What to Expect from Enterprise Architects in Large-Scale Agile Development? A Multiple-Case Study

Completed Research

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Abstract

In modern times, traditional enterprises are confronted with rapidly changing customer demands, increasing market dynamics, and continuous emergence of technological advancements. Confronted with the imperatives of a digital world, companies are striving to adopt agile methods on a larger scale to meet these requirements. In recent years, enterprise architecture management has established itself as a valuable governance mechanism for coordinating large-scale agile transformations by connecting strategic considerations to the execution of transformation projects. Our research is motivated by the lack of empirical studies on the collaboration between enterprise architects and agile teams. Against this backdrop, we present a multiple-case study of five leading German companies that aims to shed light on this field of tension. Based on our results from 20 semi-structured interviews, we present the expectations of agile teams for enterprise architects and how they are fulfilled.

Keywords

Enterprise architecture management, large-scale agile development, multiple-case study

Introduction

In increasingly hypercompetitive environments, enterprises face a multitude of challenges such as continuously changing customer demands, rapidly evolving technological advancements, and tensing regulatory uncertainties (Fuchs and Hess 2018; Kettunen and Laanti 2017). Consequently, companies are urged to undergo organizational transformations to respond readily to environmental changes (Besson and Rowe 2012; Gerster et al. 2018). To master their respective organizational transformation, firms are extensively adopting agile practices which often necessitate large-scale agile transformations (Dikert et al. 2016; Fuchs and Hess 2018). However, these transformations entail new managerial challenges (Dingsøyr et al. 2018) such as hierarchical organizational structures that prevent the wide adoption of agile (Hekkala et al. 2017), traditional project management mechanisms that are overly process driven and bureaucratic (Gregory et al. 2015), and coordination and alignment issues between large-scale agile activities as well as between agile and non-agile teams (Scheerer et al. 2014). The term "large-scale agile development" has been used to describe multi-team development efforts that make use of agile principles involving a high number of actors and interfaces with existing systems (Dingsøyr et al. 2014; Rolland et al. 2016).

In recent years, enterprise architecture management (EAM) has established itself as a valuable governance mechanism to coordinate transformations by connecting strategic considerations to the execution of large-scale agile projects (Greefhorst and Proper 2011). It covers all dimensions of an enterprise (business, application, information, and infrastructure aspects) and fosters the mutual alignment of business and IT (Hauder et al. 2014; Rouhani et al. 2015).

In large-scale agile development, typical tasks of enterprise architects (EAs) include (1) harmonizing governance requirements across sprints and agile teams (ATs), (2) supporting ATs by aligning individual project strategies with enterprise objectives, and (3) working closely with ATs by guiding them through business and technical roadmaps (Uludağ et al. 2017). However, the mutual expectations of EAs and ATs are not always frictionless (Kulak and Li 2017). This tension originates to some extent from the antithetic ways of thinking and mindsets of both stakeholder groups. EAs embrace a top-down perspective focusing on long-term goals and strategies (Hanschke et al. 2015). This top-down decision model may conflict with ATs' short-term ambitions to satisfy the business representatives (Dingsøyr et al. 2018). The pressure to deliver business functionality may lead to the negligence of long-term architectural improvements (Dingsøyr et al. 2018). The traditional "*command and control*" culture of EAs may oppose the conversant "*servant leadership*" culture of ATs (Kulak and Li 2017).

Our findings are consonant with those of Canat et al. (2018), Hanschke et al. (2015), and Hauder et al. (2014) that empirical studies on the collaboration between EAs and ATs are lacking. Against this backdrop, we aim to fill this gap formulating the following research questions:

RQ 1: What expectations do agile teams have for enterprise architects?

RQ 2: To what extent are these expectations satisfied by enterprise architects?

