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IT Governance in Scaling Agile Frameworks

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Abstract. Dynamic business environments call for companies' organizational agility as being able to sense the changes in competitive environments and respond accordingly. A flexible IT environment facilitates this aim but contrasts with the structuration of IT organization through IT governance. We analyze how scaling agile frameworks as blueprints for agile IT organizations solve the contrast between structuration embedded in IT governance and agility. We see converging business and IT in structure and strategy as facilitator for resolving this conflict. In detail, we compare eight scaling agile frameworks on how IT governance is covered, how IT governance decisions are made and whether business IT convergence is achieved. We conclude that IT governance is still predominantly top down decision-making and focuses on traditional business IT alignment instead of business IT convergence. With our analysis, we provide a comprehensive base for organizations to choose from when approaching their specific agility challenges.

Keywords: Organizational Agility, IT Agility, IT Governance, Business IT Alignment

1 Introduction

Highly dynamic business environments involve increasing market uncertainties and a volatile pace of change in customer expectations for companies. Companies have to compete in these turbulent environments in order to survive, but how to face these dynamics proposes a huge challenge for many organizations which has yet to be solved. For responding to the turbulence, research increasingly answers with emphasizing organizational agility as solution, having the ability of sensing opportunities for innovation and competitiveness in these environments [1] and responding with ease, speed and dexterity [2]. As digital solutions become the primary mode by which many companies do their business, IT is an enabler of a company's agility capabilities [3]. Both sensing emerging trends and responding to changes by being organized in a way to facilitate rapid realignment is required [4, 5]. This extends the demand for agility beyond IS development and agile project management which merely focus on the response dimension [1, 3]. IT agility also implies that using agile, lean and continuous methods is suitable for achieving rapid response to changes [3, 6, 7]. The challenge remains how the call for agility impacts the existing structure of the IT organization.

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The structure of the IT organization is highly dependent on its IT governance, specifying the decision rights, authority and accountability for strategic IT planning and control [8]. It formalizes the structures, processes and relational mechanisms to ensure that IT follows the business objectives [9], usually supported by frameworks such as e.g. COBIT 5 [10]. IT governance is part of corporate governance [10] and exercised by the board, executives and IT management [9]. If IT seeks to achieve agility in the large, commitment from all involved units is needed and this cannot be achieved without governance. While some authors already call for agile IT governance based on empirical analyses [6, 11], practices for specific governance decisions like Continuous Planning [12, 13], Agile Portfolio and Product Management [14, 15] and Continuous or Lean Budgeting [12, 16] are mainly proposed. A holistic overview is yet missing.

Rapidly responding to changing needs with the right services can be facilitated by structurally converging the business and IT side in order to reduce communication distances and foster shared understanding. Companies usually introduce autonomous self-organizing, self-disciplined delivery teams ‘managed’ by a Product Owner from business but require new forms of leadership [17]. Other form “BizDev(Ops)” teams with business and IT team members or locate agile IT teams in business units [18]. Some approaches also promote strategic convergence related to IT governance decisions. In strategy development, a central Digital Business Strategy [19] or Digital Transformation Strategy [20] for the whole organization is proposed and strategy execution may use Continuous Planning [12] to integrate developers in strategic business decision-making. The topic on convergence in relation to agility is not systematically addressed by research yet. The approaches focus on different perspectives and are only loosely coupled. It also remains unclear whether a traditional business IT alignment with IT and business as strategically and operationally aligned but distinct entities [21] might be favorable for agility. This imposes the question on how business IT convergence impacts IT governance.

To analyze the contrast agility vs. structuration through IT governance, we examine scaling agile frameworks as a common way for organizations to achieve agility by providing blueprints of agile organizational setups. Following a qualitative analysis on identified scaling frameworks, we seek to answer the question “How can businesses solve their conflict of structuration vs. agility with the help of scaling agile frameworks?” The question cannot be answered by existing comparisons since they do not address the subject of IT governance [22–26]. Moreover, they compare general dimensions like e.g. focal point, appropriate team size, suitable organization type, framework adaptability, adopted agile practices or key risks and concerns.

