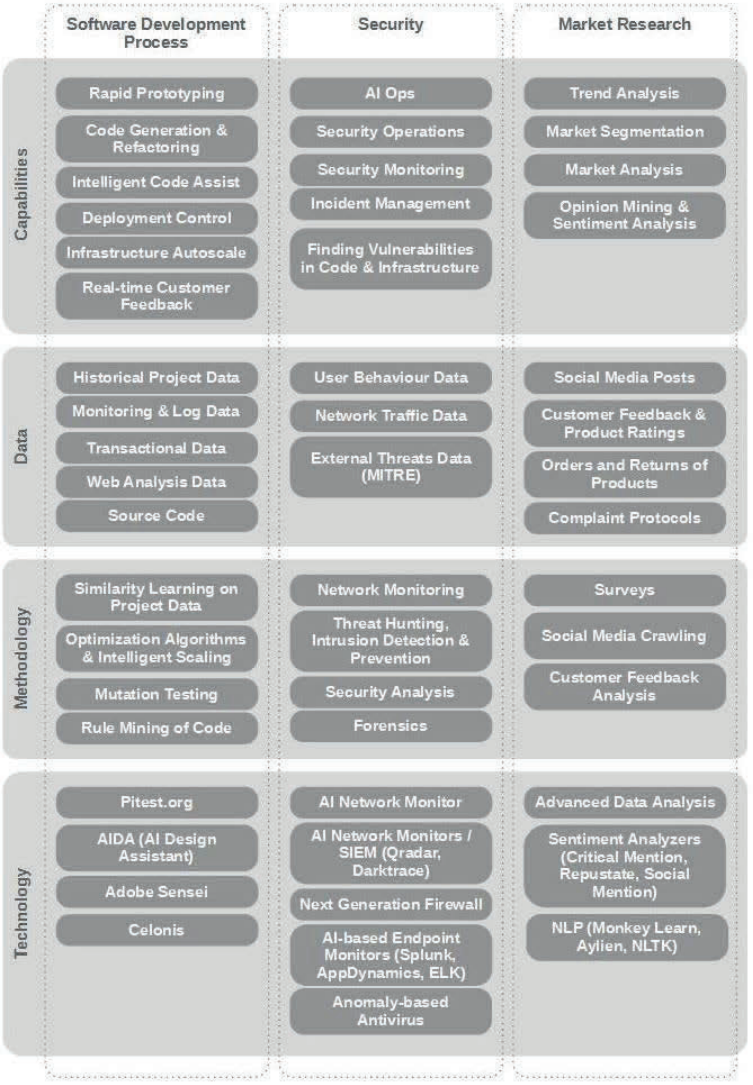

Figure 4: General view of architectural AI Blocks to support decision making

This view enlists AI-based capabilities that support the move of an enterprise towards adaptability. In this step, the paper identifies which of these capabilities can be implemented and how, making use of the EAM function and AI for increasing the adaptability of an enterprise. In alignment with agile principles and in a similar fashion how enterprises can iterate through the EAM function to acquire information for decision

making, the paper proposes to iterate frequently through the EAM function to make informed decisions and adjustments/re-implementations of respective models.

4.4 Use defined principles to (re-)implement the adaptive part (Phase 4)

An enterprise can choose from a plethora of different approaches on their change journey [Tm03, As15]. For the specific change case of adaptiveness, section two highlighted that adaptive enterprises are using principles to support their adaptiveness and achievement of long-term goals. These existing principles, however, are built around the behavior of an already adaptive enterprise. An extract from principals of adaptive enterprises that have shown practical application is listed as follows [Bv05]:

Be innovative: An enterprise must constantly be aware of possibilities that create new values and secure the viability of the enterprise. Also, it must monitor the progress of innovative initiatives within the enterprise and scale the developed solution into an enterprise wide context.

Holistic thinking: An enterprise must have an overall view of its organizations and ongoing initiatives. This principle is strongly related to transparency so that decision-making is supported in adequate ways. Having an overall picture allows the enterprise to pave the way for future states.

Interdependence: This principle describes the importance of the relation of distinct principles. As described in section 2 principles must be linked to each other to provide the relevant systemic structure to support the overarching goal or business case.

Although this list gives non-adaptive enterprises an idea of how a potential adaptive state might look like, there is little guidance on how to move towards adaptiveness. Therefore the paper developed four guiding "principles of procedure" that can be used by an enterprise when approaching or adjusting its adaptiveness:

***Revolution*:** A "revolution" is fast but also risk-prone and only works in specific cases. The paper proposes to use the revolution approach when setting up agile sub-companies/departments or carve out existing - and capable - teams/sub-companies. This is because these parts of the enterprise are more or less isolated, and therefore the impact of an occurring risk can be managed more easily. It must be mentioned that this approach is not always successful and highly depends on the current mindset of the involved people. A mindset change and preparation phase before "flipping the coin" is a mandatory success factor.