Theoretical Background and Related Work

Agile methods such as Scrum or XP rely mainly on emergent design practices, meaning that architecture emerges from the system and is not imposed by some direct structuring force (Babar 2009). The practice of emergent design is effective at the team level but insufficient when agile methods are applied on a larger scale. For large-scale agile development, a certain degree of architectural planning and governance becomes more important (Leffingwell et al. 2008) as they ensure the alignment of ATs to achieve desirable organization-wide effects (Ovaska et al. 2003) and provide a common target vision by combing strategic considerations with the execution of agile projects (Greefhorst and Proper 2011). Alike (Greefhorst and Proper 2011), we take the view that the mutual alignment of large-scale agile transformation can be achieved by an effective EAM function. Until now, EAM initiatives mostly focused on top-down governance (Winter 2016). However, this enforcement-centric view does not fit well into increasingly widespread agile environments as it restricts the design freedom of ATs and encounters their resistance (Kulak and Li 2017). In recent years, a number of novel EAM approaches have been proposed to address the aforementioned problems, which are presented in the following.

Agile Enterprise Architecture Management (Hauder et al. 2014)

Hauder et al. (2014) propose an organization-specific agile EAM function that consists of the three main phases. In the first phase, the EAM function starts by motivating an EAM endeavor. In this phase, the EAM function must convince the stakeholders of the meaningfulness of the EAM function and its long-term benefits for the entire company. Here, the EAM function must ensure that the top management and other key stakeholders support the EAM endeavor. Next to motivating the EAM endeavor, the EAM team collects information from various stakeholders that serves as a decision base later on. The collected information is formalized by developing stakeholder-specific models. In the second phase, developed models and concepts are communicated and used to explain decisions. This phase is characterized by strong communication and supporting activities between the EAM team and its stakeholders. In this phase, the EAM team should show the turnover for each individual stakeholder. In this step, the EAM team gathers feedback by asking its stakeholders what went well and what went wrong. In the third phase, the EAM team not only analyzes and reflects on its results and practices, but also analyzes and reflects on the feedback and engagement of stakeholders. Based on a new information base, the EAM team may consider adjusting the EAM function.

Adaptive Enterprise Architecture (Wilkinson 2006)

Based on a case study, Wilkinson (2006) proposes a method for designing an adaptive Enterprise Architecture by exploiting the use of architecture principles, IT governance, and the adaptability of a service-oriented computing infrastructure. In addition, Wilkinson (2006) describes a set of architecture principles that include modularity, simplifcation, integration, and standardization that can be applied to build an adaptive Enterprise Architecture.

Collaborative Enterprise Architecture (Bente et al. 2012)

Bente et al. (2012) propose six building blocks for a collaborative Enterprise Achitecture based on lean and agile practices to tackle identified EAM problems such as dealing with the speed of change in the landscape of business models and IT systems or enforcing rules and compliance where each project has a high degree of freedom. Benefiting from examined sources paired with their professional experience, Bente et al. (2012) describe how architecture processes can be streamlined, how an agile and lean EAM initiave can be built, and how collaboration and participation can be fostered.

Lightweight Enterprise Architecture (Theuerkorn 2004)

As enterprise system landscapes are becoming increasingly complex, Theuerkorn (2004) proposes a lightweight Enterprise Architecture framework that uses a set of architectural artifacts to align IT with business strategy and to govern and evolve complex IT systems in organizations. The framework picks up the issues of many Enterprise Architecture functionalities that fail to deliver their promised benefits in time or cost. Besides an extensive explanation of the framework itself, Theuerkorn (2004) also explains how to deal with bad behaviors of architects, e.g., EAs who have their own agenda in mind and do not care about others or even perceive them as competition, thus causing trouble.

Case Study Design

Since our research is motivated by a practical problem, we apply case study research as it provides an in-depth overview of real-life situations and contemporary phenomena (Easterbrook et al. 2008). In the following, we outline the design of this multiple-case study in line with Runeson and Höst (2008).

Case Study Design: Our goal is to explore the expectations of ATs for EAs in large-scale agile development. We also seek to describe and explain the situation whenever possible. Therefore, our case study is of exploratory nature but also bears a descriptive or explanatory character (Runeson and Höst 2008). Additionally, this paper employs a multiple-case study design with five organizations that allows cross-case analysis (Yin 1994). The cases were purposefully selected because the companies undergo major agile transformations and their traditional EAM functions face unprecedented challenges while collaborating with large-scale agile development endeavors. We selected cases from diverse industries to avoid industry bias. An overview of the case organizations and conducted interviews is presented in Table 1.

