

Profiles and success factors of responsive organizations

A Master's Thesis submitted for the degree of
"Master of Science"

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Vienna, 17.04.2023

Affidavit

I, **PHILIP KARL ZIPSE, B. ENG.**, hereby declare

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2. that I have not prior to this date submitted the topic of this Master's Thesis or parts of it in any form for assessment as an examination paper, either in Austria or abroad.

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ABSTRACT

Innovation departments in fast-changing environments face the urge of harmonizing continuous product development with the preservation and uninterrupted operation of the existing product portfolio. Resulting from the lack of responsiveness and high operational strain, traditional organization structures are not always suitable to meet these needs, creating the demand for alternative organization setups.

Thus, this thesis aims to provide an overview of organizational setups that have been developed to support organizational responsiveness, and elements that allow the creation of an appropriate setup of innovative organizations. All based on the assumption that a correlation exists between meeting an organization's demands for operational agility and their innovative capabilities. The thesis distinguishes between the organization structure that creates the framework and enables operations, and the procedural organization that guides dynamic operational processes and responsibilities.

Building on literature research, approaches to traditional and responsive organization design are identified and elaborated. By confronting these with their limitations and practical challenges, the beneficial constituents of responsive setups are carved out. Confronting these elements with the challenges derived from interviews with an innovation organization, these insights lead the discovery of organizational contributors to the organizational responsiveness, hence innovative capabilities of an organization.

The work results in an extensive overview of existing responsive organization approaches supplemented with a set of empirical insights originating from case studies. Furthermore, a comparison of the practical challenges of an innovation department and the common characteristics of responsive organization setups is drawn to evaluate the practical relevance of the identified responsive characteristics.

The aspect that reoccurred in different manifestations, in both responsive organization theories and case studies, is distribution. Such ranges from procedural responsibilities to managerial authority, as well as structural to procedural organization. It appears to be a common theme when overcoming practical challenges with responsive organization approaches as the flexibilization is achieved by independently leveraging different constituents of an organization. Hereby, the underlying organization structure supports the operational organization by fulfilling general static functions and enabling a higher degree of flexibility by reducing the amount of static aspects within the organization.

1. INTRODUCTION

Based on a 2012 survey spanning the full range of regions, industries and company sized, 62% of the responding executives reported about broad innovation portfolios that include multiple structural organization models to drive innovation efforts. The separate functions include innovation centers, business groups focusing on emerging business opportunities and (advanced) technologies or new business development. (Capozzi *et al.*, 2012, p. 8) As 86% moreover responded that the separate functions for innovation and day-to-day business influence the innovation outcomes positively (Capozzi *et al.*, 2012, p. 1f.) and benefit maintaining focus and budget on innovation purposes (Ringel *et al.*, 2015, p. 19), this raises the question if traditional organizational structures of companies are not ideally suited for innovation purposes. Consequently, businesses rather form insular organization structures than innovating in their ordinary organization.

With 42% in 2015 and an increasing share, too long development times were stated the biggest challenge to generating a return on investment in innovation (Ringel *et al.*, 2015, p. 8) prompting that the speed of innovation is crucial to the success of innovation. Moreover “companies that are built for speed often realize first-mover advantages; they are able to react more quickly to competitors’ moves or market shifts [...]” (Ringel *et al.*, 2015, p. 9) resulting in a higher likelihood to be a strong and disruptive innovator. To get there, lean processes should be applied, customer input included, people and resources dedicated to the task and the right metrics should be established and followed. Hence, companies must design their system, organization, processes and culture for speed. (Ringel *et al.*, 2015, p. 9 f.)

One mean to address development speed are the working methodologies applied in practice. In 2019 only 8% of the respondents to a study series from the University of Applied Sciences in Koblenz among participants from 26 countries reported to consistently use classic project management while 20% consistently used agile methods for their work. Comparing this to 22% classical and 16% agile approaches in 2012, the use of classical project management approaches clearly decreased. In the same period, the use of hybrid approaches changed from 27% in 2012 to 43% (Komus *et al.*, 2020, p. 13f.) arguing, that the shift toward agile approaches was made to improve time to market and quality, reduce project risks and to improve team morale. Too, demand by management, customer or market partner totals up to 34% and frustration with classical project management to 22% of the responses, indicating that the demand by business stakeholders too contributes to the shift. (Komus *et al.*, 2020, p. 22) While the strongest adoption is visible in software development, where agile approaches originated from, utilization can also be seen in other domains. Figure 1 visualizes the adoption in different areas.

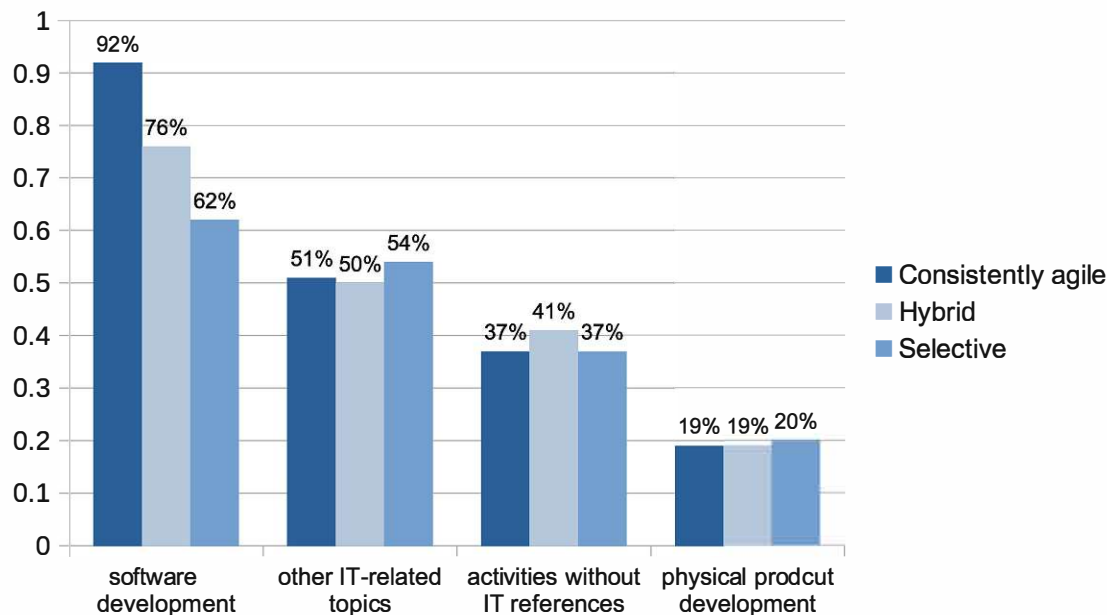


Figure 1.1: Areas of application of agile methodologies (ref. Komus *et al.*, 2020, p. 18)

However, it is not a new trend that organizations deviate from traditional organization approaches that are designed for efficiency by e.g. excluding innovation from the main organization or creating parallel structures that are designed for innovation or speed. (Mohrman and Lawler, 1989, p. 257) Despite the knowledge and penetration of agile working, more than 80% of Chief Executive Officers are reported to believe that innovation is critical to growth and that their business model is at risk. Only 6% are satisfied with the innovation performance of their firm. (McKinsey & Company, n.d.) Therefore, simply applying agile working into traditional organizational structures and excluding innovation hubs from the main organization cannot be the answer to fast innovation. Instead, different organizational approaches are needed that allow companies to design their organization for the speed and innovation, without losing strategic priorities and focus, nor knowledge and insights into the market and customers. (Capozzi *et al.*, 2012, p. 1 f.)

2. SCOPE OF WORK

2.1. Research questions

Capturing the challenges and trends described above, organizations seem to lack of well-structured alternatives to address common innovation challenges, as “agile working” was the only alternative named. However, such solely is a method to organize operations and may be unlikely to be capable of addressing a wide range of organizational challenges. To put “agile working” into a broader context and to expand the set of alternatives, this thesis targets the following research questions:

1. What is the deployment profile of alternative organization approaches addressing textural flexibility in organizations according to literature provided by consulting and industry reports?
2. What use cases were attempted to address with alternative organization setups? What findings have been created during and after the deployment?
3. According to a group of interviewees, what are high priority success factors for an innovation organization? How do such relate to alternative organization approaches?

2.2. Goals

This thesis aims to provide an overview of common approaches to responsive organization design that is supplemented with a set of empirical insights originating from case studies. Building on such, the organization approaches further undergo an analysis to derive common characteristics that are confronted with the practical challenges of innovation departments resulting from interviews to evaluate their suitability to tackle such. Building on the preceding results, the work intends to define elements of an organizational setup that meet the requirements of innovation departments and organizations with a high demand for flexibility.

2.3. Glossary

Within this thesis, one will refer to “*innovation*” as the outcome of “activities or processes resulting in, or aiming for, innovation.” “An innovation can be a product, service, process, model, method, etc. [realizing or redistributing value to the organization].” (“ISO 56000:2020 (en) Innovation management - Fundamentals and vocabulary”, 2020)

“*Development*” in the context of product development in this thesis refers to the process of developing a new product or an advanced version of an existing product. (“OxfordLanguages”, 2022, Development)

“*Agile*”, if defined by dictionaries, refers to the ability to move quick or having a quick and adaptable character. (Merriam-Webster, n.d.) Agile Alliance, which was founded by the author of the Scrum Guide and inventor of „Agile Working”, describes with the term in the context of working „the ability to create and respond to change. It is a way of dealing with, and ultimately succeeding in, an uncertain and turbulent environment.”

(“Agile 101”, 2015) As the meanings vary, in this thesis “agile” will refer to the general procedural ability to respond to change. To differentiate the structural ability of an organization to adapt and deal with turbulent environments, the term “responsive” will be used to differentiate the structural character from the procedural.

Building on this understanding of agile, „*Agile Working*“ is understood as an operational approach that is applied to achieve responsiveness in the context of work. This does not include the broader understanding of the general flexibilization of time, location, role and source constraints that are applied to a working environment (“What is Agile Working?”, n.d.) Also, Agile Working does not act as a proxy for organizational responsiveness nor innovation capabilities as it might be one approach to increase responsiveness but such is not limited to Agile Working.

“*Methodology*” or “*method*” will be used as a term to describe “the [systematic] procedure for accomplishing or approaching something [...]”. (“OxfordLanguages”, 2022, Method) This refers to e.g. the operational or procedural working approach of an organization.

The term “*organization*” is being used in ambiguity. On the one hand, it refers to “an organized group of people with a particular purpose, such as a business or government department” and on the other hand to “the way in which the elements of a whole are arranged.” (“OxfordLanguages”, 2022, Organization) Responsive organizations in this context describe a subset of organizations that inherently have the capabilities to respond to change with its internal organization.

“*Organizational structure*” refers to the “system that outlines how certain activities [and processes] are directed in order to achieve the goals of an organization.” (“OxfordLanguages”, 2022, Organizational Structures) Organization structures will be subdivided into traditional and responsive structures. Traditional organizational structures include e.g. single- and multi-line organizations, and matrix organizations. Responsive organization structures may include agile working methods and alternative structural models focusing on materializing responsiveness in organizations.

The term “*role*” refers to a granular and defined scope of accountability which contributes to the value generation of the organization. Each individual role definition lines out the key responsibilities of the role and the field in which decision can be made independently by the role owner.

“*Framework*” describes the essential supporting structure underlying a system. (“OxfordLanguages”, 2022, Framework) In the context of this thesis, the underlying system is the organization that the framework can sustain on e.g. a structural, procedural or cultural basis.

2.4. Methodological approach

Firstly, desktop research about common industrial practices was conducted to identify common approaches to and principles of responsive organization. Building on these insights, secondly, an explanation of the most relevant approaches was created that was complemented by information on and experiences from the implementation of the mentioned organization approaches. The organization approaches that were elaborated

and regarded in this thesis were chosen based on their deployment merit. High merit hereby originated from either the existing industrial deployment that is reported in industry surveys about common alternative organization approaches or the proven potential to replace aspects of traditional organization structures which could be backed by an extensive set of case studies. The case studies contributing practical insights were intentionally chosen to include organizations that differ strongly from each other with regard to the organization size and industry.

Thirdly, the elaborated approaches were analyzed to derive reoccurring constitutional elements on a theoretical basis. To confront the theoretical insights with their merit for application in innovation departments in volatile environments, interviews with such an innovation organization were conducted to contribute specific insights into challenges of such a department. The criteria for the theoretical evaluation where determined through the set of semi-structured interviews was conducted with the stakeholders in and around an innovation department. The questions were chosen to gain a clear understanding of the interaction with the observed organization and the resulting aspects of (dis-)content resulting from the collaboration. To narrow down on the specifics of the organization and to receive targeted insights, the remaining set of questions aimed for the specifics of the current and an improved organization structure, as well as a future interaction with the improved organization. The questions were designed and asked by the author to support the evaluation of the information gathered in the desktop research.

The results were analyzed for patterns before being used to confront the theoretical insights and to identify beneficial constituents for organizations in such volatile environments. Building on the preceding results, the work intended to define elements of an organization that met the requirements of innovation departments and other organizations demanding flexibility. The necessities used were deducted from the limitations and challenges raised in the interviews and the case studies.

2.5. Summary

Resulting from studies performed in the last years, the demand for alternative corporate approaches to innovation has become apparent. The implementation of different organization approaches to separate innovation and day-to-day operations, hereby have been proven to be a countermeasure for achieving innovation while upholding organization structures that are not fit for the innovation purposes. Besides creating separate organizations independent from and different to each other, this includes the rise of agile working approaches that have penetrated a range of companies in different industries. Both materialize the reaction to the structural inaptitude of traditional organization structures for certain innovation purposes that prompts the interest in alternative organizational approaches that could meet such demands more effectively. Building on this assumption, this thesis aims to identify elements to alternative organization structures that benefit innovation purposes of organizations. By analyzing literature and a range of case studies on responsive organizational approaches, the focus lays on alternative methods and setups to meet organizational demands originating from innovation activities. To verify their merit, these elements will be confronted with the innovation reality of a selected innovation department.

3. DESKTOP ANALYSIS OF INDUSTRY PRACTICES

3.1. Approaches to traditional organizations

3.1.1 Single- and multi-line organization

Single- and multi-line organizations are two of the traditional approaches to organizing companies functionally. In a single-line organization, a position is subordinated to only one instance from which it receives directives. In a multi-line organization, a position receives directives from multiple superior instances. Latter can balance out long communication paths that single-line organizations create, but simultaneously create conflicts of competencies as multiple line managers take influence on the subordinates. For this reason, multi-line organizations are uncommon in practice. (Wöhe, 2008, p. 123f.) One exception is the matrix organization, though. Such is common in practice and is elaborated separately in chapter 3.1.4. Figure 3.1 compares the two line organizations schematically.

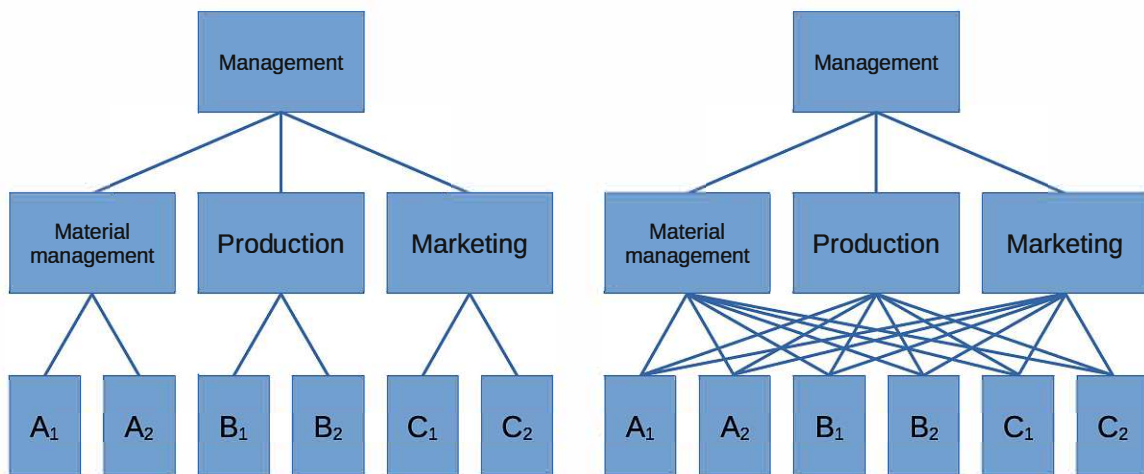


Figure 3.1: Single- and multi-line organization (ref. Wöhe, 2008, p. 124)

3.1.2 Line and staff organization

Accounting for the growth of an organization and to avoid additional hierarchical levels that slow down decision-making, staff positions and central departments may be created. Staff positions in such cases have no decision authority, and central departments command restricted decision authority. Such is limited to the subject area of the central department. Disciplinary and managerial responsibility remains with the superior. As with single-line organizations too, horizontal coordination is not envisaged in line organizations. Hence, coordination only occurs via the management. (Wöhe, 2008, p. 124f.) An exemplary organization is depicted in Figure 3.2.