The remainder of this paper is structured as follows. In the next section, we explain the research method that will help us with our analysis. As the next step, we will present our results. In the last section, we summarize and discuss the findings and present implications for future research.

2 Research Methodology

Our qualitative analysis of scaling agile frameworks encompassed two steps. First, we conducted a literature review to obtain a comprehensive overview on existing scaling

frameworks in their ‘vanilla’ form without modifications by practice. We searched in large IS databases such as ACM, AIS electronic library, EBSCOHost, Google Scholar, IEEE and Springer Link for existing peer-reviewed research. We also conducted a Google search to identify additional information on the frameworks by the frameworks’ creators and further frameworks we have not identified in research before. For both searches, we used combinations of search teams of “scaling agile” or “scaled agile” and “framework” or “approach” and optionally added “comparison” for identifying existing comparisons between frameworks in research and practice. In sum, we found 35 approaches which explicitly address scaling agile, show how scaling agile shall be achieved and what should be introduced to scale agility and are not replications of other approaches in structure and content (see Table 1).

Table 1. List of scaling agile frameworks

Organization Focus		Transformation Focus
<i>Enterprise-focus</i>	<i>Inter-Team focus</i>	
<ul style="list-style-type: none"> - Disciplined Agile (DA) [27] - Enterprise Agility [28] - Enterprise Unified Process (EUP) [29] - laCoCa Model [30] - Recipes for Agile Governance in the Enterprise (RAGE) [31] - Scaled Agile Framework (SAFe) [32] - Scrum@Scale [33] - XScale [34] 	<ul style="list-style-type: none"> - Crystal Family [35] - Driving Strategy, Delivering More (DSDM) [36] - Enterprise Scrum [37] - FAST Agile [38] - Goal Driven Agile [39] - Large Scale Scrum (LeSS) [40] - Nexus [41] - PRINCE 2 Agile [42] - Scrum of Scrums [43] - Scrum Pattern Language of Programs (PloP) [44] - Spotify Model [45] - Sustainable Cultural Agile Release in the Enterprise (SCARE) [46] - Matrix of Services [47] - Scrum Lean in Motion (SLIM) [48] 	<p><u>Transformation Process:</u></p> <ul style="list-style-type: none"> - Agile Culture Model [49] - CollabNet Agile Transformation Strategy [50] - EBM - Agility Path [51] - Enterprise Transformation Framework (ETF) [52] - Leading Agile [53] - ScALeD [54] <p><u>Transformation Progress:</u></p> <ul style="list-style-type: none"> - Aditi Agile Transformation Maturity Model [55] - AGILE Maturity Map [56] - Agile Maturity Model [57] - Agile Capability Maturity Model Integration [58] - Comparative Agility [59] - Roadmap for Agile success [60] - Scrum Capability Ratings [61]

We identified two streams of scaling agile frameworks. **Transformation-focused** frameworks center around process agility by offering a transformation roadmap with necessary steps (*Transformation process*) and/or assessing companies regarding their state of transforming towards organizational agility (*Transformation progress*). **Organization-focused** frameworks in turn focus on product agility and the “blueprint” agile organization. This stream also has two sub-streams. While *Enterprise-focused*

approaches address a vertical scaling mind-set with organizational levels from strategy to execution, *Inter-Team focused* frameworks address horizontal scaling with coordinating large numbers of agile teams. Although this kind of frameworks could generally be applied on program or portfolio level, they traditionally solely focus on solution delivery without describing planning and monitoring activities. As IT governance comprises both planning and monitoring, we exclude the inter-team focused frameworks for deeper analysis. Furthermore, transformation frameworks are also excluded since they address the planning steps of a transformation instead of IT governance in the target organization.