Industry and code name of case organization	Head-quarter location	Company size [employees]	No. of inter-views	Position of interviewees
Global insurance company ("GlobalInsureCo")	Germany	140,000+	4	Agile developer (AD); enterprise architect (EA); chapter lead agile coaching (CLAC)
Car manufacturer ("CarCo")	Germany	130,000+	5	Chief technology officer (CTO); enterprise architect (EA); product owner (PO)
Information technology company ("ITCo")	Germany	7,000+	2	Enterprise architect (EA); product owner (PO)
Retail company ("RetailCo")	Germany	50,000+	5	Chapter lead business process architecture (CLBPA); enterprise architect (EA); product owner (PO); scrum master (SM)
Public sector insurance company ("PublicInsureCo")	Germany	6,700+	4	Agile developer (AD); enterprise architect (EA); head of IT governance department (IT-G)

Table 1. Overview and specifics of case organizations and conducted interviews

Data Collection: We focused on first- and third-degree data collection techniques (Lethbridge et al. 2005). First-degree techniques are direct methods where the researcher is in direct contact with the subject and collects data in real time. For that, we conducted 20 individual and group interviews which were semi-structured. In almost all companies, at least one senior executive, one EA, and one member of an AT were

interviewed to gain a diverse perspective on the expectations for EAs and further triangulate our results. The interviews followed a semi-structured questionnaire and were rather conversational to allow interviewees to explore their views in detail (Yin 1994). Each interview lasted 45-60 minutes and was primarily conducted in face-to-face meetings. At least two researchers were present in the interviews to facilitate observer triangulation and to mitigate the risk of researcher bias (Runeson and Höst 2008). We supplemented our interview findings by third-degree data collection techniques, which allow the researcher to get an independent analysis of work artifacts based on already available and sometimes compiled data. Slide decks and wiki pages of the cases provided us in-depth information about their EAM initiatives. Hence, we were able to obtain supplementary information on how EAs perceive their role in large-scale agile development or how EAs themselves work agile and lean. The purposeful selection of different data sources and roles from different case organizations enables the triangulation of data sources (Stake 1995).

Data Analysis: The interviews were recorded, transcribed, then coded by one researcher with open coding (Miles et al. 2014) and using the qualitative data analysis software MAXQDA[1]. Preliminary codes were consolidated and checked for consistency and completeness by another researcher. Subsequently, groups of code phrases were merged into concepts that were later related to the formulated research questions.

Results

Expectations of Agile Teams for Enterprise Architects

We used the organization-specific agile EAM practice model (Hauder et al. 2014) to determine the expectations of ATs for EAs. Our results are presented along with the agile EAM model. Here, we focus on the activities, which are particularly relevant for the collaboration between EAs and ATs.

(1) Models: In all cases, application landscape diagrams and business capability maps (sometimes referred to as domain maps) were the primary architecture models provided by EAs for ATs. Further, in all case organizations, business capability maps were enriched by additional information, e.g., applications, technologies, infrastructure components, etc. Other commonly models named were data models, interface models, system communication models or process models. Furthermore, technical reference architectures, architecture blueprints, architecture patterns or technical reference architectures were mentioned. In all organizations, interviewees stated that ATs have the following expectations of provided models: availability, binding force, quality, and relevance. Further important expectations of models mentioned were added value, applicability, and level of detail.

(2) Availability: Across all cases, the general statement was that EAs should not be a part of ATs as they should remain within their overarching role and coordinate multiple ATs. However, ATs' expect on demand availability of EAs who should support and consult ATs on architectural issues as needed. The majority of interviewees rated the availability of EAs to support as ATs as moderate, mainly due to capacity bottlenecks.