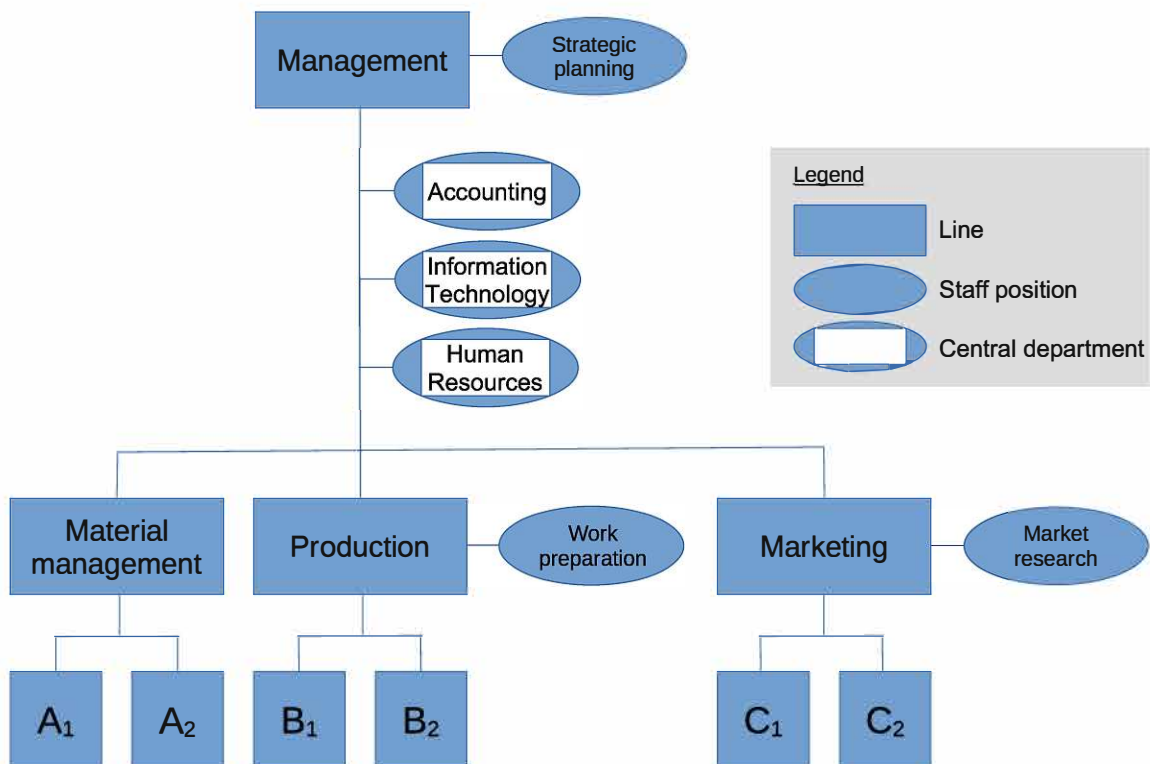


Figure 3.2: Line and staff organization (ref. Wöhe, 2008, p. 125)

3.1.3 Divisional organization

Divisional organizations cluster the system into areas of activity (divisions) where each is to be regarded independently from the others. Typical division types are product groups, sales regions and customer segments. Resulting from divisional organization, decision-making and process control are decentralized as each division has the functions required to sustain operation. Such results in redundant functions within the system but allows to meet heterogeneous portfolios at the same time, where different divisions could e.g. operate in different market environments or display different business models. (Wöhe, 2008, p. 125f.)

3.1.4 Matrix organization

A combination of divisional and functional organization is the “Matrix organization”. Such is a hybrid organization structure that consists of a functional-driven facet that is displayed vertically and a divisional that is represented horizontally. Where the two lines meet, a node is representing a team that bears the tension of multiple supervisors with different interests. However, this organization setup keeps the product focus and allows leveraging e.g. procurement, production and sales advantages as the same capacities are utilized for multiple products resulting in cost advantages over other traditional organization approaches. (Wöhe, 2008, p. 126ff.) An exemplary organization applying this approach is displayed in Figure 3.3.

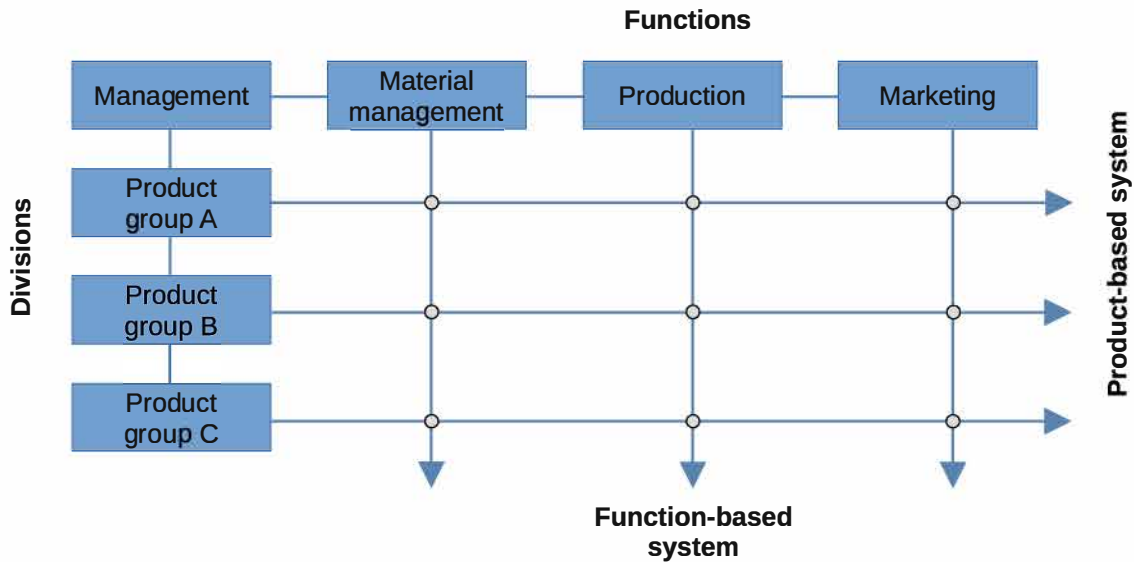


Figure 3.3: Schematic depiction of a matrix organization (ref. Wöhe, 2008, p. 127)

3.2. Approaches to responsive organization structures

3.2.1 Prelude

As there might be numerous alternative organization approaches to the setup of organizations, the number of those included in this thesis has been limited to the ones described in chapter 3.2.2 to 3.2.8. A deeper elaboration of additional ones is refrained from for several reasons. These include in many cases that additional derivatives from Scrum are constituted. Scrum hereby is of special importance as it has marked a paradigm shift in the setup of organizations when it was invented and penetrated the industry. Other reasons are, that a general approach to leadership or a set of values, principles and tools rather than the operational nor structural nature of an organization is described. The selection therefore has been limited and includes some of the most common approaches to scaling responsiveness in organizations. Approaches that have not been elaborated in this work include but are not limited to:

- Large-Scale Scrum (LeSS)
- Holacracy
- Enterprise Scrum
- Disciplined agile
- Recipes for Agile Governance in the Enterprises
- Agile Portfolio Management

The focus instead was put on some of the most common approaches to scaling organizational responsiveness, like the Scaled Agile Framework, Scrum@Scale and Scrum of Scrums which the most common practices. Studies with company representatives of various industries and company sizes have shown, that the most prominent approaches to scaling agile working have remained constant over the years. 53% of the respondents reply that their organization utilizes SAFe and 28% either Scrum@Scale or Scrum of Scrum (digital.ai, 2022, p. 16). As Scrum, which marks the origination of agile working, plays a significant role in organizations deviating from common practices, it also has a prominent role in responsive setups of organizations. Despite Scrum originating from the software industry, the implementation of responsive organization approaches can be pursued by companies of all industries and sizes to both product development and product management. (digital.ai, 2021, p. 16) (digital.ai, 2022, p. 11) Some of the most common approaches will be elaborated in the following chapter.

3.2.2 Scrum

Scrum has been developed in the early 1990s by Ken Schwaber and Jeff Sutherland who wrote the first version of the Scrum Guide in 2010 that contains the definition of Scrum. (Schwaber and Sutherland, 2020, p. 1) “Scrum is a lightweight framework that helps [...] organization generate value through adaptive solutions for complex problems” (Schwaber and Sutherland, 2020, p. 3) The framework however only defines the parts required to implement Scrum theory and builds on the collective intelligence of the people rather than providing detailed instructions. It is founded on empiricism and lean thinking, hence asserting knowledge coming from experience and reducing waste and focusing on the essentials. The framework is built on the pillars of transparency, inspection, and adaption. (Schwaber and Sutherland, 2020, p. 3f.)

Transparency:

“The emergent process and work must be visible to those performing the work as well as those receiving the work” which means that the stakeholders contributing to the establishment and execution of a process and to its outcomes, as well as the stakeholders receiving the outcomes, must have a clear understanding of the ongoing work. Consequently, transparency enables meaningful and productive inspection.

- Inspection:

The “progress toward agreed goals must be inspected frequently and diligently to detect potentially undesirable variance or problems” As events within the Scrum framework intend provoke change, such is only enabled by inspection.

- Adaption:

The expectation that a Scrum Team adapts the moment it learns about deviations outside the acceptable limits, so that further deviation of the process or the materials being produced is minimized. (Schwaber and Sutherland, 2020, p. 3 f.)

The Scrum Team is the elementary unit of Scrum and consists of a Scrum Master, one Product Owner, and Developers. It “is a cohesive unit of professionals focused on one objective at a time, the Product Goal.” (Schwaber and Sutherland, 2020, p. 5) Scrum Teams are cross-functional and have all the skills necessary to create value in each Sprint. At the end of each Sprint, the Scrum Team and its stakeholder inspect the results and adjust for the next Sprint before the next Sprint begins. (Schwaber and Sutherland, 2020, p. 2ff.) As they are self-managing, they internally decide who does what, when, and how. The Scrum Team is typically 10 or fewer people, responsible for all product-related activities and the entire team is accountable for creating a valuable, useful increment every Sprint. The Product Owner is responsible for maximizing the value resulting from the work of the team by developing and communicating the Product Goal, creating, and ordering Product Backlog items, and ensuring transparency and understanding of the Product Backlog. “Developers are the people in the Scrum Team that are committed to creating any aspect of a usable Increment each Sprint.” (Schwaber and Sutherland, 2020, p. 5) They are accountable for creating a plan for the Sprint (Sprint Backlog), instilling quality by defining when work is considered completed, adapting their plan toward the Sprint Goal and holding each other accountable. The Scrum Master helps everyone understand Scrum theory and practice, as well as establishing Scrum and team effectiveness. (Schwaber and Sutherland, 2020, p. 5f.)

Scrum is built on an environment where the Product Owner orders the work that needs to be done to achieve the Product Goal into a Product Backlog. The Scrum Team turns a selection of the work from the Product Backlog into an Increment of value during a Sprint. The Product Backlog hereby is an emergent and ordered list of what is needed to improve the product, hence the features that add value to the outcome of the work which is called product. Simultaneously, the Product Backlog describes a future state of the product, hence the Product Goal is included in the Product Backlog.

During dedicated meetings (Sprint Planning), the Product Backlog is decomposed into a plan for the next Sprint that includes a selected set of items from the Product Backlog, an actionable plan for delivering the usable Increment of additional value and a Sprint Goal. (Schwaber and Sutherland, 2020, p. 10f.) Sprints are fixed length events of consistently one month or less where ideas are turned into value, hence being elaborated and implemented. During a Sprint, there are no changes to the defined Sprint Goal, but the scope of the Sprint may be clarified and renegotiated with the Product Owner as more information is gathered. “A new Sprint starts immediately after the conclusion of the previous Sprint.” (Schwaber and Sutherland, 2020, p. 7) During a Sprint, there are 15-minute events for the Developers of the Scrum Team to inspect the progress toward the Sprint Goal. These “Daily Scrums” allow the team to adapt the Sprint Backlog and adjust the upcoming planned work if necessary. “Daily Scrums improve communications, identify impediments, promote quick decision-making, and consequently eliminate the need for other meetings [within a Sprint].” (Schwaber and Sutherland, 2020, p. 9)

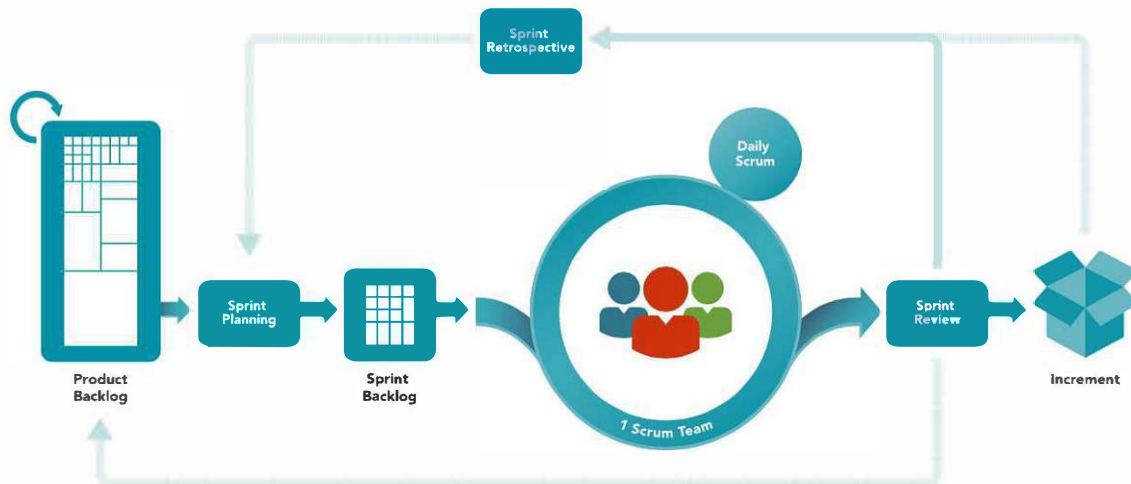


Figure 3.4: Schematic explanation of the Scrum framework (Scrum.org, 2020, p. 1)

To inspect the outcome of a Sprint and to discuss the progress toward the Product Goal, the produced Increment is presented to key stakeholders in the “Sprint Review” at the end of each Sprint. The focus of the event is on the work outcome of the Sprint. Complementing the Sprint Review, an additional meeting is held focusing on planning ways to increase quality and effectiveness of the team. At least one identified ways will immediately be added to the next Sprint’s Backlog and with that implemented in the next Sprint. (Schwaber and Sutherland, 2020, p. 9f.) The schematic illustration of the Scrum framework is displayed in Figure 3.4 showing the interaction of the different events and artifacts that are being used by the Scrum Team.