As second step, we conducted a qualitative content analysis on the remaining frameworks. Our analysis had three parts: First, we examined whether and how comprehensive governance is addressed (with e.g. processes, roles, practices etc.). We used common IT governance roles, practices and processes addressed by research [9] and governance framework COBIT 5 [10] and roles (e.g. Product Owner), practices (e.g. backlogs) and principles from the agile philosophy. Second, we analyzed whether a top-down (authority-led) or a bottom-up approach (autonomy-led) is taken. Third, we examined how business IT convergence is integrated by the approaches by examining who is mainly responsible for its execution. As theoretical foundation for the analysis on the eight remaining frameworks, we used the five IT governance decision domains by Weill & Ross [8] as widely acknowledged governance approach (see Table 2). While the *IT principles* domain focuses on the strategic role of IT in the organization, *business application needs* and *IT architecture* decisions focus on the needs to be fulfilled or the technological basis to be applied. *IT infrastructure strategies* addresses the decision on whether the realized services can be individualized for each business unit or whether it should be central. *IT investment and prioritization* focuses on the funding of IT.

3 Scaling Agile Frameworks and IT Governance

The following comparison shows the level of coverage of IT governance and differences and similarities between applied practices between the frameworks. Per governance decision domain [8], the frameworks are further compared regarding their mode of control and the overall responsibility.

































3.1 IT Principles

The IT governance decision domain of IT principles is evident in five frameworks with EUP and SAFe giving the most details. However, both frameworks differ in their overall logic. For strategy planning, SAFe derives IT strategy via strategic themes based on business objectives for each SAFe portfolio. Since the SAFe portfolio does not need to cover the whole IT organization, a common IT strategy is not necessarily guaranteed. EUP in contrast perceives one common enterprise strategy which integrates the IT strategy as crucial. The roles responsible for planning also differ. As IT strategy is closely linked to portfolio management, SAFe proposes responsibility for a “Lean Portfolio Management”. This function usually includes business managers and

executives who understand the enterprise's financial position. EUP in turn uses a specific "Enterprise Business Modeler". The strategic planning process is similar using lightweight methods and being collaborative in close alignment with enterprise stakeholders and the enterprise architecture discipline for technological input. Other approaches only cover parts of IT strategy. DA captures a planning process with themes like in SAFe that are captured in a business roadmap as main practice describing the near term, intermediate term (3-12 months) and long term (1 year and more) vision. In Scrum@Scale, a general IT strategic vision aligning and setting strategic priorities is developed by a "Executive Meta Scrum" led by the executive Product Owner, i.e. the CEO or Strategic Vice President. The laCoCa model is a real exception among the frameworks. It proclaims a "Dynamic Corporate Strategy" which integrates business and IT strategy. This strategy is developed by "StraDevOps" teams who include "customer and or departments, business strategists, Enterprise Architects, [...] and close the gap between the existing business strategy and regular DevOps teams" [30].

In sum, IT strategy remains a top down governance decision domain in the agile frameworks. Also, the responsibilities of business and IT executives are traditional. Although they collaborate closely on strategy development, business is still perceived as mere stakeholder from IT. Alignment between them is still the dominant practice.

Table 2. Comparison of scaling agile frameworks

	Scaled Agile Framework (SAFe)	Disciplined Agile (DA)	Enterprise Unified Process (EUP)	Enterprise Agility	laCoCa Model	Scrum @Scale	Recipes f. A. Governance (RAGE)	XScale
IT Principles	 4, t	 4, t	 4, t		 3, t	 4, t		
IT Architecture	 1, m	 4, m	 1, m	 1, b	 3, m			
IT Infrastructure Strategies	 1, b	 1, m		 1, b	 3, b			 1, m
Business Application Needs	 4, t	 4, t	 4, t	 4, t	 3, t	 4, t	 5, t	 4, t
IT Investment and Prioritization	 4, m	 4, t		 4, m			 5, t	 4, t
Legend Coverage  Why?-Principle  What?-Process  Who?-Role(s)  How?-Practice(s) Responsible 1- IT 2-Business 3-Convergence 4-Alignment 5-Not specified Control t – top down (Authority-led) b-bottom up (Autonomy-led) m-mixed								