(3) Communication: The communication between ATs and EAs is mainly indirect via third roles. At CarCo, EAs and solution architects (SAs) regularly discuss and decide on cross-team architecture topics within architecture boards. The decisions made are communicated to the respective teams by SAs. However, ATs can use common communication media such as wikis, e-mails or phone to communicate with EAs. Face-to-face communication between EAs and SAs takes place frequently. At ITCo, the communication between ATs and EAs is more complicated. There, EAs align with domain architects (DAs) through so-called business area architecture meetings on a monthly basis. The topics discussed are communicated by DAs to SAs, which forward related information to their corresponding teams. Nevertheless, ATs can directly communicate with EAs via phone or e-mails. A similar flow of communication can be observed at RetailCo. EAs meet weekly with DAs and SAs in communities of practices for architecture (CoPA) and discuss overarching architecture topics. Participation is mandatory for all architects. The topics discussed there are then communicated to the teams. Again, ATs can directly communicate with EAs by scheduling face-to-face meetings. In some cases, EAs and ATs sit in the same building. The interviewees considered the co-location of EAs and ATs helpful as it increases productivity due to the shorter physical and communication distances. At PublicInsureCo, communication between EAs and ATs is in some cases direct, e.g., when EAs join ATs at the beginning of a project. The communication between the two is facilitated by daily stand-ups,

[1] https://www.maxqda.com/

plannings or retrospectives. In other cases, communication between EAs and ATs takes place indirectly via DAs and SMs. Apart from a CoPA every two weeks, there are no other regular meetings between EAs and ATs. Alike PublicInsureCo, EAs at GlobalInsureCo can join ATs as needed and directly communicate with them. However, the regular exchange is indirect through CoPAs and SAs. Like CarCo, ATs can use diverse communication tools such as e-mail or phone to contact EAs. In all cases, ATs expect a more frequent and personal contact to EAs. They also consider the communication through third persons as suboptimal.

(4) Involvement: The involvement of ATs in relevant architecture processes differs across the case organizations. At CarCo, the to-be architecture of a project is defined without involving ATs. At the beginning of a project, the to-be architecture is handed over to a SA who is responsible for intra-team architecture decisions. Deviations between the as-is and to-be architecture have to be documented and justified by the SAs. Hence, ATs are not involved in the creation of intentional architecture but have some degree of freedom for emergent architecture. At ITCo, the involvement of ATs in relevant architecture processes is accomplished by DAs who act as representatives of ATs (similar to SAs at CarCo). At RetailCo, ATs and their respective SAs take responsibility for intra-team architecture decisions. However, on higher levels, ATs are not involved in architecture processes. Similar to CarCo, ATs at PublicInsureCo and GlobalInsureCo are less involved in up-front planning but are involved in the creation of emergent architecture. Across all cases, however, ATs want to be involved in the creation of intentional architecture. One EA of PublicInsureCo argued that "*[ATs] should be very strongly involved, as they are the domain experts*". An PO of CarCo added that "*Each project should retain freedom and be accepted by EAs*".

(5) Support: Currently, EAs support ATs by providing architecture principles, assisting teams in their realization (CarCo; PublicInsureCo; GlobalInsureCo), providing tools and technology stacks (CarCo; PublicInsureCo), and guiding them through technical roadmaps (CarCo; PublicInsureCo). In addition, EAs consult and support ATs on architectural issues (RetailCo; PublicInsureCo; GlobalInsureCo) and mediate further relevant contact persons (GlobalInsureCo). In some cases, EAs perform architecture spikes (PublicInsureCo) and directly collaborate with ATs on a code basis (GlobalInsureCo). However, ATs expect first and foremost hands-on solutions and assistance in selecting new tools (CarCo; RetailCo; PublicInsureCo). Also, ATs expect personal support and guidance in the realization of the to-be enterprise architecture (ITCo; PublicInsureCo; GlobalInsureCo).

(6) Feedback: We observed that no formal and standardized feedback processes between ATs and EAs exist. In general, ATs are able to provide feedback informally and as needed. For this reason, ATs can use typical communication media such as e-mail or phone or arrange face-to-face meetings. In almost all companies, CoPAs were mentioned as an adequate arena for providing feedback (CarCo; RetailCo; PublicInsureCo; GlobalInsureCo). At CarCo and PublicInsureCo, ATs provide feedback by commenting on the wikis of EAs. On the one hand, some ATs stated that their expectations of the current form and frequency of giving EAs feedback are met: "*As it is now*" (PO, RetailCo; AD, PublicInsureCo). On the other hand, others expect of having regular appointments with EAs: "*One enterprise architecture block every week to visit 15 teams*" (SM; RetailCo). Also, ATs would like to continue giving EAs feedback through CoPAs (CarCo; RetailCo; PublicInsureCo; GlobalInsureCo) or personal dialogues (ITCo; CarCo). Across all case organizations, interviewees mentioned that feedback from ATs is reflected by EAs. Based on the feedback, EAs revise architecture principles and guidelines, adapt the meta-model of their EAM repositories to create new architecture models, provide new or revised architecture artifacts or attempt to work more closely with ATs. All respondents appreciated the EA' reflections on feedback.