Interpretation

Scrum is a lightweight framework that targets solution generation for complex problems. The framework helps teams and organization to generate solutions to address complex problems iteratively and adaptively. (Scrum.org, n.d.) It assumes that all required skills to develop a solution can be included in a team that consists of less than 10 people whereas the composition of the team can be adapted in between every Sprint to meet the needs of the subsequent Sprint. As of the framework, the work that is to be done in the next Sprint must be decomposed from complex and vague requirements to precisely defined chunks of work that can be taken and processed by single team members without significant dependencies. If dependencies occur, these should mainly occur within the team to allow rapid removal and progressing. As the setup mainly defines team-internal procedures, it does not define the collaboration with additional teams nor stakeholders explicitly. However, one can assume that such interactions are included in the Product, Sprint Backlog or tasks of the Scrum Master. Assuming that the interaction with or availability of stakeholders and decision-makers is limited to the Sprint Reviews, which are the only events where the interaction is stated explicitly besides the responsibilities of the Scrum Master, this would leave only one event at the end of each Sprint to make decisions that are outside of the Scrum Team’s space of autonomy and potentially delaying the progress until the decision is made during the Sprint Review. Assuming this is considered an impediment, it’s the Scrum Master’s task to remove it rapidly which could be a bottleneck in the setup if the communication

between Scrum Master and stakeholder cannot be established easily. The integration of the framework into the larger organization is not defined. Product and portfolio management, as well as company strategy, for that reason require additional structures to integrate Scrum into a larger context. Table 3.1 summarizes some key advantages and disadvantages of Scrum.

Table 3.1: Concluded advantages and disadvantages of the Scrum framework

Advantages	Disadvantages
Suitable for environments lacking clear requirements and require flexibility	No consideration of the overall project deadline as only Sprints are being planned
Transparency and frequent Sprint Reviews result in high visibility for team and project	Scrum demands experienced personnel complicating the implementation in existing structures
Working routines foster trust and team development resulting in higher satisfaction	Successful Scrum integration requires organizational transformation to enable autonomous team and decision-making
Quick adoption as it requires less documentation and control and focuses on innovative products instead	Large endeavors going beyond the team size of 9 require additional structures that are not defined by the framework
	Decisions outside the Scrum Teams operational space are limited to dedicated events in between the Sprints
	Frequent check-ins require significant discipline to avoid micromanagement by stakeholders

3.2.3 R-Scrum

R-Scrum is a procedural approach derived from Scrum and adapted to „regulated environments such as automotive, aviation, financial services [...]“ (Fitzgerald *et al.*, 2013, p. 863) Such environments traditionally comprise primarily hardware and follow a defined logic of development processes as these processes are audited by external assessors. (Fitzgerald *et al.*, 2013, p. 863) R-Scrum stands for “Regulated Scrum”, which processes are mostly aligned with the original version of Scrum. The adaptation of agile methodological frameworks is required as the development processes within regulated environments contradict the approaches of iterative product development. (Beck *et al.*, 2001a) Such are built on empirical logic, inspecting the outcome of a process and adapting as needed to solve occurring problems and improve the process. (Deming, 2000, p. 88) Contradictions are further enforced by the prioritization derived from the Agile Manifesto that regards processes and tools as less important than

individuals and their interactions, as well as comprehensive documentation less than working software. (Beck *et al.*, 2001b) These examples however, depict the tension between agile approaches and the development processes in regulated environments, as both deprioritized constituents are essential principles of e.g. the requirements of the Food and Drug Association (FDA) regarding development and approval of (software) products. (ref. Federal Agency U.S. Food and Drug Administration, 2002, p. 12f.) Additionally, following such external regulations and standards provided by notified bodies is one of the key denominators of regulated environments. These regulations can cover „quality assurance, safety and security, effectiveness, traceability, and verification and validation.“ (Fitzgerald *et al.*, 2013, p. 864) The key concepts of regulated environments that apply are elaborated in Appendix A. KEY CONCEPTS IN REGULATED ENVIRONMENTS.

The specific case that was adduced by the author to describe the framework, embedded R-Scrum in a company working on “regulatory compliance management software for document and quality management”. (Fitzgerald *et al.*, 2013, p. 863 f.) The organizational structure uses a “Product Council” to direct product development processes, set general objectives, approve key phases, make strategic decisions and “identify the resources required for the project management plan and timeline.” (Fitzgerald *et al.*, 2013, p. 867) Once a product development is authorized by the Product Council, a Product Development Team is to be appointed. The core team members are the Product Owner, Scrum Master and the lead developer who meet regularly to review the implementation process.

All development Sprints of 3 weeks are independently audited by Quality Assurance (QA) within 3 days after Sprint completion to ensure procedural compliance. QA issues non-conformance reports, lack of traceability or tasks not fully closed in line with predefined procedures, guidelines and Sprint plans. Every issue is fed back into the Product Backlog for resolution in the subsequent Sprint. To ensure the quality of the code, adherence to coding standards and that unit tests are run, peer code review and code refactoring are practiced for every task. (Fitzgerald *et al.*, 2013, p. 867f.) Risk mitigation is mainly facilitated by the ability to ascertain the project status in real time. It is managed by the Scrum Master throughout the process. If difficulties arise in items of the Product Backlog, the team has more time for the tasks to mitigate or avoid the risk. Process security is ensured by security clearance of employees involved and full traceability of actions in all stages of the agile process. (Fitzgerald *et al.*, 2013, p. 868f.) This structural approach builds the framework for the agile development process.

Table 3.1: Key structural elements of QUMAS' R-Scrum (ref. Fitzgerald *et al.*, 2013, p. 867ff.)

Title	Role
Product Council	Set overall objectives, approve key phases, strategic decisions and identify staff/resources required for the project management plan and timeline.
Product Development Team	Formally assigned by the Product Council. Core team consists of Scrum Master, Product Owner and Lead Developer. A person for documentation ensures link between development, documentation and support
Quality Assurance	Ensure procedural compliance: Issue non-conformance, lack of traceability or tasks not fully in line with predefined procedures, guidelines and Sprint plans

The Product Backlog is defined and prioritized by the Scrum Master and the Product Owner, who has extensive knowledge about the applicable regulations and customers. In Sprint Planning Meetings, the tasks are estimated on an hourly basis so that a project plan can be created and consequently tracked by the Scrum Master to identify potential delays or overruns. Simultaneously, estimating the duration of tasks is the foundation for creating the Sprint Backlog and estimating the work for the next development phase. (Fitzgerald *et al.*, 2013, p. 868) These are the first deviations from the Scrum framework as within Scrum no project plan is being created and the Scrum Master does not hold any project management responsibilities. They instead facilitate the agile process. Furthermore, within Scrum the Product Backlog is nurtured by the Product Owner in collaboration with the customer, the Scrum Master is not involved in this process. Summarizing the roles in R-Scrum, Table 3.2 gives an overview of the available roles.

Table 3.2: Team roles in R-Scrum product development (ref. Fitzgerald *et al.*, 2013, p. 867)

Title	Role
Product Sponsor	Executive sponsor of product development making key business decisions. Report to management board.
Scrum Master	Overall project management responsibility. Produce the project management & Sprint plans. Liaise between the Head of Development & Support, Head of Quality & Customer Relationship Management and project team. Prioritize work items.
Product Owner	Represents the customer. Extensive knowledge of regulations and the business domain, expert on usage of product. Works closely together with Scrum Master to define and prioritize Backlog.
Quality Assurance (QA) & Customer Relationship Management (CRM)	Verify that the output(s) from each Sprint adhere to the required procedures and standards.
Development & Support	Ensure that acceptable progress is gained. Act as advisor to the Scrum Master and Product Development Team. Overall responsibility for the development and updating the Executive Management. If required, proxy for Product Sponsor.
Software Developers	Coding and debugging of software. Produce required installation and associated user documentation where required.
Quality Control	Produce system test documentation and execute system test scripts in line with required standards and product specification. Document all test results for release review.

Development Sprints, Dailies and Sprint Reviews are used similarly to Scrum but Sprint Retrospectives in R-Scrum focus on improving estimations based on the data from the previous Sprint rather than improving collaboration. Other deviations from Scrum are firstly, that the Increments that are produced within Sprints are dedicated as marketing material. Secondly, each completed task in the Sprint undergoes quality control as described previously. And thirdly, Sprint Reviews act as quality assurance checkpoints to issue non-conformance reports and ensure regulatory compliance. This results in feedback that is fed back to the Product Backlog and resolved in the subsequent “Hardening sprint” as depicted in Figure 3.5. Additionally, these Hardening sprints ensure the readiness for release which Quality Assurance only sanctions with all open issues closed. (Fitzgerald *et al.*, 2013, p. 870) This implies that the “Definition of Done” (DoD) must include regulatory compliance as a criterion which reinforces that in regulated environments software “must be developed in accordance with not only a

customer's requirements, but also with any regulatory requirements [...]” (McHugh *et al.*, 2013, p. 349) DoD are short, measurable checklists that are the benchmark to decide if an Increment is ready for release. (Scrum.org, n.d.)

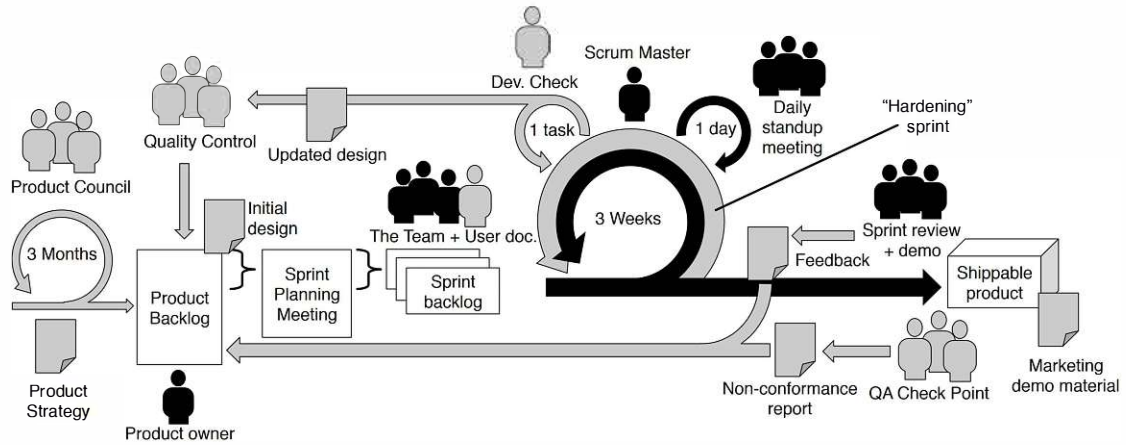


Figure 3.5: Schematic explanation of R-Scrum implemented at QUMAS (Fitzgerald *et al.*, 2013, p. 868)

Interpretation

R-Scrum is a framework based on Scrum that has been adapted to fit regulated environments like aviation, automobile, medicine, etc. The original framework allegedly does not suit such regulated industries, as traceability, documentation, as well as verification and validation weren't adequately possible. To fit Scrum to the specific requirements and to ensure regulatory compliance, role descriptions as well as events have been redefined in R-Scrum. Furthermore, additional explicit elements surrounding the framework like Quality Control and Assurance have been added. These additional stakeholders provide detailed feedback that implemented in so called "Hardening sprints" which explicitly target the fulfillment of the Definition of Done. The DoD includes both customer requirements and regulatory specifics.

Going beyond the description of how product development is being approached, "Scaling Agile Methods to Regulated Environments: An Industry Case Study" additionally describes an organizational structure that covers governance and responsibilities, as well as embeds R-Scrum in a corporate setup. E.g. the Product Owner does define the specifications of the product but the decisions and governance lies with the Product Sponsor. The two roles are different persons working on different hierarchical levels and not sharing the same responsibilities. Latter acts like the Head of Quality Assurance or Development and Support, as a supervisory instance, and is not directly involved in the product development. Therefore, the article describes two independent constituents of the solution that has been implemented at QUMAS. R-Scrum hereby is the operational approach to product development. It includes explicit structural elements like Quality Control, and "Hardening sprints" that describe how the work is performed in the structural context. Comparing R-Scrum to Scrum, Quality Assurance are stakeholders that assess the Increment in the Sprint Review, the Product Council giving input for the Product Backlog are (internal) customers, and

Hardening sprints are a subsequent Sprint addressing the non-conformance reports and feedback of Quality Control and Assurance. All would not require additional elements for the framework except the Development Check that is performed for every single task of each Sprint. This would require an adaptation of the task handling described by Scrum.

Furthermore, from the description how regulatory compliance is achieved, it predominantly is a result from the tools supporting the development process rather than the procedural approach to it. E.g. “Greenhopper” is used for agile planning and project management and “Crucible” is used for peer code review and recording code changes. (Fitzgerald *et al.*, 2013, p. 867) Hence, formal planning and facilitating traceability, which are both key concepts of regulated environments (see Appendix A. KEY CONCEPTS IN REGULATED ENVIRONMENTS), are provided by the tools and not necessarily by the process framework. Summarizing, Table 3.3 states exemplary up- and downsides of the operational framework that has been described, while not covering the structural approach embedding it as this is a company-specific setup.

Table 3.3: Concluded advantages and disadvantages of the R-Scrum framework (ref. Indeed, 2021)

Advantages	Disadvantages
Suitable for development processes in regulated environments due to explicitness of the associated constituents.	Redundant structures create unnecessary complexity
Continuous generation of valuable input for other business areas and promotion	Little customer-focus in product definition due to limitation on internal stakeholders
Continuous regulatory compliance through enforcement of immediate rectification of non-conformance	Fake agile as it builds on conventional organizational understanding and structures
Shorter validation and reworking phases through iterative approach	

3.2.4 Scrum@Scale

As the previously described approaches to agile working focus on teams up to 9 people each, more teams are needed when working on larger endeavors. Yet, as the number of teams grows the “volume, speed and quality of their output [...] [tends to fall], due to issues such as cross-team dependencies, duplication of work, and communication overhead”. (Scrum@Scale, 2022) Additionally, competing business priorities and inability to quickly respond to dynamic market conditions reportedly grows (Scrum@Scale, 2022), which essentially equals the loss of responsiveness. Therefore, to counteract these issues, Scrum@Scale was developed.

Alike Scrum, Scrum@Scale uses agile teams of up to nine people, Scrum Masters and Product Owners with the same definitions and procedures as described in the chapter about Scrum. Separating accountabilities, two operational cycles are applied to differentiate between the product-facing (“what”) and process-facing (“how”) perspective. Prior is accounted for by the Product Owner and the latter by the Scrum Master. Interference with the opposed cycle is only foreseen through the product and established team metrics as illustrated in Figure 3.6. Both dined with transparent information of the teams. The intersecting cycles act as a support structure for coordinating the team process of multiple teams along one unified path.