***Evolution*:** In most cases where a fast change is not possible, "evolution" can be possible. This is because of multi-level structures and dependencies within and across enterprises that build up a complex system. The drawback is that this approach and the shifting mindset of the people can be very slow, which can be a reason for failure itself.

Furthermore, top-down steering, organizational silos, or deep-rooted processes and behaviors may work against an evolutionary approach.

***Submarines/Speedboats*:** Submarines/Speedboats can help you figure out the best approach, also to generate visible success stories for the part of the enterprise which is still to be transformed. They need to be continued, e.g. by a follow-up revolution.

Recreation: While not an appropriate approach for bigger and already future-oriented and well-performing parts of the organization, this transformation approach can be used to substitute existing structures (business as well as IT) with new capabilities created in parallel. While the initial transformation effort and also the information system transition architecture efforts exceed the variants above, this approach can unlock possibilities with a controllable risk. To succeed in any of the proposed approaches, invariant enterprise architecture capabilities are needed in the part to be transformed.

It is recommended that the principles of procedure described above (this also applies to principles in general) are not an isolated approach and should rather be used in combination and hierarchical linkage with other principles during the transformation journey. Furthermore, they will not fit the enterprise as a whole, and therefore an individual adaption and fit for respective parts of the enterprise should be considered.

As described in section 3, the EAM function plays an important role in the alignment of transformation goals within and beyond the enterprise. To support the move towards transformation and in addition to the enterprise principles above, the paper proposes an underlying principle for the EAM function itself:

EAM empowerment of the basis: When the basis of the enterprise is accelerating and enhancing its capabilities for faster change, the EAM function itself must increase in speed to keep up with the basis of the enterprise. One approach is to increase the agility of the EAM function. This means that the function is required to work more “bottom-up” and less in the more traditional top-down approach. Established (and empowered) EAM capabilities help in a strategic focused transformation while not risking the needed velocity. Introduction and promotion of large-scale agile execution frameworks (e.g., SAFe) can support the EAM as well as the enterprise itself.

The role of the enterprise architect must bridge different views and stakeholders: The empowered basis, the market, and the company strategy. Therefore, EAM behaves like the “active connector” in the enterprise. With these capabilities, the work of an enterprise architect changes: “Think like a CEO and act like a CDO” [Su20], [Ro20], which means that the enterprise architect should not solely feel like part of the IT organization. Also, the architect should not lose the connection to the basis. More enterprise architects must be highly connected to solution architects and business architects and need to work collaboratively. The definition of contracts on architectural high-level targets (as proposed in TOGAF) can still be a part of enterprise architecture governance, but due to the high frequency of changes and empowerment on the basis, this tool is not sufficient alone.

In this phase, the enterprise is using principles to move towards a desired state of adaptiveness. Various principles of an adaptive enterprise are found in literature and can be used in a specific state of adaptiveness. The principles presented in this section will help an enterprise to define its journey towards adaptiveness.

4.5 Decouple the adaptive parts and its team from the company and empower them (Phase 5)

Depending on the granularity chosen in steps two and three, partially different strategies can be applied. While developing this paper we found frequent occurring aspects that showed similar patterns across various transformation projects in different industries. Therefore, this paper proposes five invariant aspects that are to be considered when moving towards adaptiveness:

- Empowerment of the transformed part.
- Organizational decoupling of line organization or of people involved.
- Strong sponsorship on all levels: CxO Sponsor and Sponsors in the chain.
- Adaptive ground rules on interconnections to non-transformed enterprise parts.
- Evolvement tasks in the IT landscape and common systems (Systems as boundaries).

In the following paragraphs, these aspects will be detailed.

Empowerment means: Giving each adaptive part of the enterprise the ability to decide on their own and optimize themselves based on their business demands. Analogous to "fully empowered product teams", agile management methodologies can apply on all management levels. Examples are capability-based budgeting (including line/run and projects). The ***organizational decoupling*** can define a key element in this empowerment action plan, as in many companies, budget, reporting, and target derivation are directly bound to the organizational structures. Especially within the first adoption phases, ***Sponsorship*** on all levels is needed to achieve the needed change – also in terms of mindset and culture. Without sponsorship, a transformation project will not have enough supportive resources and will potentially phase-out before achieving the desired output. When carving out adaptive parts from the enterprise, it is important to define the boundaries of interaction between the adaptive and the non-transformed parts of the enterprise. Mindset and culture within the enterprise will also be impacted by these changes to entities and their connections **adaptive ground rules** (or even loose principles) can help an enterprise to set the framework and standardize the interactions of these new connections, avoiding, e.g., clash of these new cultures. Finally, **Evolvement tasks in the IT landscape and common systems** must be built around the (re-)implemented adaptive parts of the system and the move towards adaptiveness to give the decoupled and empowered parts sufficient and long-term competitive ability within the enterprise. A special focus must be given to interfaces – processual and IT-based. A high maturity in classical EAM helps here to a) identify those correctly and b) foster change and adoption.