Self-Perception versus External Perception of Enterprise Architects

After revealing the ATs' expectations, we asked all interviewees to rate and justify the extent to which these expectations are met by EAs.

(1) Models: All stakeholder groups felt that the architecture models provided by EAs only partially met the expectations. In general, ATs considered the models too abstract or unspecific and thus irrelevant (PO, CarCo; AT, RetailCo). One AT member enjoyed the freedom due to their high degree of abstraction: "*I enjoy the space, so the expectations are fulfilled*" (AD, PublicInsureCo). Two team members indicated that the required architecture models were not made available in time (PO, CarCo; AT, RetailCo). Interestingly, EAs had the most negative perception of the models. In this respect, four main pain points were mentioned. First, current architecture models offer a high level of technical detail and thus are considered immature (EA ITCo; EA, RetailCo; EA, PublicInsureCo). Second, EAs recognized difficulties of ATs in understanding

their architecture models because they are too abstract, general or complex (EA, RetailCo; EA, GlobalInsureCo). Third, the architecture models do not provide sufficient guidance on how they should be implemented by ATs, thus being considered not practicable (EA, RetailCo; EA, GlobalInsureCo). Last but not least, the communication of the models is considered as insufficient, leading to a low level of awareness by ATs (EA, CarCo; EA, RetailCo; EA, GlobalInsureCo). The EA of GlobalInsureCo suggested communicating architecture models when starting a new project. Managers shared the opinion that most of the models are mainly driven by standardization and complexity reduction aspects. The CTO of CarCo stated that "*one size fits all architecture models"* do not meet the expectations of ATs and that the models mostly propose solutions that include unnecessary or missing functionalities, causing additional efforts and costs. The IT-G of PublicInsureCo stated that many EAs assume that old proven models would be still useful for new problems. He suggested that EAs have to create new tailored models for ATs. Two managers added that current models do not provide sufficient technical details (IT-G, PublicInsureCo; CLBPA, RetailCo).

(2) Availability: ATs expect high availability of EAs. 37.50% of AT members said that they have difficulties in finding an EA, while 62.50% had a rather positive perception. 53.85% of all EAs reported that ATs have issues finding an EA, while the remaining 46.15% claimed that this is not the case. In contradiction, all managers felt that ATs have no difficulties finding EAs.

(3) Communication: Among all stakeholder groups, ATs were the least satisfied with the communication with EAs. They stated that EAs are overloaded (PO, CarCo) and lack technical know-how (SM, RetailCo), affecting the speed of communication (PO, CarCo). Further, AT members stated that direct communication channels are missing and that they need a lot of effort to identify contact persons (AT, RetailCo; AD, GlobalInsureCo). At PublicInsureCo, the perception of the communication was rather positive. An agile developer (AD) of PublicInsureCo explained that the required information is provided by EAs and that existing communication channels work. An AD of GlobalInsureCo also positively mentioned that EAs are perceived as valuable through direct contact and open dialogue. Similar to ATs, EAs also felt that the expectations regarding the communication are not satisfied. EAs argued that there are not able to communicate more intensively with ATs due to capacity restrictions (EA, CarCo; EA, RetailCo). They also recognized the issue of indirect communication with ATs via DAs, thus leading to dissatisfactions by ATs and their unwillingness to communicate with EAs (EA, PublicInsureCo). An EA of GlobalInsureCo explained the communication between EAs and ATs is good through the use of training and tools, but also noted that existing communication formats are not yet known by everyone and therefore sometimes communication is missing. An EA of CarCo had a more positive perception: "*There are no complaints*". Two EAs proposed one suggestion for improving this situation, namely, to clarify the roles and responsibilities of EAs so that the different expectations can be met (EA, RetailCo; EA, PublicInsureCo). Also, EAs should offer a variety of communication channels for faster accessibility (EA, GlobalInsureCo). In this respect, the external perception of managers differs considerably from that of ATs and EAs. The managers stated that EAs work closely with ATs (CTO, CarCo; CLAC, GlobalInsureCo), have sufficient time to collaborate (CTO, CarCo), and are always available to them (CLBPA, RetailCo).