3.2 IT Architecture

Five frameworks directly address IT architecture with DA, EUP and SAFe covering both principles, process, roles and practices. All three frameworks propose a strategic architecture role model with specific enterprise architects from IT for resolving technical dependencies on portfolio level and solution/system architects or chief architecture owners on program level. DA also proposes the role of architecture owners as team member who is responsible for a single team's architecture. The practices applied in the frameworks differ. While EUP uses traditional planning artefacts with a largely predefined "Enterprise Architecture (EA) Model" and reference architectures ("candidates"), SAFe and DA architects create a high level common technological vision and guidance and derive strategic architectural initiatives which will then be integrated in the portfolio. For initiative execution, SAFe uses "Enabler Epics" as requirements descriptions which are realized to build a central "Architectural Runway" for all teams. In contrast, DA promotes an adaptive, context-sensitive strategy to architecture. Based on the specific goals, architects identify the process decision points to be considered. For each point, a range of strategies to choose from is provided. The laCoCa model proposes a Lean EA management with specifically tailoring the EA framework TOGAF without giving guidance on how to tailor, conducted by the enterprise architects in "StraDevOps" team. All four frameworks also propose bottom up architecting by actively seeking validation and feedback by the teams and identifying their needs for architecture optimization. Radical bottom up Incremental Architecture solely emerging from solution implementing by teams instead of up-front planning is only proposed by Enterprise Agility. They perceive architects to be consultants rather than leaders like in traditional architecture management.

Overall, a shift towards architectural autonomy of the teams is seen in the frameworks as Enterprise Agility states: "Rather than decide the architecture in advance, let it emerge as you implement stories" [28]. As architecture is technological in nature, responsibilities are still mainly with architecture roles based in the IT organization. Due to having an enterprise architecture function, the roles also have a high business proficiency.

3.3 IT Infrastructure Strategies

The mapping of this IT governance decision domain was challenging since Weill & Ross [8] imply governance of a multi business unit organization. IT infrastructure strategies addresses which IT services need to be provided as shared services for all business units and which can be individually changed. We transfer this challenge to the agile organization in the way that the degree of autonomy of a single agile team regarding choice of IT infrastructure is focal in this dimension. Since this is inextricably linked to the IT architecture, we highlight topics not covered before.

Five out of the eight analyzed frameworks address IT infrastructure strategies, mostly regarding the topics continuous integration, delivery and deployment. In all frameworks, teams are empowered to own their process, the concrete selection of practice patterns and tooling such as e.g. 1 Click Deploy to self-determine how they

will work together. In order to achieve continuous delivery, automation of tasks and decoupling of solutions are perceived as key enablers in the frameworks. While XScale solely proposes behavior driven development - a common language between business representatives and agile teams for creating successful automated tests - as solution, SAFe proposes an extensive set of practices with e.g. the Continuous Delivery Pipeline. This contains the assets and technologies (workflows, activities, and automation) needed to deliver solution value as independently as possible. They further introduce the “System Team” next to their agile teams (DevTeam, Scrum Master, Product Owner) assist in building and using the Agile development environment, including continuous integration, test automation and continuous deployment. In the other frameworks, capabilities for continuous delivery are directly embedded into the teams.

For all frameworks, governance refers to avoiding technical debt. While XScale proposes “XP core plus weekly retrospectives” as suitable practice to achieve this goal, SAFe emphasizes data and security management. These areas are monitored by “Shared Services” who are specialists that help teams with their professional skills regarding e.g. data security or enterprise architecture. The architectural runway as technology roadmap also serves for monitoring technical debt. As exception, DA addresses the responsibility of a specific IT governance process that should guide and monitor the teams to ensure that they leverage and evolve the IT infrastructure effectively so that the infrastructure is sound. This also includes data management as well as security. Comparing to the other IT governance decision domains, this area has the highest level of autonomy by the teams with minimal interference of authority. Since IT infrastructure is IT architecture from a technological perspective, business involvement in this domain is also limited in the frameworks.