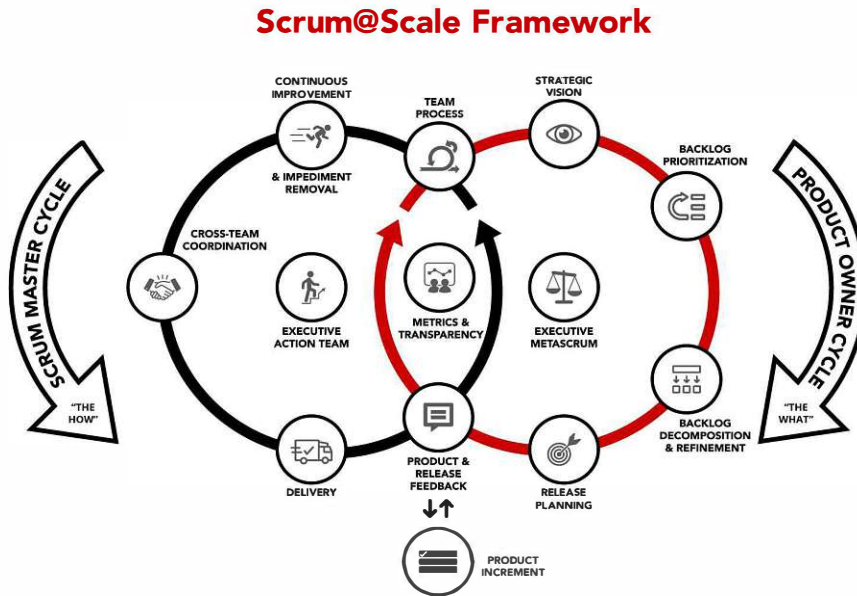


Figure 3.6: Product and process cycles (Scrum@Scale, 2022)

To scale agile working to multiple teams using this framework, each contributing team is an agile team according to Scrum. Multiple teams are accumulated in groups based on their need to coordinate, because e.g. they work on the same product work stream or demand the same resources. Grouping such into a Scrum of Scrum (SoS), allows the delivery of an integrated Increment at the end of each Sprint. The SoS is the scaled version of a Scrum Team that conducts Scaled Daily Scrums (SDS) to align with the other teams that work on e.g. the same product work stream. (Scrum@Scale, 2022) “To operate effectively, the Scrum of Scrums needs to be supported by [...] two leadership groups: an Executive MetaScrum (EMS), focused on what is produced by the Scrum of Scrums and an Executive Action Team (EAT) focused on how they can get it done faster.” (Scrum@Scale, 2022) These groups are the central point around which the two cycles depicted in Figure 3.6 revolve. As Scrum of Scrums are a scaled version of Scrum, also the events must exist in a scaled manner. Therefore, the group facilitating the SoS is called Scrum of Scrum Master (SoSM) consisting of a group of Scrum Masters and the group facilitating the Sprint Reviews and Backlog Refinement is called Product Owner Team guided by a Chief Product Owner (CPO). Both groups are represented in the leadership groups EMS and EAT.

The Executive Action Team owns the Scrum Master cycle and fulfills the Scrum Master accountabilities for the whole agile organization creating an agile setup for the organization. Among others, this may include

- Coordinating several Scrum of Scrums simultaneously
- Interfacing with any non-agile areas of the organization
- Continuously growing the capabilities of the organization and individuals
- Creating corporate operational rules, procedures and guidelines
- Ensuring a Product Owner organization is created, funded and supported
- Removing impediments and improving productivity

The EAT works with the (Scrum of) Scrum Masters to form the Scrum Master organization and is responsible for the backlog to be carried out. This includes mitigating cross-team dependencies to ensure consistent delivery of valuable, finished Increments to the customer. “The Scrum of Scrum Master is accountable for ensuring the Scaled events take place, are productive, positive, and kept within the time-box.” (Scrum@Scale, 2022) They account for both the continuous value delivery and performance improvement of the Scrum of Scrums. To improve the delivery mechanisms, release feedback is interpreted jointly by the Scrum Master Organization.

The Executive MetaScrum on the other hand coordinates what is delivered by the team. The EMS event consists of the Chief Product Owners, Leadership and other stakeholders to negotiate priorities, alter budgets, or to realign to maximize value delivery. It is facilitated by the Chief Product Owner and it is the only meeting in a Sprint where such decisions may be made. Furthermore, the EMS sets the organizational vision and the strategic priorities

- aligns all teams around common goals
- ensures an aligned Backlog, as well as prioritization, decomposition and refinement
- does Release Planning to forecast the delivery timeline of key product Increments

To connect the two cycles, to drive continuous improvement of the product and to update the Product Backlog, the Product Owner organization interprets the product feedback. It consists of the Product Owners, the Chief Product Owner and the Executive Meta Scrum. “The Chief Product Owner coordinates priorities with the Product Owner Team [...] [to] align backlog priorities with stakeholder and customer needs” (Scrum@Scale, 2022)

The organizational design of Scrum@Scale is component-based, to allow rebalancing and responding to the market. Central departments like Customer Relations, Legal and Compliance or Human Resources may be included as independent Scrum teams as depicted in Figure 3.7. To scale the framework beyond two layers of agile teams, additional layers can be added to create a Scrum of Scrum of Scrum. The operational procedures scale as described along the two-layered organization before.

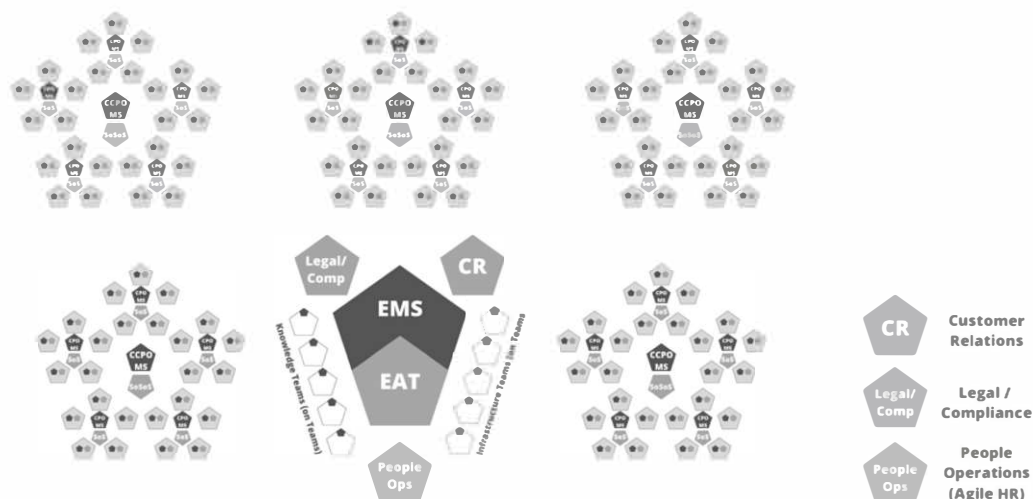


Figure 3.7: Scrum@Scale augmented with general-purpose departments (Scrum@Scale, 2022)

Interpretation

As the name indicates, Scrum@Scale is an approach to scale Scrum to larger endeavors that include several agile teams up to an entire company. It mainly describes a process framework that leverages “virtual teams” consisting of delegates from the agile (delivery) teams (Spanner, n.d.). Structural or hierarchical elements are only introduced in the context of support functions and management as part of the EMS and EAT. Figure 3.7 indicates how an organization chart using Scrum@Scale could look like, yet no description concerning reporting lines, responsibilities or governance has been outlined in the original literature.

Table 3.4: Concluded advantages and disadvantages of Scrum@Scale

Advantages	Disadvantages
Suitable for large projects and developments due to the focus on framework scalability	Additional scaling layers increase alignment efforts disproportionally through ever new delegations and alignment demand
Scaling through delegation maintains information quality across scaling layers	Management team is assumed to be leading projects as per their role in EAT and EMS
Virtual teams and low focus on organization structures allow a high degree of adaptability	
Management responsibility and authority fluently integrates into the framework	

3.2.5 Nexus

“A Nexus is a group of approximately three to nine Scrum Teams that work together to deliver a single product”. (Schwaber, 2021, p. 4) It has one Product Owner who manages one single Product Backlog from which all teams work. Nexus aims to scale the value that a group of Scrum Teams can deliver while working on one product by helping to solve common scaling challenges like cross-team dependencies, maintaining self-management and transparency, and ensuring accountability. Nexus build on the values and principles of Scrum. It does this by building on the Scrum framework and reducing the complexity of collaboration between teams. This is achieved by reducing or removing dependencies between the teams that cause mismatches in the product or communication structure. (Schwaber, 2021, p. 4f.)

- Product structure: “The degree to which different concerns are independently separated in the product will greatly affect the complexity of creating an integrated product release.” (Schwaber, 2021, p. 4)
- Communication structure: “The way that people communicate within and between teams affects their ability to get work done; delays in communication and feedback reduce the flow of work.” (Schwaber, 2021, p. 4)

As of Nexus, to reduce complexity and dependencies within an endeavor, scaling down the amount of people working on it leads to an increase of the value that can be delivered. This results from the reduction of communication pathways involved in decision-making and the need for collaboration that would have been required by an increase in people or project scope. Building on the principles of Scrum, the main differences to Nexus are the additional elements that care for the integration between the Scrum Teams, as well as the terminology used to describe roles, events, and artifacts. The individual teams operate as described in chapter 3.2.2. The events within Nexus are called “Nexus Sprint Planning” instead of “Sprint Planning” in Scrum, “Nexus Sprint Review” instead of “Sprint Review” and so forth. The elements that are added to the Scrum framework to transform it into the Nexus framework are a Nexus Integration Team, Nexus Daily Scrum and the cross-team refinement of the Product Backlog as depicted in Figure 3.8. Like in Scrum, Nexus aims to deliver an Increment at the end of each Sprint. As several teams work on the same Increment and they aim to deliver an Integrated Increment rather than a combination of the individual contributions, the integration of the individual teams’ contributions plays a significant role to create a valuable and harmonized, hence Integrated Increment. (Schwaber, 2021, p. 4f.)

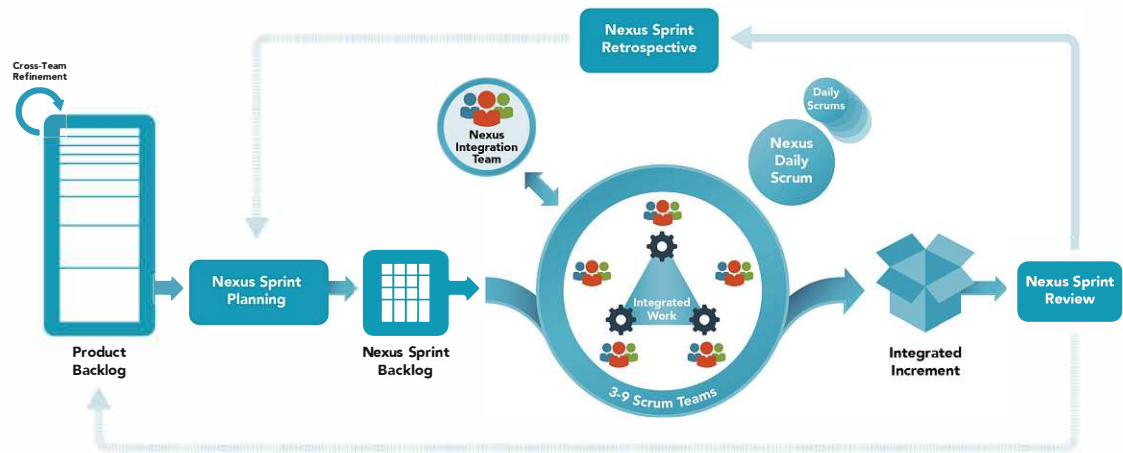


Figure 3.8: Schematic explanation of scaling Scrum with Nexus (Scrum.org, 2021)

“The Nexus Integration Team is accountable for ensuring that a done Integrated Increment [...] is produced at least once a Sprint.” (Schwaber, 2021, p. 5) It provides the accountability to create valuable and useful Product Increments while addressing integration issues as a focus point within the Nexus. Coaching and guiding the Scrum Teams are essential tasks of the team to improve the ability to produce valuable Increments. The Nexus Integration Team uses bottom-up intelligence by including the Product Owner, one Scrum Master and one or more appropriate members from the Scrum Teams. (Schwaber, 2021, p. 5f.) “Appropriate members are the people with the necessary skills and knowledge to help resolve the issues the Nexus faces at any point in time.” (Schwaber, 2021, p. 6) To forecast which team will deliver which Product Backlog items and to identify dependencies across teams, the teams engage in cross-team refinement of the Product Backlog. Through different levels of decomposition, the Product Backlog items are decomposed from very large and vague requests to actionable work. These items then can be included in the next Sprint during the Nexus Sprint Planning that is set up analogous to the Sprint Planning in Scrum. It is conducted with appropriate representatives from each Scrum Team and the Product Owner. The result of the Nexus Sprint Planning is a Nexus Sprint Goal, that gives guidance during the Sprint and that is aligned with the overall Product Goal. Additionally, each team is aware of their individual team’s Sprint Goal that is aligned with the Nexus Sprint Goal. And lastly, a Sprint Backlog for each Scrum Team which makes their contribution to the Nexus Sprint Goal transparent.

Inspection of the progress toward the Nexus Sprint Goal and identification of integration issues are included in Nexus Daily Scrums which include appropriate representatives from the Scrum Teams. Furthermore, the current state of the Integrated Increment is assessed during these meetings so that newly discovered cross-team dependencies or impacts can be addressed timely by the respective Scrum Teams. Therefore, the individual teams’ Daily Scrums are scheduled after the Nexus Daily Scrum. (Flossmann, 2021) To finalize the Sprint, a Nexus Sprint Review and Nexus Sprint Retrospective are conducted. Former includes a review of the Integrated Increment and latter the review of the quality and effectiveness of the whole Nexus while considering the individuals, teams, interactions, and other factors. (Schwaber, 2021, p. 7f.)

Interpretation

Nexus describes a framework that is to be applied in large-scale product development focusing on the delivery of one integrated product using several agile teams. Nexus can be understood as an extension of Scrum, as each contributing team is set up following the Scrum Guide. Nevertheless, the main difference to Scrum is that several teams contribute a defined part of the solutions each. To ensure integration into one functional Increment, an additional committee with its' meetings is used to complement the Scrum Teams in their originally defined structure. As no differences have been defined regarding the management of stakeholders, the same critique as for Scrum can be applied for Nexus, too. The framework can be applied for endeavors that include about ten to eighty-five persons who work on the development of one single product. Nexus, like Scrum, describes a style of working and project execution. However it does not define any administrative structure nor supervisory requirements.

Table 3.2: Concluded advantages and disadvantages of the Nexus framework (ref. Indeed, 2021)

Advantages	Disadvantages
Suitable for environments lacking clear requirements and require flexibility	No consideration of the overall project deadline as only Sprints are being planned
Transparency and frequent Nexus Sprint Reviews result in high visibility for teams and project	Nexus demands experienced personnel as the framework adds additional complexity to the definition of project requirements and execution
Working routines foster trust and team development resulting in higher satisfaction	Successful Nexus integration requires organizational transformation to enable autonomous team and decision-making
Large endeavors going beyond the team size of an individual agile team can be executed	Decisions outside the Scrum Team's space of operation are limited to dedicated events in between the Sprints
Overarching issues can be identified and solved timely through dedicated framework elements and appropriately defined procedures	

3.2.6 Scaled Agile Framework (SAFe)

“SAFe is the most popular framework to implement Agile, Lean, and DevOps practices at scale.” (Scaled Agile, n.d.) It provides guidance for scaling agile in large, distributed, complex, or high-compliance settings and claims to provide an effective and continuously improving system. To achieve this, agile-adjacent principles like Lean and DevOps are integrated in a system thinking. (Scaled Agile, n.d.) Lean is a common management practice focused on the acceleration of processes and reduction of organizational complexity. (Wöhe, 2008, p. 120) DevOps is a set of practices and tools to integrate processes between software development and IT operations teams. (Atlassian, n.d.) As the SAFe framework is very extensive, the following descriptions will focus only on the structural elements and the procedures that are relevant for product development based on the version 5.1 of SAFe for Lean Enterprises.

When applying the Scaled Agile Framework, the entire organization structure targets full alignment of all organizational aspects with the customers’ needs. To achieve that, the framework is defined in layers with different cycle duration and operational granularity. Starting on the highest layer, the “Portfolio” layer, that includes the strategic themes of the organization from which a suitable Portfolio Vision is derived. The Portfolio Vision feeds both the Portfolio Backlog and the Budget planning for the Development Value Streams. (Scaled Agile, 2021a) The “Development value streams (DVS) are the sequence of activities needed to convert a business hypothesis into a [...] Solution.” (Scaled Agile, 2023a) These solutions cover holistic products like websites, devices, software applications or alike outputs that are potentially delivered to customers. Additionally, DVS are the underlying structure defining how employees are formally grouped together. Organizing around value streams, allows to accelerate the time to market by improving workflows targeting value delivery to the customer across all divisions. (Scaled Agile, 2023a) This may include, but not demand, physical adaptation of reporting lines away from functions and towards Value Streams (Scaled Agile, 2021b). As the name indicates and along the lines of all agile organization approaches, DVS target continuous value delivery rather than monolithic solution delivery. The anatomy of a Development Value Stream is depicted in Figure 3.9.