(4) Involvement: The majority of ATs felt left out regarding their involvement in the architecture process because of weak collaboration (PO, CarCo; PO, ITCo; PO, SM, RetailCo). An PO of ITCo added: "*[ATs] are simply not asked*". Some interviewees called for greater involvement (PO, CarCo; SM, RetailCo). At PublicInsureCo, the opinion of one AD was very positive: "*Nothing is missing*". Similarly, an AD of GlobalInsureCo mentioned that teams are well involved in architecture decisions such as deciding on best practices, software architecture or code libraries. The self-perception of EAs is similar to that of ATs. The primary reason given was that the capacity of EAs is fully exhausted (EA, CarCo; EA, RetailCo; EA PublicInsureCo). According to one EA of PublicInsureCo, ATs do not necessarily feel to be involved in architecture processes due to the lack of support given by EAs. In addition, the involvement must be clarified in advance and optimized: "*Wherever there is a need, the way of involvement must be clarified*" (EA, PublicInsureCo). The feedback from ATs helps to optimize the capacities of EAs and thus enables their involvement in architecture processes (EA, RetailCo). Compared to other stakeholder groups, the managers' perception is very positive. At GlobalInsureCo, ATs are actively involved in architecture processes through architecture coordination circles (CLAC, GlobalInsureCo). With this respect, the CLBPA of RetailCo explained that the active involvement of ATs facilitates the creation of the to-be enterprise architecture. In contrast, the CTO of CarCo explained that not all ATs can be involved in architecture processes as this constitutes a scaling issue and they lack the necessary overarching view of the organization.

(5) Support: The majority of AT members are not satisfied with the support of EAs. They complained about the lack of support from EAs due to capacity problems, work overload, and a lack of technical know-how (PO, CarCo; PO, ITCo; SM, RetailCo; AD, PublicInsureCo). Few AT members were satisfied to some extent and reported positive feedback (PO, CarCo; SM, PO, RetailCo; AD, GlobalInsureCo). The added value of EAs was perceived positively in cases in which they provide high-level requirements (PO, CarCo) and offer top-down informative, consultative, and mediatory support (AD, GlobalInsureCo). The self-perception of EAs on this point is similar to that of ATs. The EAs mentioned time and capacity restrictions as main reasons for inadequate support (EA, CarCo; EA RetailCo; EA, GlobalInsureCo). Two EAs explained that architecture models provided are too unspecific and the expected support cannot be given (EA, CarCo; EA, RetailCo). In many cases, EAs do not have the necessary technical know-how to support ATs adequately (EA, CarCo). One EA of PublicInsureCo also stated that some ATs do not need support by EAs. Both EAs of GlobalInsureCo felt that ATs are satisfied as "*concrete added value is created in the teams*". Among all three stakeholder groups, the managers had the most positive perception. The CTO of CarCo praised that their EAs receive a lot of positive feedback and that competent EAs are highly demanded by ATs. He noted that EAs lack of capacity and thus need to focus on the most important projects with a high economic impact (CTO, CarCo). The CLBPA of RetailCo was very pleased with the support as "*they have a lot of educational and explanatory work to do*". The CLAC of GlobalInsureCo perceived the role of EAs as more active, because they "*join the team and are part of the team, not by e-mail, phone or other means*".