Dedicated interconnections between the new adaptive part and the residual enterprise with speed-embracing interface methodologies and technologies define a key enabler to empower the carved-out adaptive part.

In this phase, the enterprise is carving out and decoupling adaptive parts of the enterprise and provides the necessary funding from various perspectives. Common patterns and obstacles are considered to mitigate the risk of failure and increase the chances of success. The new or adapted entities of the enterprise are put into a systemic and holistic perspective and managed accordingly.

4.6 Consolidate successful transformations into the enterprise (Phase 6)

While the authors intentionally describe a decision gateway for "success" or "failure" to describe the result of the transformation efforts (cf. Figure 3), a more comprehensive definition must be given. As described earlier in „Agility comes with a price", levers in positive as well as negative directions will occur in agile enterprise transformation. Considering this, and to judge for success or failure, an enterprise must reflect upon the overall resulting business case. If it is positive, we consider it as a success and worth keeping (maybe subject to later further transformations). If it is negative, a drop/rollback is proposed (or a rework with changed scope).

For the consolidation, a switchover must be made in all included dimensions, like organizational structure, processes, IT integration and IT processes, customer experience, etc. As mentioned before, to safeguard the successful transition, long-lasting empowerment must be ensured, also in terms of the established budgeting processes.

In case of cancelled transformation or with the realization of a negative business case outcome, the paper proposes to ***drop these adaptive parts as quickly as possible***. Accepting the "sunken cost fallacy", management strength and boldness is needed in these situations to avoid suboptimal "pseudo agile enterprises" in the long run.

Nevertheless, just doing a partial rollback is an option. Also, the definition of a smaller organizational sub-scope and a retry of this sub-scope in the next iteration is possible. Efforts in mindset change can be reused, and therein motivated employees may be leveraged.

5 Conclusion

The concept described in this paper provides an approach to an evolutionary transformation based on an iterative model. While the authors present a single sequential iteration for simplification, with growing maturity and increasing capability in the organization the process can be parallelized, and multiple transformation activities may take place at the same time. Nevertheless, this dimension of parallelization needs to be

managed actively to balance change capabilities, a feedback loop (e.g. lessons learned), and required adoption speed. The EAM function of the enterprise must play a key role in the transformation process.

Independent from optimizations: Transformations to agility must also be executed with help of agile toolsets. There is no longer "one technologically driven" strategic EA target design, which used to be common in many enterprises.

6 References

[As15] Andreas, Schutkin: Das Geheimnis des Neuen: Wie innovationen entstehen, 2015

[Bv05] Bas, Verbuggen: The adaptive enterprise: Defining architecture principles for an adaptive enterprise, 2005

[Bo15] Bonnet, D.; Buvat, J.; KVJ, S.: When Digital Disruption Strikes: How Can Incumbents Respond? 2015, Capgemini Consulting, URL: https://www.capgemini.com/consulting/wp-content/uploads/sites/30/2017/07/digital_disruption_1.pdf

[Ca16] Cancila, M.; Toombs, D.; Waite, A.; Khnaser, E.: Gartner 2017 Planning Guide for Cloud Computing. Gartner, 2016.

[Cb18] Carsten, Brockmann; Eldar, Sultanow; Christian Czarnecki: Enterprise Architectures between agility and traditional methodologies, Lecture Notes in Informatics, 2018.

[Gc04] Guangming, Cao; Steve, Clarke, Lehaney: The Need for a Systemic Approach to Change Management, 2004.

[JC96] John, Kotterer: Leading Change. Harvard Business School Press, 1996

[Mc09] Mike, COHN: Addison-Wesley Professional: Succeeding with Agile, 2009.

[Og18] The Open Group: The TOGAF® Standard, Version 9.2, 2018

[Ri12] Ries, E.: Lean Startup: Schnell, risikolos und erfolgreich Unternehmen gründen. Redline Verlag, ISBN: 978-3-86881-333-3.

[Ro20] Roth, S.; Heimann, T.; Sultanow, E.: Innovation ist Architektursache: Stellschrauben für die Innovationsfähigkeit. Objektspektrum, 06/2020.

[Sa03] Sambamurthy, Bharadwaj, and Grover. 2003. "Shaping Agility through Digital Options: Reconceptualizing the Role of Information Technology in Contemporary Firms," MIS Quarterly (27:2), p. 237, DOI: https://doi.org/10.2307/30036530.

[Su18] Sultanow, E.; Chircu, A; Schröder, K.; Kern, S.: A Reference Architecture for Pharma, Healthcare & Life Science, Workshop der Informatik, 2018

[Su20] Sultanow, E.; Duane, J.-N.; Chircu, A.: Skills for Sustainable Enterprise Architectures in a VUCA World, WI 2020 – 15. internationale Tagung Wirtschaftsinformatik vom 9.-11.3.2020 in Potsdam. DOI: https://doi.org/10.30844/wi_2020_x2-sultanow

[Tm03] Thomas, Malone; Robert Laubacher;Inventing the organizations of the 21st century, 2003