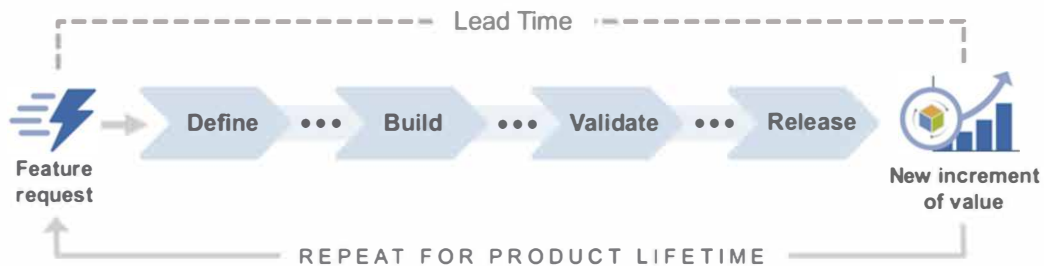


Figure 3.9: Anatomy of a Development Value Stream (Scaled Agile, 2023a)

To accomplish continuous value delivery, the next organization layer of SAFe is crucial. On the “Large Solution” layer, what is being built and how it will be built are captured in the “Solution Intent” that is the foundation for creating the Solution Roadmap and thereon the Solution Backlog. New knowledge and fixed decisions continuously are fed back into the Solution Intent to decrease the variability and uncertainty. Furthermore, requirements like compliance, traceability and conforming with standards are included

in the Solution Intent, too. (Scaled Agile, 2021c) Building on this common working basis, the Solution Backlog is executed by a “Solution Train” which, depending on the size and complexity of the solution, is typically a team of teams where each team contains another several agile teams. Solution Trains can be compared to a Scrum of Scrum of Scrum. The alignment of all teams is achieved by a shared mission in combination with the one common Solution Intent, a fixed and uniform delivery cadence, iteration time box and demo schedule like e.g. in Scrum. (Scaled Agile, 2021d)

Drilling deeper into the Solution Trains and the enclosed teams, the “Essential” layer unfolds. Here, common agile team structures and working practices can be included that determine the methodologies used to perform the execution. These may include DevOps, Extreme Programming, Design Thinking, Scrum, Kanban or traditional methodologies like waterfall project management. The individual methodologies are not defined by SAFe as these should be specifically chosen for each individual environment. Instead, the Essential layer includes a decomposition of the Solution Backlog into Program and Team Backlogs. This decomposition is a result of and contributes to the alignment across all teams and teams of teams involved in the process. (Scaled Agile, 2021a, p. 5) The alignment hereby is conducted as in Scrum or Scrum of Scrum, depending on the amount of layers involved.

Complementing the operational elements of SAFe, additional staffing roles ensure the fitness of the framework. Some, like the System Architects or Product Managers, Epic Owners, Scrum Masters and Product Owners are required to keep the processes running. (Scaled Agile, 2021a) Others, like Business Owners are accountable for the growth of the organization and its people, operational excellence and business outcomes (Scaled Agile, 2021e), or establish a technology strategy and road map like the Enterprise Architect (Scaled Agile, 2021f). The cadence of planning hereby is directly linked to the degree of detail. The more detailed a work is, the shorter its planning cadence is. Figure 3.10 (Scaled Agile, 2021g) illustrates the different planning horizons depending on the degree of detail of the associated work.

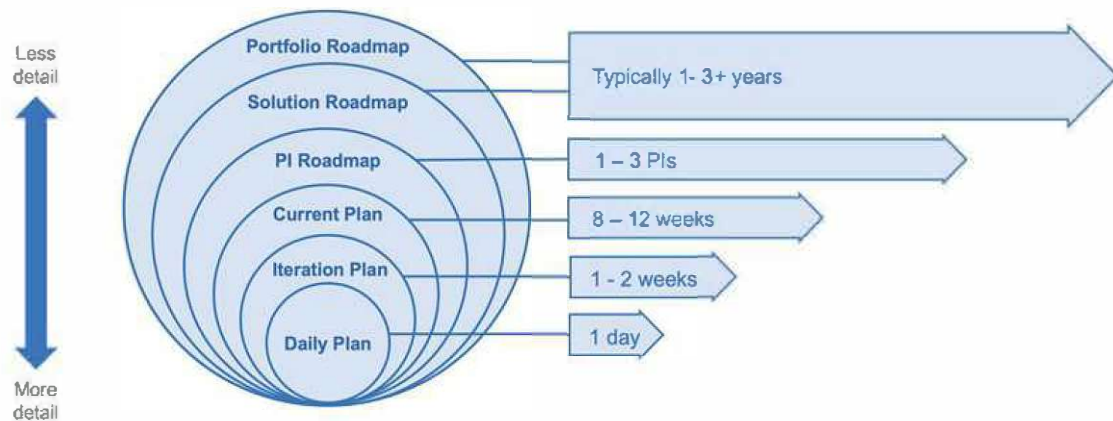


Figure 3.10: SAFe Planning Horizons (Scaled Agile, 2021g)

The operational framework described above is furthermore complemented by a set of competencies and approaches like “Organizational Agility” and “Continuous Learning Culture”, as well as a set of features like “Core Values” and “Lean-Agile Leadership”

that are considered relevant for the successful implementation of SAFe. Beyond, Scaled Agile Framework also uses universally known tools like metrics, shared services or milestones road maps that are applied in several occasions and applications. Yet, these are not specifically for agile organizations but common business tools. The only element that is relatively unknown are the “Communities of Practice” which are “organized groups of people who have a common interest in a specific [...] domain. They collaborate regularly to share information, improve their skills, and actively work on advancing the general knowledge of the domain.” (Scaled Agile, 2021h) Such communities are comparable to “Guilds” which will be described in chapter 3.2.7 Spotify model and allow topic-driven development that can e.g. contribute to the continuous development of the organization. The entire Scaled Agile framework in its full extend is depicted in Figure 3.11.

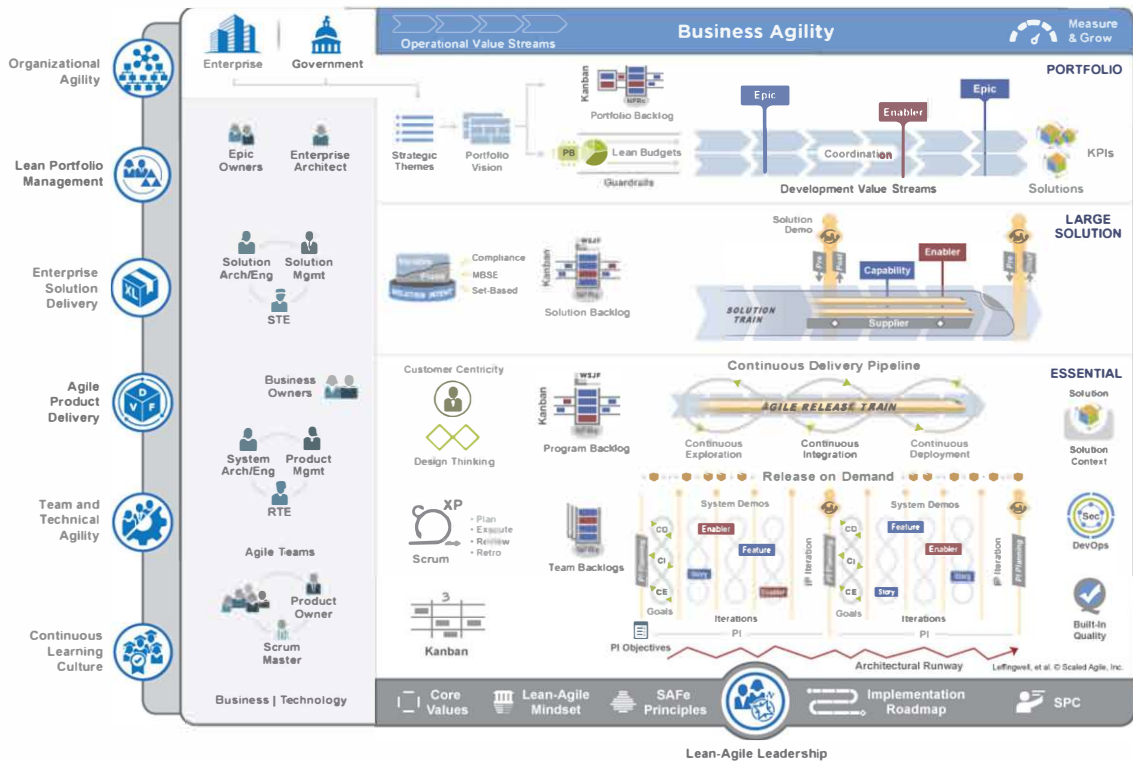


Figure 3.11: Scaled Agile Framework 5 (Scaled Agile, 2021a)

In essence, SAFe is a framework that combines operational practices along agile principles with structural and scaling elements. The combination unlocks the potential to use the Scaled Agile Framework for structuring entire enterprises and governments as it includes both operational methodologies and structural organizations that determine aspects like reporting lines, team memberships and general-purpose departments. Table 3.5 elaborates on key advantages and disadvantages of SAFe.

Table 3.5: Concluded advantages and disadvantages of the Scaled Agile Framework (ref. The Agile Times, 2020) (ref. Agilemania, 2021) (ref. Scaled Agile, 2023b)

Advantages	Disadvantages
Holistic framework covers structural, operational and strategic facets of organizations	High complexity of the framework requires significant training efforts and has its own jargon
Adaptable to organization characteristics and suitable for growth	Extensive framework bears the risk of overshooting the target and requires significant restructuring efforts
Alignment of all teams towards common customer-facing goals	High commercialization of the framework and its surroundings
Cross-domain planning and dependency management is ingrained in the framework	Variety of specific roles are required for operating the framework
Streamlined organization and operation resulting in faster time to market	Inadequate for small enterprises as it restricts the ability to adapt with large organization elements
Organization-wide transparency regarding deliverables, expectations and progress	Conform with traditional top-down approaches as decision-making remains with management

Interpretation

Building on the literature from Scaled Agile, Inc., which was co-founded by Dean Leffingwell who invented SAFe, all aspects of the Scaled Agile Framework are covered in depth except the integration into existing organization structures or the creation of new ones. The existence of structures beyond SAFe are only mentioned once in the context of the organization around value streams. Here, it's elaborated that the traditional functions like Engineering, HR and Legal are organized in "silos". An organization around value streams however demands cross-functional teams that include employees originating from different "silos" to entail all competencies that are required to deliver value (ref. Scaled Agile, 2021b). Presumably, this means that an organization accounting for e.g. functional training and cohesion, as well as employee development and supervision still is required beyond SAFe. Resulting from that, SAFe would only contribute a large share of the necessary attributes to an organization. These could be e.g. strategic guidance derived from the portfolio vision and the individual program backlogs, supervision and mentoring brought by the hierarchy of organizational layers and social cohesion contributed by the teams within Value Streams and Solution Trains. Distantly, functional training and cohesion could potentially be provided by the Communities of Practice. Yet, most of the missing attributes would better be provided by traditional team-like structures that could form a

parallel organization to SAFe as indicated. If this was the case, then SAFe would separate the different activities within an organization depending of its goals. One dimension of this differentiation would in such a case be formed by the functions that are responsible for administrative work like employee supervision, hiring, on-boarding and training, salary negotiations and social integration into the organization. The main dimension would cover all development activities that are market oriented and be structured using SAFe. And the last dimension could be formed by the Operational Value Streams that are mentioned as a side note as the Scaled Agile Framework has mainly been developed targeting software companies active in development. These Operational Value Streams however could benefit from a different organization than development as these cover activities like processing customer requests, manufacturing, offer software products, supplier contracting, employee hiring and retention. For this, “strong, functional departments to build and share knowledge [are needed]” beyond SAFe. (Scaled Agile, 2021i)

3.2.7 Spotify model

The Spotify model originated as the name indicates from the company Spotify that is a Swedish company involved in streaming music, video, and podcasts. The model addresses organizations where multiple teams are involved in product development.

According to the Spotify model, the basic units of development are Squads. Squads are self-organizing teams that choose their ways of working themselves. They are designed to have all the skills and tools that are needed to design, develop, test, and release increments into production (Kniberg and Ivarsson, 2012, p. 2) “Production” refers to the final environment in the software development process in which the work is publicly available. It faces the “Development” environment where the main application is built and where the development work is being conducted. (Mylonas, 2017) By definition, Squads are self-organizing teams. Therefore, they are supposed to be fully autonomous. Each team is responsible for one specific part of the user experience, as shown in Figure 3.12. Also, each Squad has its own long-term mission to become experts in that area. “To promote learning [about new tools and techniques] and innovation, each squad is encouraged to spend roughly 10% of their time on “hack days”. During hack days people do whatever they want, typically trying out new ideas and sharing with their buddies.” (Kniberg and Ivarsson, 2012, p. 2)

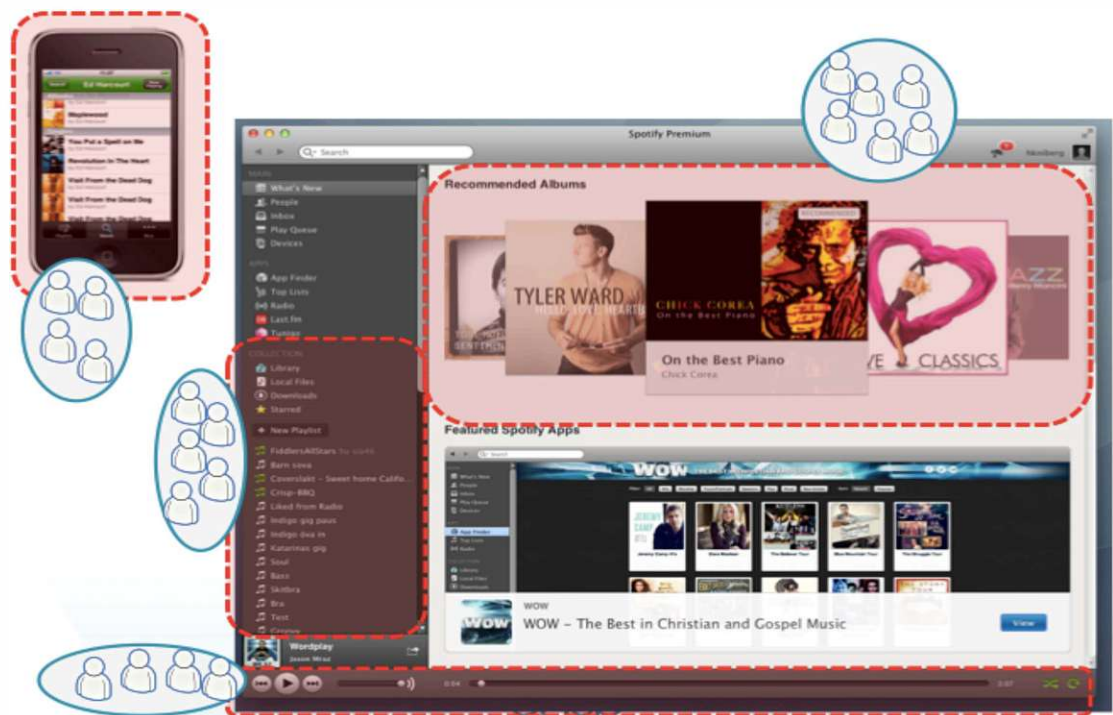


Figure 3.12: Exemplary allocation of Squads in the Spotify application (Kniberg and Ivarsson, 2012, p. 2)

Squads don't have a formally appointed leader but a Product Owner (PO). In the Spotify Model the Product Owner is responsible for prioritizing the work for the team but doesn't participate in doing the work. The POs of different Squads collaborate with each other to maintain a high-level road-map of where Spotify as a unity is heading and ensuring that the Product Backlog of their team matches with it. Furthermore, every Squad has access to an Agile Coach to help with personal development and improving working approaches. The Agile Coach additionally runs Sprint Retrospectives, Sprint Plannings, identifies impediments, etc. with the team. As being fully autonomous and without dependencies in between the teams become more difficult when multiple teams work on the same product, Spotify runs quarterly surveys to identify where to focus the improvement effort within the team. (Kniberg and Ivarsson, 2012, p. 5f.) As several Squads can work in related product areas, there is a higher instance that combines several Squads into "Tribes" which provide the best possible work environment for the Squads included in the respective Tribe. Regular informal gatherings to show peer Squads current or past projects, live demos, new tools and techniques, etc. are part of the work within a Tribe. To minimize problematic dependencies, surveys help to understand to what extent dependencies are blocking to slowing down the Squads. The results of these surveys assist with eliminating problematic dependencies by e.g. causing re-prioritization, reorganization, architectural changes or utilizing technical solutions. If several Teams work on a project collaboratively, regular synchronization meeting of the teams are held to address dependencies during the project duration.