(6) Feedback: The AT members had a rather negative opinion since the feedback culture is not lived and there is a lack of feedback mechanisms between ATs and EAs (SM, RetailCo; AD, PublicInsureCo). According to an AD of GlobalInsureCo, EAs should show more initiative to gather feedback from ATs through observation and direct team collaboration. Due to the lack of capacity, EAs are not able to receive and process feedback (PO, ITCo). Only one AT member indicated that his feedback was well received and processed (PO, CarCo). The majority of EAs felt that the expectations of the ATs for the opportunity to provide feedback are met. They explained that ATs have sufficient feedback opportunities, e.g., workshops, e-mail or personal face-to-face meetings (EA, CarCo; EA, ITCo; EA, RetailCo; EA, PublicInsureCo; EA, GlobalInsureCo). One EA of CarCo stated: "*Wouldn't know how to improve it*". An EA of ITCo opposed since structured feedback mechanisms are not established or are further improvable. One EA of GlobalInsureCo added that some EAs do not respond to feedback of ATs at all. The perception of the managers is similar to that of EAs. Many ATs still perceive EAM as an ivory tower and therefore give little feedback to the EAs (CTO, CarCo). Existing feedback is driven top-down by EAs due to immature feedback culture and its dependency to the organizational structure (IT-G, PublicInsureCo; CLAC, GlobalInsureCo). One solution would be establishing stable feedback channels between ATs and EAs (CLAC, GlobalInsureCo).

(7) Recommendation: We used the Net Promoter Score (NPS) to obtain an overview of the satisfaction of all stakeholder groups. Here, we asked the question: *How likely is it that you would recommend an EA to an AT*? The participants were able to give an answer ranging from 0 (*not at all likely*) to 10 (*extremely likely*). Respondents with a score of 9 or 10 are called promoters. Interviewees answering a 7 or 8 are denoted as passives. Detractors are those with a score of 0 to 6. Finally, the NPS was calculated as the percentage of promoters minus the percentage of detractors. Figure 1 shows the NPS calculated for each stakeholder group as well as the overall NPS.

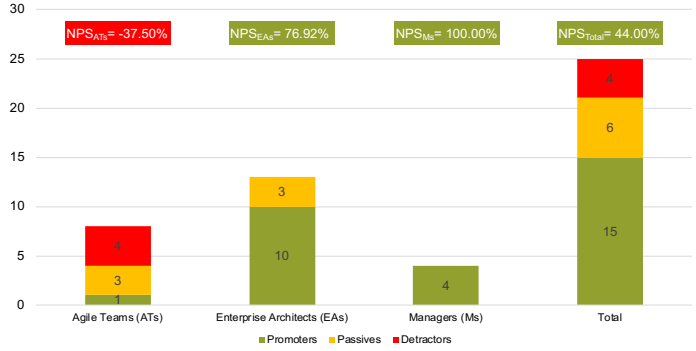

Figure 1. Overview of the NPS of all stakeholder groups (N=25)

Four interesting observations can be made: First, ATs do not seem to be satisfied with the current support by EAs (NPS = -37.50%). Second, most of the EAs would recommend themselves, thus seem to be satisfied

with how they support ATs (NPS = 76.92%). Third, all managers recommend EAs to ATs (NPS = 100.00%). Fourth, a comparison of all stakeholder groups reveals that ATs are least satisfied with the current situation and that the managers recognize the added value of EAs, confirming our previous observations and findings. The overall NPS value is 44.00%.

Figure 2 provides an aggregated overview of the respective ratings by each stakeholder group.

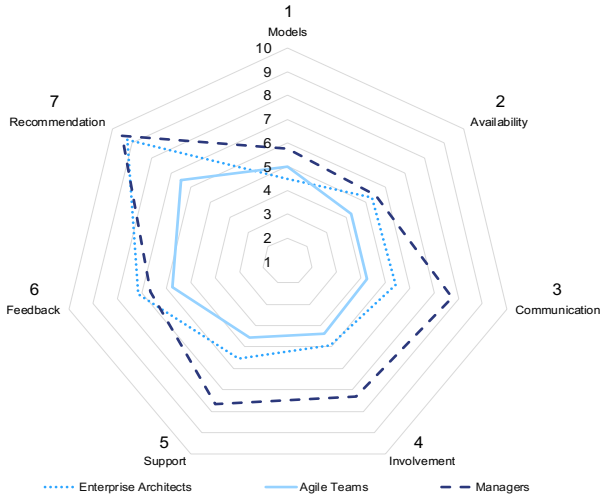

Figure 2. Overview of the rating on how different stakeholder groups perceive to what extent the ATs' expectations are fulfilled by EAs (N=25)