3.4 Business Application Needs

All approaches except the laCoCa model explicitly address this IT governance decision domain as portfolio management for scaling agile. In the laCoCa model, business application needs is covered by Agile Requirements Management.

For guidance on how to achieve and maintain the overall portfolio, the frameworks show different levels of detailed descriptions, e.g. for proposed practices. SAFe is extensive with detailed descriptions on the three main process areas “Strategy and Investment Funding”, “Agile Program Guidance”, and “Lean Governance”. For managing the portfolio, SAFe proposes using a Lean/Kanban Portfolio system with corresponding backlog containing both business and technical requirements. Overall responsibility is with the specific “Lean Portfolio Management” function which closely collaborates with architecture and business stakeholder. Other approaches like DA and RAGE also favor dedicated individual functions or roles using “Portfolio Owner” as authority over selection and prioritization. Scrum@Scale and XScale in turn propose group approach like the “Executive Meta Scrum” with executive leadership and stakeholder members or a “Portfolio Squad” with business and technical leaders as more suitable. XScale further uses a “Portfolio Leader” and “Portfolio Coach” as ‘Leadership as a Service’ function for intelligently liaising with the business's executive team to manage the organization's finances. Practices for portfolio management are

largely provided by the frameworks. XScale advises to adapt a high-cadence “Continuous Adaption Cycle”, preferably weekly, with e.g. team retrospectives and the Portfolio Squad meeting to improve and refactor a portfolio to avoid technical and cultural debt. RAGE and Scrum@Scale also propose specific meetings such as portfolio planning and grooming or backlog prioritization sessions for conducting portfolio management. RAGE further addresses specific documents to be used like a business case, an agile charter containing the product vision, a decision matrix with the priority value of all initiatives and a portfolio backlog containing the descriptions of the initiatives. Practices for monitoring of the results are not explicitly addressed the approaches except SAFe. However, the need is addressed by the majority.

In sum, the frameworks propose the traditional top down portfolio management approach as it still “entails two major activities: Making [strategic] decisions about what initiatives to execute or fund, and making decisions about whether or how to continue work on initiatives that are already in progress” [32] as RAGE states.

3.5 IT Investment and Prioritization

Five of the examined frameworks directly address the IT governance decision domain of IT investment and prioritization. For all, budgeting decisions are inextricably linked to portfolio management and need a flexible model underlying. Thus, SAFe or Enterprise Agility link funding to value streams or products. The concrete budgeting mechanisms differ between both frameworks. The Enterprise Agility framework proposes a couple of mechanisms such as “Capacity Based Investment” with funding based on a portfolio or a line of business. The amount of funding then determines the number of teams dedicated the line or portfolio. As alternative, “Viable Increment based Investment” is proposed with the investment community getting together on a regular cadence (e.g. once per iteration or quarter) and prioritizing the next MVIs from each area against each other. SAFe and also DA use a continuous budgeting approach with lean or “Rolling Wave Budgeting” using lean business cases which are iteratively readjusted based on learnings. Although fiduciaries have control of spending, the value streams are empowered for rapid decision-making and flexible value delivery. Each value stream budget can then be adjusted over time based on its relative value to the portfolio. Furthermore, epic funding and governance is used for funding substantial, crosscutting or significant local investment concerns based on a lean business case. These may be funded by an overall budgetary reserve, reallocation of personnel, budgets from another value stream or by buffers in the existing value stream budget. Nominally, these budgets are adjusted twice annually to not impede agility, but create planning security for the teams. XScale’s approach of “Throughput Accounting” is similar to lean budgeting, but uses the bottleneck that dominates throughput per value stream and portfolio and budgets accordingly. RAGE is the only traditional approach which uses project funding supported by a traditional static business case.

Since IT investments are inextricably linked to portfolio management, most budgeting approaches have a similar shape. Decisions are made top down by portfolio management in alignment with business and technical stakeholder. One interesting exception, however, represents Lean Budgeting by SAFe as “dramatically different

approach to budgeting, one that reduces the overhead and costs associated with traditional cost accounting, while empowering decentralized decision-making [to value streams]” [32].