(Kniberg and Ivarsson, 2012, p. 5f.) To address the dependency between development and operations, operations is a separate team that doesn't make releases for the Squads but supports with releasing the code themselves by providing the infrastructure, scripts and routines. (Kniberg and Ivarsson, 2012, p. 8) As fully autonomous teams lose the economy of scale by insufficient knowledge sharing, Spotify utilizes Chapters and Guilds to foster exchange. Chapters are small groups with employees having similar skills and working within the same competency area within a Tribe. These meet regularly to discuss their specific area of expertise and challenges. Each Chapter has a Chapter Lead to act as a line manager with traditional responsibilities like setting salaries and people development. Yet, the Chapter Lead is part of a chapter too and is involved in doing the work prioritized by the respective Product Owner. A Guild is a wide-reaching community of interest to share knowledge, tools, code and practices across tribes, chapters and Squads. Chapters are always within one Tribe only, as depicted in Figure 3.13. Guilds are open for anyone who is interested and coordinated by a "Guild Coordinator". (Kniberg and Ivarsson, 2012, p. 9f.)

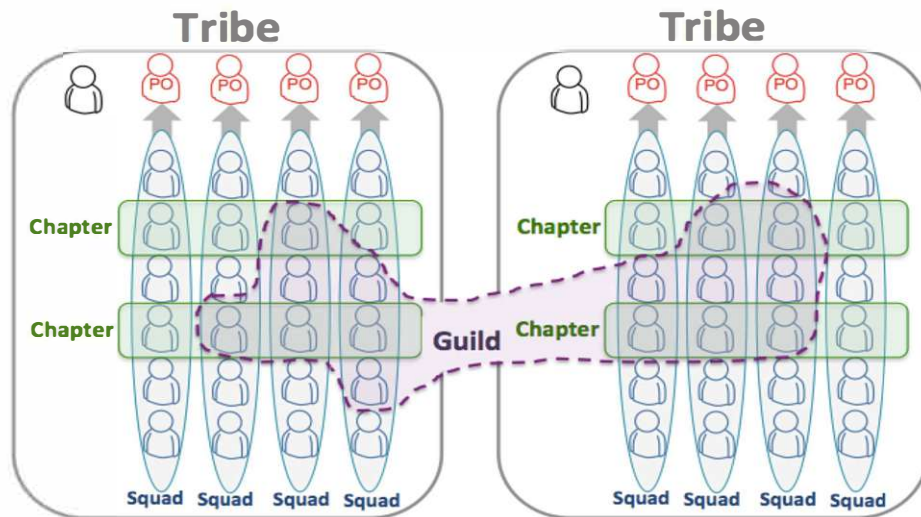


Figure 3.13: Schematic description of the elements in the Spotify model (Kniberg and Ivarsson, 2012, p. 1)

The main difference to traditional matrix organizations is that people rarely are assigned to projects and report to a functional manager (Chapter Lead) like it otherwise would be common practice. To increase the focus on delivery, people are grouped into stable Squads, which are the primary dimension in the Spotify model and could be compared to the horizontal assignment to projects. The secondary relationship serves sharing knowledge, tools and code which is facilitated by the Chapter Leads focusing on technical excellence. To maintain the integrity of the whole system, a System Owner of a pair of a Development and Operations representative are the main persons to be addressed for any technical or architectural issues related to that system. They are coordinator so that Guilds working on the same system don't conflict with each other. Additionally, a Chief Architect coordinates work on high-level architecture across several systems to review the development of new systems to avoid common mistakes

and to align the work with the architectural vision.(Kniberg and Ivarsson, 2012, p. 11f.) As the defined persona are roles rather than jobs, a person can have multiple roles simultaneously. Therefore, one person can be member of a Squad, Chapter Lead and System Owner at the same time. The assembly of Tribe, Product and Design Leads within single Tribe (one person or not) is called “Trio” and ensures improved workflows through alignment between product- and design-related areas. To accomplish a goal arching several Tribes, the Trios of the associated Tribes form an Alliance. The Alliance helps the Tribes to work toward a larger strategic goal. (Tsonev, 2019)

Interpretation

The Spotify model offers several new elements while building on common practices like Scrum and matrix organizations. Similarities with matrix organizations can be found in the separation of the functional cohesion represented in the Chapters and the operational cohesion represented by Squads and Tribes where both dimensions of cohesion fulfill different purposes of an organization. The formation of inter-disciplinary teams that work independently and receive prioritized input from dedicated persons displays similarities to the working style defined by Scrum. Additionally, the Spotify model is called to be based on a culture of “self-organization, respect for people, and trust [...] [promoting] transparency [...], as well as a no-blame work environment where mistakes are seen as learning opportunities rather than failures.” (Tsonev, 2019) Such too displays similarities with the philosophy of the Scrum framework which is built on transparency, inspection and adaption. Bringing it to a broader perspective, the Spotify model defines both working style and organization structure as the organization of development projects, as well as administrative and managerial responsibilities, are described. Table 3.4 summarizes main advantages and disadvantages of the model.

Table 3.4: Concluded advantages and disadvantages of the Spotify model (ref. Kniberg, 2014, scs. 405–450) (ref. Merryweather, 2022) (ref. Tsonev, 2019)

Advantages	Disadvantages
High level of transparency and team collaboration through the organization in Squads, Tribes, Chapters and Guilds	Not universally applicable as approach was developed based on culture, work processes and dedication at Spotify
Improved value production efficiency by delegating power to autonomous teams and avoiding bottlenecks	System architecture risks arise from work on partial system as changes are often required in several systems
Minimized negative effects of dependencies by mostly autonomous working and monitoring of dependencies	
Less formal processes due to the organization around product areas instead of specialization	
High employee satisfaction	

3.2.8 Sociocracy / Dynamic Governance

An approach for self-organization in systems is Sociocracy which is also referred to as Dynamic Governance. (“Dynamic Governance”, 2021) Sociocratic systems are built on effectiveness, equivalence and transparency. “Effectiveness” in this context means that what the organization does, makes a difference. This gives a sense of purpose to the actions and the organization. All voices matter equally defines “Equivalence” and “Transparency” is ensured by working openly and eradicating non-public deals, as well as making information and budgets accessible to everyone in the organization. (Rau, 2019) The basis element of the organization approach is the organization in Circles, which are defined teams of people that are working towards a stated Circle Aim. Limited to their domain, these working circles both perform the day-to-day work and regulate the circle’s operational domain. The Domain hereby describes the “circle’s area of activities and decision-making authority.” (Rau, 2019) It defines the scope and responsibilities, as well as authorities for each domain. Decomposing the organization’s aim and mission, each Circle carries out a piece (Circle Aim) that becomes more detailed with each level of decomposition. (Rau, 2022) In Sociocracy, a system of Circles is created where each relates to another either directly or via other Circles. Most commonly, this is achieved by layers where each layer has operational and policy work with different levels of specificity of their own. Creating Circles for the sake of information flow does not fulfilling this requirement. Figure 3.14 depicts a generic organization structure applying this approach.

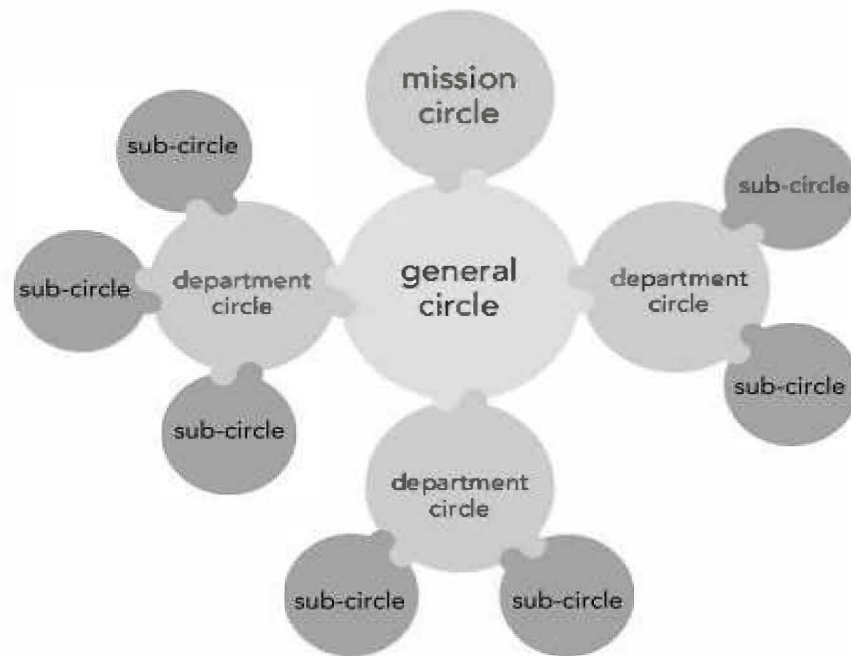


Figure 3.14: Sociocratic organization with three layers (Rau, 2019)

To ensure information flow between layers, two people in each Circle serve as leader and delegate to double link Circles in both directions. The leader accounts for the operation of the Circle and the delegate ensures that the Circle’s voice is heard in the next broader Circle. As all voices are equal, proximity to the center of the organization

does not necessarily correlate with power, because the sub-layers have authority to decide within their domains possibly leaving little decision power to the center Circle. Such an organization is called “circular hierarchy”. (Rau, 2019) To lead the day-to-day operation, the General Circle connects all Department Circles and forms the center of information flow connecting the departments. A Mission Circle, as depicted in Figure 3.14, contributes the long-term planning of the organization and makes sure that it stays true to its mission and aim. It can include outside experts and carry other names, yet it always contributes a perspective comparable to a board of directors. (Rau, 2019)

People fill one or more roles within a Circle. The main roles to uphold a Circle’s operation are Leader, Delegate, Secretary and Facilitator. As these are the minimum of roles in a meeting, with the organization growing, more roles might be added. To fill roles, candidates are proposed by members of the Circle.

- **Leader:** Oversee operations of the Circle, hold processes and communicate interests and decisions
- **Delegate:** Participate as a full member and attend events in the next broader Circle, report from their Circle and make concerns heard
- **Secretary/Circle Administrator:** Take notes and publish within the organization (logbook), manage policies and role-elections
- **Facilitator:** Prepare and run Circle meetings, guide decision-making

Besides the previously mentioned roles, the Delegate(s) together with the Leader(s) from sub-layers participate in the Circle meetings and decisions, too. (Rau, 2017) Delegates’ participation in the next broader layer are both, link and filter to pass on relevant information from and to their Circle allowing information flow throughout the organization. (Rau, 2019)

Another key element to the organization approach is decision-making by consent. As no person within the organization is more powerful than others, decisions cannot be made autocratically. Instead, every voice is heard and counted on in the process to reach consent by everyone involved. Unlike majority vote, this ensures that even minority needs are accounted for. (Rau, 2021a, p. 6f.) In case no agreement can be achieved within a group, it is condemned to inactivity. If “agreement is reached the decision is binding on all who have made it.” (Boeke, 1945)

Interpretation

Unlike other organization approaches, Dynamic Governance does not include any aspect of hierarchy. Instead, it is built on equality throughout all layers comprised in an organization demanding appropriate decision-making and steering means. This contradicts all classical organization approaches, and is mostly applied by organizations with a strong purpose, like e.g. community-based associations, companies active in decentralization, or volunteering communities. (“Case studies of sociocracy”, n.d.) These organizations have in common that they have a deep-rooted cause they are supporting. This cause often includes fostering sustainability, improving inclusion, creating fair working conditions or empowering democratic communities. They also share their considerably small size and often their status as a non-profit organization. Concluding from that, maximizing influence and salary might not be primary motives for participation. Hence, accumulating influence within the organization is not a striking

motive for members which qualifies Sociocracy as an appropriate organization approach for the organization. Comparing this to traditional organizations where a career and being promoted equals the increase of personal influence, Dynamic Governance might be unfit. What differentiates Sociocracy from other organization approaches is the approach to creating organization structures solely based on the activity of the organization. As there is no explicit person or committee steering a sociocratic organization, the creation, alteration and removal of organization structures is entirely community-based. Yet, no working methods besides the decision-making and absolute transparency are induced by Sociocracy, which qualifies it as an approach for structuring organizations without paying closer attention to the field of activity or working.

Table 3.6: Concluded advantages and disadvantages of Sociocracy

Advantages	Disadvantages
Absolute transparency over information and decisions	Risk of time-consuming decision-making induced by consent-principle
Organizational resilience is created by solely purpose-driven organization setup	Lack of incentives that go beyond intrinsic motivation
Equality for every member of the organization	Challenging transition if applied to existing organization caused by the unconventional organization setup
Flexible organization structures that can be adapted to needs without any constraints	Significant training demand during the transition and for new members
Limitations of power accumulation fosters empowerment for members	

3.3. Conclusion

One dimension of difference from responsive and traditional organization approaches is the extent to which working methodologies or organization structures are described. When comparing responsive approaches to e.g. a line and staff organization, where no working approach is being explicitly induced and solely the arrangement of staff with regard to product and function is described, responsive organization approaches partially have a different focus. On the one hand, most approaches solely describe the methodological approach of an organization without describing structural aspects. Examples for this are Scrum, R-Scrum, Scrum@Scale and Nexus, where the operational setup is describes. On the other hand, Sociocracy mainly describes the structural organization as no procedural prescriptions and descriptions are included. The Spotify model and SAFe include elements of both aspects as they describe a holistic operational setup and to a different extent the structural integration. The level of detail in all description varies however. While the Spotify model and SAFe are

examples for very detailed descriptions as both their elements and interactions are described in all their detail, other organization approaches leave out significant aspects to form a holistic organization. Partially excluding descriptions of operations as well as governance and accountability. Thus giving significant room for interpretation. As most responsive organization approaches focus on the process organization rather than the structural organization, these couldn't go without a complementing structure to form a functional organization that accounts for key functions like managerial authority, definition of responsibility and coordinating performance.

An aspect that the described responsive approaches have in common, is the focus on value delivery in the form of improving the output of the organization. While traditional arrangements tend to focus on governance and meaningful grouping based on activities, responsive arrangements always form around the value driver of the organization in a streamlined manner. Taking Scrum as an example, the team forms around the increments of value that are to be produced and receive their input from the Product Owner that is the link to the customer. Taking the Spotify model as another example, there the Squads form around the product features undergoing continuous development and the Tribes that forms around a common product. Both have dedicated persons to provide the input for development. The same applies for e.g. SAFe that uses Agile Release Trains and Solution Trains for products of different complexity. Comparing this to a traditional organization, teams mostly work independent from other departments (Wöhe, 2008, p. 121) like in single-line and divisional organizations or they receive input from different persons (Wöhe, 2008, p. 124ff.) like in multi-line and matrix organizations. Divisional organizations might handle such tensions better than other traditional setups as they create several divisions with redundant teams but targeted structural organization. Yet, multiple teams address similar activities without structurally embedded knowledge exchange between the divisions which hinders the organizational efficiency. Taking this comparison further, the matrix organization shows the biggest similarities to responsive organizations regarding value orientation, as the product or project may be the guiding instrument for operation. Yet, such organizations are not set up for changing their orientation and destined to bear governance conflicts as multiple managers access the same capacities if confronted with significant changes of priorities. (Wöhe, 2008, p. 126ff.)