Discussion

Key Findings

Five key findings emerge from this multiple-case study: First, our results indicate that ATs mainly expect technological guidance and support from EAs. We are consonant with Drews et al. (2017) and believe that the role of the EA should be primarily technology focused. To this end, EAs must leave the "ivory tower" and keep their technical knowledge up-to-date (Kulak and Li 2017). Second, the lack of capacity and the high workload of EAs makes it difficult to deliver their services on time and in appropriate quality. Some EAM initiatives of the case organizations use agile and lean methods to address the above-mentioned problem. This finding is in line with Hanschke et al. (2015) and Hauder et al. (2014) that companies are applying agile and lean methods to increase the efficiency of EAM initiatives. Third, we made similar observations as Canat et al. (2018) that the communication between EAs and ATs is an issue. We observed that EAs work closely with ATs at the beginning of a project life-cycle and leave them after a project matured, similar to the way described in the Enterprise Unified Process (Ambler 2002). In addition, we witnessed that the communication between ATs and EAs via a third persons is considered suboptimal. Fourth, the fear of the "*Big Design Upfront*" becomes reality for ATs as they feel excluded from architecture processes. Although ATs follow the emergent design principle of the Agile Manifesto (Beck et al. 2001), we found that in many cases ATs ask for involvement in the creation of an intentional architecture. Fifth, the positive perception of managers and the rather negative attitude of ATs towards EAs show that the added value of EAs has not yet reached the team level, which is a similar result to that of (Canat et al. 2018).

Limitations

For the evaluation of possible validity threats of our observations, we used the assessment scheme recommended by (Runeson and Höst 2008). Since the case study is exploratory and does not seek to establish causal relationships, internal validity is not a concern. *Construct validity* is concerned with whether the study design represents a proper investigation of the research questions. We took three countermeasures to address this threat. First, we used several sources for data collection. These included semi-structured interviews with various stakeholder groups and internal documents of the cases. Second, the interviews were transcribed and coded by one researcher and then reviewed by a second researcher.

Third, key informants of the case organizations reviewed the interview results to establish a chain of evidence. *External validity* relates to the generalization of the findings and to what extent the results are of interest outside the investigated cases. For this purpose, we focused on the literal replication of our cases and aimed for analytical generalization by providing a thorough description of the cases. Our case study provides profound details so that this validity can be addressed by identifying similarities between other organizations and the characteristics of our cases. *Reliability* refers to whether the case study is conducted in a robust manner and whether a replication by other researchers would yield the same results, i.e., researcher bias. Three countermeasures were taken to counteract researcher bias. First, there were always two researchers present in the interviews. Second, the data analysis was checked for consistency and completeness by a second researcher. Third, all reports sent to the companies were revised by another researcher and discussed with company representatives.

Conclusion and Future Work

Confronted with the imperatives of competitive environments, firms are urged to undergo large-scale agile transformations to respond to environmental changes (Fuchs and Hess 2018; Gerster et al. 2018). The EAM function provides governance mechanisms to coordinate and align multiple large-scale agile activities to achieve desirable organization-wide effects and agility (Drews et al. 2017; Greefhorst and Proper 2011). The expectations of EAs and ATs are not always frictionless as both exhibit antithetic ways of thinking and mindsets (Kulak and Li 2017). Our research is motivated by the lack of empirical studies on the collaboration between EAs and ATs. We conducted an exploratory study with five cases to get an understanding of this field of tension.

Derived insights are threefold: First, communication between EAs and ATs is primarily driven by SAs, which increases information loss and misunderstanding. Second, all interviewees request a supporting EA role in the future, which is characterized by a deep understanding of technologies and broad communication skills. However, this new role requires EAs to cede decision-making power and possess sound reasoning skills. Third, the workload of EAs grew due to the multitude of ATs. Consequently, EAs have difficulties in handling all requests of ATs on architectural issues.

Finally, this article leaves some room for further studies. We encourage researchers to perform longitudinal studies on how the expectations of ATs for EAs vary throughout large-scale agile transformations. Researchers should also conduct cross-case analyses with the goal to compare how the role of the EA is realized in different types of organizations.

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