4 Discussion and concluding remarks

Our research aimed at showing how the conflict between structuration through IT governance and agility is solved in selected scaling agile frameworks. As a facilitator for achieving this goal, we originally proposed structurally and strategically converging the business and IT side to close the gap and foster shared understanding.

Our research indicates that the frameworks try to solve the conflict of structuration vs. agility by presenting themselves as the structuration in which agility is framed. The governance setups in the frameworks enable rapid response to changing needs by e. g. updating the program and team backlogs based on new decisions from the governance body. However, the agile empowered self-organized autonomous teams [17] as imperative for agility are limited by a traditional governance structure on the higher levels. Most decisions, especially more business-related, are still solely top down without using input from the teams. Information flows back to the governing body focus, similar to traditional IT governance frameworks [10], on mere team performance monitoring instead of qualitative feedback on e.g. how valuable is the service to the customer. These findings are in line with earlier analysis by Weill & Ross [8]. However, the required new forms of leadership [17] have not been embedded yet. Thus, IT governance on each level – especially program and portfolio – needs further inquiry on how to integrate agility and which balance between autonomy and authority is needed.

Second, our results highlight that the conflict of IT governance and agility by long term formalized decisions and inhibiting flexibility in response to changing needs has not been solved by the frameworks. Planning on strategic level mostly follows the traditional short term cadences via quarterly or semi-annually time frames. Continuous lifecycles including continuous business strategy and planning [12, 13] are only scarcely existent. This approach however raises the question how continuous learning as central element to agility [12] needs to be reflected on the strategic level.

Finally, we show that most scaling agile frameworks still perceive themselves as interfaces to non-agile enterprises. A structural and strategic convergence is only in its nascent phase within the frameworks while traditional business IT alignment [21] is rather promoted. However, when approaching a convergence, the IT governance structures are reshaped by e.g. having a “StraDevOps” team for continuously planning and controlling ITG decisions. Also, the strategic approach is affected by strategic convergence of business and IT strategy towards a “Digital Transformation Strategy” [20] or “Digital Business Strategy” [19] to realize IT’s role as trigger for business opportunities [19]. When aiming for structural convergence, integrating the product owner as ‘master’ of the product backlog is implied. The “BizDevOps” vision [18] including further business members within the teams is only in its nascence or merely a vision [27]. Our results pose the question whether organizational agility needs a business IT convergence as enabler or whether the traditional business IT alignment

needs to be achieved. In more detail, it is still unclear for which decision domains convergence needs to apply and for which decisions alignment is favorable.

For practitioners, a main contribution of our research is the reveal of principles, practices, process steps and roles for IT governance in the frameworks. Thus, we provide companies a comprehensive base of approaches to choose from for working on their specific challenges. These insights both can be used for the challenge to holistically adopt IT agility as well as for solving specific problems like the adoption of an agile portfolio function. As next step, companies can assess the suitability of the variations to their specific needs. Another major practical contribution of our research is the reflection of gaps of the frameworks in case companies strive to achieve a profound agile enterprise. For example, the comparison illustrates that IT governance is still mainly traditionally shaped. The ‘right’ balance between autonomy and authority has not crystalized yet as each framework handles the decision domains differently. This also holds true for finding a ‘right’ cadency of decision-making for each domain.

Our research is mainly limited by its selective analysis based on a small number of frameworks. The findings are further based on an interpretative and therefore subjective analysis on the frameworks. Also, high level public descriptions of some frameworks limited our research. For those, we used news articles or conference presentations by the frameworks’ authors as knowledgeable information source to fill information gaps.

To sum up, this analysis serves as a good foundation for future research in and between the agile and business IT alignment communities. Confirming the assessment by experts or applying other IT governance approaches to the frameworks might also provide valuable additional insights. An in-depth analysis of the frameworks’ application by companies and comparing proposed business-related agile governance mechanisms in research to the frameworks’ practices may further ‘optimize’ the frameworks’ structure and use regarding IT governance and business inclusion.

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