Deriving from that, corporate governance is one of the aspects where the most significant differences between traditional and responsive organizations occur. While traditional organizations typically manage by exception, delegation, objective or system (Wöhe, 2008, p. 131f.), management in responsive systems can only apply management by objective, as division of labor typically is limited to low-level teams that work on the same product feature. Hence, the main measurable performance criterion is the team's output that could be complemented by e.g. common agile work valuation practices like story points to measure the individual performance of team members. However, since the collaboration within such teams is very close, the dependence on the other team members is much higher compared to traditional setups. Instead of reducing dependencies within teams, responsive organizations aim to limit cross-team dependencies to benefit the throughput of the individual teams rather than the individuals. (Merryweather, 2022) (Flossmann, 2021) As optimizing throughput is the intention of traditional organizations too, this pursuit is not reserved for responsive organizations alone. The challenge that traditional organizations create however, are

the dependencies in between teams, when e.g. multiple products are being produced in single- or multi-line organizations, as the function-specific teams work mostly independent from each other. Additionally, conflicts for capacity occur within matrix organizations, as constrained capacities are accessed by managers working on multiple products or projects. (Davis and Lawrence, 1978) In such cases, decision-making becomes exceedingly important as prioritization and coordination in traditional organizations comes from the next higher instance. Such could impede the progress of the organization as the lower instance remains in a void of guidance while decisions are made on a case-basis or following long communication lines. (Wöhe, 2008, pp. 124, 128) Comparing this to the organization approaches elaborated in chapter 3.2, decisions are intended to be made on the lowest possible level, often being the working level that demands for a decision. In such a way, power is being distributed throughout the organization, rather than accumulated in managerial positions, to limit the delay caused by decision-making. Taking Scrum and its derivatives as an example, all decisions are made by the agile team that is empowered to steer their work independently. Such is possible, because the Product Owner, who is a team member themselves, can step in to represent the customer's perspective which is central to the development process and gives the team a broad-ranging view. (Schwaber and Sutherland, 2020, p. 5f.) The same occurs in Sociocracy where Circles come to a decision within their Domain. Only if this is not possible or Domains are not definable from another, a broader Circle would come into play. (Rau, 2021b) While not all responsive concepts are free of accumulated power, all have in common that escalation of issues shall be avoided if a solution can be found on a lower level. This potentially is one the factors that differentiates responsive and traditional organizations the most. While traditional organizations tend to accumulate power to account for the governance within the organization, responsive concepts often keep responsibilities on the working level. With that, such distribute e.g. the decision-making power and limit the responsibility of management to creating the right environment and incentives for the teams to operate according to their intentions. In Scrum derivatives this is for example achieved by creating teams that have all competences they need to perform and giving them guidance and targets in the form of a decomposed Product Backlog. (Schwaber and Sutherland, 2020, p. 5) Something similar occurs in the Spotify model where the development targets are not imposed by the Tribe Lead but by the long-term missions that the Squads formulate themselves. Even the development of employees hereby is arranged within the Chapters without the involvement of management. (Kniberg and Ivarsson, 2012, pp. 2, 9) Both indicate that the cross-functional teams are designed to last as the productivity typically grows with a team's maturity.

Another aspect that differentiates traditional from responsive organizations, is the fact that operations and structures are much stronger interconnected. As e.g. exposed in chapter "Scaled Agile Framework (SAFe)", the operational setup is implicitly backed by a structural setup. Yet, such a structural setup is in the background of the organization and does not determine the organization of operational processes, which implies a different understanding of the structure's contributions to the setup of the organization. Such a differentiation between structure and operation can be seen with all elaborated concepts for responsive organization, except for Dynamic Governance. In Scrum and its derivatives, it is the methodology to running operations that is described independently from any organizational structure. The Spotify model describes how

Chapters and Squads interlink with each other. Chapters hereby describe an element of a structural organization whereas latter is part of the operational setup. Continuing with Sociocracy, no structure is predetermined by the approach at all. Such is entirely to be derived from the operational setup. As this can be seen in other responsive organization approaches as well, this implies that the structural setup of an organization is supposed to support operations. Such exhibits a different understanding of the organization structure in responsive than in traditional approaches and the definition of it. In the initial definition, "Organizational structure" refers to the "system that outlines how certain activities [and processes] are directed in order to achieve the goals of an organization." ("OxfordLanguages", 2022 Organizational Structure) Yet, if such a weak or not existing link between structure and operational processes is present, one of the aspects could undergo alteration without significantly influencing the other aspect of the organization. E.g. if a sudden and significant change in the demand for one product segment occurs, divisional organizations would be out of balance as the capacity is allocated within the different company division and a timely rebalancing would not be possible due to the lack of training of the staff. If the same occurred in an organization that has embedded a responsive organization e.g. the Spotify model, the same would result in a timely shift of capacities as the Chapters account for cross-qualification of the staff so that it could be distributed to the different Tribes and Squads according to their fitness. In general, such a principle applies to any organization where structure and operation are loosely interdependent. As this demand that employees must develop more diverse skills to be able to adapt to changing circumstances like different projects to work on or different tasks to account for. One potential explanation for this could be that traditional organizations tend to interlink the aspects product and function whereas responsive organizations loosen such ties through the implementation of interdisciplinary working teams. In none of the responsive setups, function and product are interlinked, nor is there a connection to the structural aspects of the organization. This materialized in e.g. employees of different functions being grouped in agile teams that collaborate in Agile Solution Trains SAFe to develop products. The same applies to other approaches, including the Spotify model where employees from different Chapters are grouped in Squads to work within the Tribe to develop the solution. The structural integration of employees in all cases however is not directly linked to the product development and therefore posses an extra layer separating the structural integration and solution development. By reducing the interconnectivity of the different aspects, the responsiveness of the organization can be increased. The better the knowledge management and training of the staff is, the more versatile capacities can be used and the faster shifts can be performed.

3.4. Empirical insights

3.4.1 Scrum and its scaling approaches

As a best practice in software development, there are numerous case studies describing the implementation of Scrum and its derivatives in a variety of different environments. *Open View Labs* is one of those. They started in 2007 to adopt Scrum for their non-software activities namely value-add and due diligence in association with their venture capital activities. Changing the operational approach was intended to support the pursue of three main goals: (Sutherland and Altman, 2009, p. 351)

- Execute operational value-add projects for portfolio companies
- Execute due diligence on prospect portfolio companies.
- Execute projects to institutionalize and build out value-add capabilities

To achieve this, Open View Labs set up a conventional Scrum team using weekly Sprints from Monday to Friday. Benefits that emerged upon Scrum implementation were the self-management of the team that freed up capacity of the management so that individual topics could be addressed better. Additionally, the communication within the team improved significantly resulting in higher transparency of the work and an elimination of around 30% of low value projects to make room for high value projects. Impediments that emerged in the first phase of the implementation process included lack of clarity and lack of communication. Some could be resolved by the Scrum team by e.g. clarifying each project and its exact requirements. Too, the acceptance of Scrum in its entirety was not present at all times, which kept the performance of the team only constant on a Sprint to Sprint comparison. (Sutherland and Altman, 2009, p. 353)

Growing the team to more members, Open View Labs created a second team. Additional changes that were implemented at this point of scaling Scrum, covered but were not limited to the introduction of a Sprint lengths of two weeks and the separation of the backlog for the two teams. At this point, Scrum led the team to surface and remove impediments as the transparency within the team improved. Too, the working efficiency increased while “producing higher quality, more value, and requiring less outside management.” (Sutherland and Altman, 2009, p. 354) Challenges that curbed the success of the changed approach included the oscillation between the focus on high velocity and quality with a spike of one leading to a reduction of the other. Further, despite the increased clarity of most stories that are being worked on, the big picture context was still lacking for some team members. Another aspect that became evident in the process was, that cross-training among the Scrum team members can be a bottleneck. Also, in several cases individuals had to be removed from the team as they preferred individual contribution and answering to one clear manager over collaboration with their peers. This hurt the productivity of the Scrum teams and were best met by the relocation of the individuals to a different area that did not apply Scrum. Some of the key lessons that Open View Labs learned, included that for Scrum to work, an openness to conflict, commitment, trust, accountability and attention to results of a team must be present. This became apparent as Scrum is very good at revealing areas where the team needs to improve. Furthermore, they concluded that a successful implementation requires focus on four components as major challenges emerge when the team focused on just a single area: (Sutherland and Altman, 2009, p. 354)

- Direction provided by the backlog
- Speed
- Quality
- Predictability

Concluding the case of Open View Labs, Scrum was introduced to a team implementing best practices in portfolio companies of a venture capital company which does not include software development where Scrum emerged from. During the implementation, not all employees showed to be suitable for such a methodology resulting in the relocation of employees with a strong individual working style. All claims of the benefits of an implementation of Scrum proved to be accurate for Open View Labs which reported higher output with less work and improved quality. As no statement was made towards the employees' view, the only reference to the changed dynamics in the team covered less need for outside management, improved transparency and elevated communication within the team.

Applying Scrum to larger organizations, *Nokia* scaled Scrum to spanning 20 teams located in four different countries and employing a total of 170 persons within two and a half years. Nokia is a global player in the telecommunication industry that engages in multi-location research and development projects that include both software and hardware. (Paasivaara and Lassenius, 2016, p. 74) Before scaling Scrum, such projects applied a traditional waterfall type, stage gate model. In the project used for this case study, a new product with a focus on software and unclear requirements was to be developed. As close collaboration with early customers was expected, it was considered a good fit for agile working by the management which promoted the methodological shift. (Paasivaara and Lassenius, 2016, p. 76)

The project started with two teams spanning circa 15 developer collocated in Finland. Both teams featured previous agile experience and worked the first couple of months on building the product while learning how to work according to agile. Subsequently, more teams were added and coached by the initial two. After five months into the project, the first geographically distributed site was added with 40 developers working in six additional teams. Using two-week Sprints, during the first year of the developments, the first key customer started to collaborate closely regarding requirements. The first working version was delivered after a bit more than one year of development. After that, monthly deliveries started to several key customers. After two and a half years of development, the projects had grown to 170 persons in four locations that applied Scrum and were monitored daily by line managers who were responsible that everything was working in the teams. Many of the line managers had a double role including e.g. Scrum Master or Software Architect besides their line responsibility. To coordinate the teams, Nokia used common Sprint Plannings, Demos and Retrospectives, as well as Scrum of Scrum meetings and Area Product Owners. Area Product Owners are one way to scale the role of the Product Owner by filling each with a System Architect and a Solution Architect where each pair is responsible for one specific product area. (Paasivaara and Lassenius, 2016, p. 77f.) Building on the practices described in chapter 3.2, the teams practiced daily meeting within each Scrum team, and a scaled Scrum of Scrum meeting with all team. When all teams were located in one geography, this was done in one physical meeting but as more global

teams were added to the project, another global Scrum of Scrum meeting was introduced that complemented the local, physical SoS of the Finnish teams. To ensure proper information flow between the teams, a summary of the physical SoS was provided to all team members working on the project globally. The meetings targeted reporting the impediments that hinder the teams to make progress. Hereby, one challenge arose as some teams stated that there wasn't anything to report because the meetings weren't considered useful. (Paasivaara and Lassenius, 2016, p. 79f.)

At the moment of the assessment described in the case study, many team members complained that the common meetings did not give a good enough big picture of the situation and some considered the participation a waste of time or misunderstood the purpose of these meetings as an update for higher levels. Thus, the meetings at Nokia became too big and weren't considered useful by the team members anymore. Going beyond that, the agile mindset was considered partially missing as practices were not internalized to the necessary degree, the complexity of the product made it difficult to divide it into reasonable requirements, a common view on Scrum implementation was missing and market pressure led to time pressure for the teams. Assessing this situation, the author came to the conclusion that the organizational requirements did not match with what the scaling approach can contribute. In this specific case, the chosen scaling approach (Large Scale Scrum - LeSS) mainly targets independent product (area) development which conflicted with the complex product that presented significant dependencies between the different product areas. (Paasivaara and Lassenius, 2016, p. 82f.)

Summarizing, Nokia intended to leverage a scaling approach for agile working to apply to a large development projects with undefined requirements. Starting with few teams located in one location, the project organization grew to include multi-location teams and demanding changes to the scaling organization. At the time of the assessment, the satisfaction with the endeavor had plunged which was pinpointed to the significant amount of cross-dependencies caused by unclear requirements which the team failed to solve with the framework. Concluding, despite having sufficient management support, the resources required, defined project ownership and prioritized backlogs, the success of both agile methodologies and scaling agile approaches is not guaranteed. In the Nokia case, a mismatch of project circumstances and the chosen approach led to decreased satisfaction of the team members. Yet no reference was made to the quality of the developed product, which doesn't allow to draw conclusions regarding the operational success. Nevertheless, this case flags the importance of matching the requirements set by the organization to the structural approach used. This includes traditional as well as responsive, and operational as well as structural approaches to organization. Despite mentioned difficulties, the significant amount of case studies on scaling agile using different scaling approaches shows that this can be a viable method to leveraging the benefits of responsiveness.

3.4.2 Scaled Agile Framework (SAFe)

One company that has been applying the Scaled Agile Framework since 2014 is *LEGO* that is mainly active in consumer goods. More than 20 development teams of the Digital Solutions department have boarded on SAFe to address challenges that arose from the growing number of development teams working simultaneously on several different products resulting in conflicting approaches on the portfolio and team level. (Kniberg and Brandsgård, 2016, p. 1f.) While on the portfolio level stable yearly processes like budget frames and long-term planning have been common, the team level performed the development in Sprints. The program level in between therefore was strained due to challenges like:

- Cross-team alignment – Getting the teams to move in the same direction
- Client collaboration – Setting realistic expectations and satisfying the clients without over-committing
- Release planning – Planning and prioritizing work across multiple sprints, multiple teams, and multiple products
- Platform development - Making sure that investments are made for the future rather than one-off solutions (Kniberg and Brandsgård, 2016, p. 3f.)

Triggered by the implementation of SAFe into the existing matrix organization, the teams were able to reduce duplicated work as the teams are more in tune with each other, reduce the amount of dependency problems, improve the speed at which priorities can be updated and impediments can be removed. Furthermore, the trust from clients could be raised as transparency created better understanding of the teams' work, planning became easier and commitments could be met more often. One aspect that is not represented in the improved work results is the improved motivation of team members that was induced by the reduced confusion and inefficient work. (Kniberg and Brandsgård, 2016, p. 31)

Key factors that contributed to the success of the implementation are stated as the dedication of the teams and the management who besides the risk and uncertainty bought into the endeavor. This included education, financial, as well as capacity means. Further, existing agile experience and deviating from the outline of the framework are named as helpful for the successful start. (Kniberg and Brandsgård, 2016, p. 33) Challenges that remained present at the time of the publication were e.g. that the initial momentum has decreased for the sake of a "business as usual" mindset. Furthermore, as experimenting with different aspects is part of continuously optimizing the system, change has become habitual leading the team to change constantly and even question "Are we really optimizing the right variable?" (Kniberg and Brandsgård, 2016, p. 34f.)

Another case study about *Fannie Mae* reports of the transition towards SAFe in the context of preparing the corporate alignment with new legislation beginning in 2015. This covered breaking apart core business processes. In this process, the company actively worked away from "a siloed command and control culture, following a gated workflow with long release cycles" (McMunn and Manketo, 2017) towards an agile organization. Fannie Mae is a government-sponsored enterprise that finances housing mortgages. (Fannie Mae, n.d.) (Graham, 2023) The key challenges the organization encountered during this transition included: ("Case Study - Fannie Mae", n.d.)

- No agile capabilities in the teams
- Low throughput resulting from inflexible architecture and other constraints
- Turning away from branching development practice towards integrative development
- Traditional organization culture

To address these challenges, Fannie Mae brought in expertise to work with the teams and train them, in order to eliminate constraints, reduce complexity and optimize workflows along value streams by e.g. utilizing shared services and codebases. To improve the traditional command and control culture, those leading the change worked significantly with leadership and management to becoming leaders of the values and principles of the Agile Manifesto. ("Case Study - Fannie Mae", n.d.) By the end of 2015, the organization included 38 agile teams that delivered 25% of the releases in an agile manner. During 2016, additional 4,900 people have participated in agile training, growing the number of agile teams to 155 in the first half year. In order to assess the maturity in the adoption of agility, an assessment tool had been used initially to quantify transparency, predictability, quality, high-performance and alignment. As of July 2017, the endeavor spanned business and technology including 220 agile teams. Four agile approaches have been implemented at that time, namely Scrum, Kanban, Scrumban and SAFe. (McMunn and Manketo, 2017) Both, Kanban and Scrumban are tools that can be used to visualize, track and expedite tasks in agile and non-agile environments. Scrumban hereby is an elaborated version of Kanban that combines the tool with certain events from the Scrum framework, limits to the work in progress and some other features. (Shore Labs, n.d.)

Taking résumé from the process, leadership played a significant role in the transition. This included both senior and middle management as especially latter are held accountable for the success of the program and are key to uphold the agile mindset within the teams. Furthermore, focusing early on supporting processes signaled the teams that the organization was serious about changing and build the case for streamlining processes. Too, giving opportunities to explore and learn over prescribing assisted with the adoption of the agile mindset that was tracked with an agile maturity model giving shape and transparency to the transition process. (McMunn and Manketo, 2017)

Some of the improvements that had been seen originating from the transition included: ("Case Study - Fannie Mae", n.d.)

- reduced delivery risk
- faster feedback cycles
- improved predictability
- boosted quality
- increased business value
- better team progress
- greater efficiency

Summing these case studies up, besides a wide range of business advantages spanning improved quality, quantity and speed, SAFe brings a high degree of adaptability capable of addressing a wide range of business challenges and organization sizes. Backed by numerous more case studies, that in most cases cover organizations of several hundred to thousand employees, it proves to be capable of scaling alignment throughout entire organizations showing no limitations regarding its size. Despite demanding significant training efforts and process alterations, it is applicable to different environments and proved in several cases to hold up the claims of one of the leading providers of SAFe expertise, stating 30 to 75% faster time-to-market, 20-50% increase in productivity, more engaged employees and 25 to 75% improvements in quality. (Scaled Agile, 2023b)

3.4.3 Spotify model

One case study that reports about the emulation of the Spotify model, reports about *Refinery29* which is a media and entertainment platform focused on women and underrepresented voices. Before emulating the Spotify model, the organization was set up with a blend of functional and matrix organization. As the teams were small and not always clearly distinct from each other, responsibility conflicts were common and execution was not as fast as it could have been. In 2015, the emulation was performed by restructuring the teams into cross-functional Squads like DevOps, Storytelling, Product Marketing, etc. that contained members of Chapters like Quality Assurance, Desktop and Content Management System.

As the applied Squads and Chapters did not account for real operations sufficiently, challenges were introduced into the organization. These were e.g. undefined or scattered ownership and varying chapter sizes whose members were spread across multiple Squads creating challenging situations for Chapter leads. (Park, 2018)

The conclusion drawn from the author of this case study revealed, that instead of transferring the Spotify Model, Refinery29 emulated it. This builds on the premise that both companies operate in the similar environment and under similar conditions which proved to be inaccurate. Despite the very few case studies revealing insights into the application of the Spotify model by other organizations, the conclusion that the Spotify model cannot be emulated unchanged is backed by several sources. Unlike other approaches describes in chapter 3.2, the Spotify model does not qualify as a framework nor as a methodology due to the fact that it does not describe universal patterns that can easily be copied. It is a description of the former organization structured applied in the company Spotify. Therefore, the model and the associated insights must undergo a tailoring to the individual circumstances where the principles are to be applied. (Campbell, 2021) This could include e.g. complementing the organization approach with risk compliance checks that might be required and for which the Spotify model does not cater for.

Summarizing, not all responsive organization approaches present universal insights as they might apply to specific circumstances only. Distinct by key features like the degree of autonomy and cross-pollination, purpose-driven leadership, lean startup culture and the maturity of agile practices (Kurian *et al.*, 2021), the Spotify model inspired with its fundamentally changed structures that differentiates from other agile frameworks and methodologies. Yet, matching the organizational requirements with the intended organization approach, model, philosophy or similar are crucial for the success of the transition towards a responsive organization. Therefore, when transferring the Spotify model, this must receive special attention.

3.4.4 Sociocracy

For Sociocracy, many case studies exist that report about and describe the implementation of it. While most of the organizations have some kind of social purpose like schools and other education facilities, community- and communal-initiatives and care-giving companies, there too are profit-oriented companies active in several industries applying Sociocracy. (Rüther, 2010, p. 104ff.)

One of the companies organized with Sociocracy is *Outlandish*, which is a collective of approximately 20 collaborators and co-owners building digital applications and websites for companies, charities and universities. Due to legal complexities, Outlandish does not have Sociocracy nor its principles incorporated into their official articles of incorporation. Instead, it fully operates according to those. Resulting from different opinions about the direction the company should take, Sociocracy became the approach that was to be implemented in the company. Though, the first trial without significant education efforts and separation of the staff failed. With the second trial, a distinction of co-owners and employees was implemented. This contained an equal split of profits and losses between all co-owners and regular salaries for employees. Together with the increased business risk, co-owners consequently became part of the top Circle and were set “in charge of the major and long-range decisions since they had most to lose.” (Ellinor, 2017, p. 3) In this second trial, the main challenges that occurred in the small business included missing clarity about the Domains and where decisions are made, as well as having defined membership in Circles. (Ellinor, 2017)

Another organization that has implemented Sociocracy is *Slagelse*, which is a municipality with almost 8,000 employees. The municipality ranges from accounting for public welfare like kindergartens and elderly homes to infrastructure. There, the mayor triggered the implementation process in 2020, which going forward was entirely based on the offer to the entire municipality. Information and support was provided to individuals, teams, departments or other sub-structures whenever interest from those was displayed. Following the information, a possible roll-out process was supported by providing training on the principles and procedures of Sociocracy, as well as additional guidance and support once the work with the approach was intended to be started. The implementation hereby followed the principle of changing the working culture first and only then adapting the organization structure to it once this started to inhibit further development and implementation. This transition did not follow a predetermined plan so that solutions for e.g. organization structures, procedures and other topics of interest emerged from the process. One exemplary structural change that has been highlighted

in the interview presenting the case, was the shift away from organizing employees according to their skills and towards an organization around the field of responsibility, e.g. an elderly care house or kindergarten. After adapted the organization structures, the decisions were made by the people working in that very field and by those who have to bear the consequences of those decisions rather than centralized coordination committees that are distant from operations bearing the consequences. (Aagaard and Rasmussen, 2022)

All challenges that have been named, are related to human behavior. Starting with the need to “unlearn” the fear of making wrong decisions and expecting negative consequences if something goes wrong, going all the way to developing the willingness in people to take on additional responsibility. Overcoming these, implementing Sociocracy led to positive results though. These included, yet were not limited to, faster decision-making both internally and towards external stakeholders, as well as more individual freedom for employees working in direct contact with e.g. patients. One example elaborated on spontaneous trips with care recipients enabled by a share of the budget that is dedicated to such endeavors and which does not require any clarification before tapping into it. (Aagaard and Rasmussen, 2022)

To sum up, Sociocracy until this day mainly is implemented by small organizations, often pursuing a topic of public interest like education, inclusion or sustainability. The majority of these organizations furthermore is run by volunteers and present a non-profit character. Yet, there are exceptions, like Slagelse and Outlandish. Prior stands out due to the significant size of the organization but exhibits well the public cause that the organization pursues. Latter, does present a relatively small size but differs from the summary through its profit-oriented character and paid employees. The aspect that is fulfilled by all organizations though, is the low structural complexity. As such results from the operation of the organization and the roll-out process, the main effort when engaging in Sociocracy comes from educating the members of the organization, which was stated a necessity. This has been highlighted in many case studies including the two elaborated above. Another aspect that has been mentioned in several cases is the difference to systems building on command and control, resulting in certain behaviors that must be unlearned or altered as described e.g. in the case study of Slagelse. Due to the lack of data, no conclusions could be drawn on the quantitative performance of organizations that have implemented Sociocracy.

4. DEDUCTION OF FAVORABLE ELEMENTS TO INNOVATIVE CAPABILITY

4.1. Evaluation of organizational approaches

As organization structures provide coordination of performance to meet targets, they play a vital role in organizations. Aspects of this coordination include the definition of hierarchies (Wöhe, 2008, p. 116ff.), as well as structuring operations and controlling managerial authority (Wöhe, 2008, p. 123). To supplement the organization structure, the process organization cares for defining responsibilities and the allocation of tasks and procedures to roles. (Wöhe, 2008, p. 120 ff.) In addition, responsive organizations demonstrate a high degree of adaptability and reaction speed that exceed traditional organizations. To understand how this is incorporated in the approaches described in this thesis, this chapter analyzes the strategic guidance provided by the organization approaches, the relationship and use of structure and process organizations, the streamlining to meet organization targets, and the responsibilities and their distribution within the organization.

Analyzing the elaborated responsive organization approaches, it unfolds that the majority of approaches to responsive organization focus on the process organization and only few address the structural organization. The ones that take latter into focus are the Spotify model and Sociocracy. All other approaches to *responsive organization* exist either explicitly or implicitly in *combination with an organization structure*. In the case studies where this was revealed, such were in combination with a matrix organization structure. Deducing from this, the combination of an organization structure with a procedural responsive approach compensates for the individual shortcomings of each of the constitutes. E.g. this might include overcoming the conflict of interest in matrix organizations by applying a strong product and customer focus contributed by the Scaled Agile Framework. This combination would likely result in clear targets associated with the product development and Sprint delivery. The functional manager in such a case would remain responsible for administrative tasks, hiring of personnel, individual goal setting and people development but give in on the operational governance which could be provided by e.g. the Agile Release Trains. Concluding, independent if the structure and process organization is defined by one or multiple approaches, crucial managerial and operational responsibilities must be defined. Besides administrative tasks like hiring, salary negotiation and vacation planning, this also includes training and development, as well as individual and collective goal-setting, operational governance and strategic guidance.

Another aspect that many responsive organizations have in common is the *decoupling of responsibilities*. Building on the assumption that the procedural approaches are combined with a structural organization, there are several aspects of interconnectivity that could undergo decoupling. In the first first aspect, the administrative and operational responsibilities are separated as the structural organization caters for managerial affairs and creating the corporate environment in which teams can perform. What remains with the operational portion is the prioritization of work, alignment with other areas, defining and fulfilling customer requirements, as well as the execution of work. The next aspect of reducing inter-dependency includes prioritization of work, as

well as the definition and fulfillment of customer requirements, that is separated from the collaboration with other teams or departments. Prior in most cases is excluded from the operational aspect to an outside-looking area or role such as the Product Owner (team), Tribe Lead or the Epic Owners. The operational aspect that remains is the alignment with other areas. In Scrum, this decoupling of responsibilities is achieved by separating tasks like work prioritization, providing guidance, defining and executing tasks, as well as creating a favorable work environment by removing impediments. Work prioritization and providing guidance are covered by the Product Owner who takes on the operational governance and creating a favorable environment by the Scrum Master which creates a well-defined and clear working environment where the agile team can perform at best performance and highest efficiency. If compared to a matrix organization, the Product Owner would give the product- and market-related input and the Scrum Master would take on important functional and managerial responsibilities. In traditional organizations, such a separation is not manifested and silo-like departments. In comparison, line organizations accumulate all of these responsibilities with the line management, hence one instance that accounts for outward-looking and operational planning, administrative tasks, and alignment with other teams and departments.

Taking this aspect further, another aspect which differs responsive organizations from traditional organizations is the *distribution of responsibility*, which traditionally lays with the line manager and in matrix organizations additionally with the project manager. In the case of Scrum, the Product Owner is responsible for the overall success of the product but decisions on operational aspects are not made by any manager but by the workforce involved in the topic itself. This takes away some of the managerial responsibility a manager in a traditional organization bears and distributes it within the team. The minus in accumulation of responsibility leads to a plus in responsiveness, as decisions can be taken much faster and closer to the topic. This potentially benefits the innovative capacities of an organization operating like this but bears the risk that alignment with other areas was missing. Yet, this principle is contained in all responsive approaches. In Sociocracy e.g., the administrative responsibilities are with those who perform the work so that decisions are taken as close to the people and processes that will be affected by them. By defining the domain of each Circle, it is clear which decisions are taken by whom to ensure that they are made on the lowest possible level. In Scrum derivatives, each team has its share to a larger product and all decisions concerning this share are taken by the agile team itself. Only if there are interdependencies with other shares, then a higher level is involved in the decision making, like it is the case with Sociocracy. According to the Spotify model, Squads take over all decisions concerning their development feature and the Tribe only addresses topics of elevated interest like the integration of different Squads' features, hence like in any other approach but with the team and not the manager.

When it comes to *strategic guidance*, only few responsive approaches provide such. Those, where a sense of strategic planning is described, are the Scaled Agile Framework, Sociocracy and implicitly the Spotify model, too. In SAFe, the decomposition of the organization's strategic themes within the planning cadences addresses strategic orientation provided by the highest levels of the organization. In Sociocracy, the mission circle with external influences that mimics a board of directors, provides such guidance. As no explicit statement about strategy building is included in

the Spotify model, the Guild element could be used for this purpose as this element can be used for any goal-driven task that is open for anyone to contribute. The three organization approaches that have a strategic element included are also the ones that could be classified as a structural organization, while all others focus only on the operational organization and do not regard strategic guidance at all. In traditional organizations, strategy often is a top management task. So it is with SAFe and Sociocracy. If Guilds are used for strategy in the Spotify model, such would be driven from employee-level rather than top management.

Going hand in hand with the strategic guidance, is the *streamlining of processes towards value delivery* that includes e.g. the alignment with other areas. In most approaches this is achieved by regular synchronization of teams and establishing common goals. In Scrum derivatives, synchronization of different working teams is achieved with daily update meetings and other alignment events such as the Sprint Reviews. Common goals result from joint planning meetings and planning cadences that are applied in SAFe and visualize how each contributing team is aligned with the strategic goals. The underlying levels hereby have the superior levels and planning cadences for guiding further decomposition. Additionally, Agile Release and Solution Trains too contribute to the delivery-focused grouping of employees. In Spotify, streamlining is achieved by the Tribe lead closely collaborating with the Squad leads and Sociocracy has the double-link between Circles. In comparison, line organizations operate in parallel to each other with every department pursuing different goals.

The last aspect that is materialized especially in the combination of responsive methodologies and organization structures, is the *independence of the process from the structural setup*, hence the dynamic from the static formal organization. While the formal structural organization is considerably static, the procedures and informal consortia are dynamic and can be changed as needed, if regarded independent from the organization structure. By disconnecting the way work is performed from the structural integration of personnel, organizations can gain additional flexibility. Taking SAFe as an example, on the one hand all employees have a department where they are structurally integrated to e.g. undergo continuous skill development. On the other hand, the development work is performed in the teams and Agile Release Trains, which are an informal construct. Unlike the structural framework of the organization, such an informal setup could be different for every project. Generally applicable for other methodological approaches too, procedural organizations shape the way in which work is performed, but which might not be crucial for performing the work in general. Providing the environment to perform the work should be provided by a structural organization, as this is one of the key purposes.

4.2. Challenges of an innovation department

To compare the theoretical findings of this work with practical challenges of innovation departments, over a dozen semi-structured interviews had been conducted. These included employees and managers from and stakeholders working with a department that develops data-driven products in the industrial plant engineering and construction business. Unlike the corporate environment where this department is located, their software-driven business is prone to volatility. While industrial plants are operated for several decades, the key customer segments and offered software products change within few years. ("Interviews on the organization setup of a data-driven innovation department", 2022) The department develops software products and services that complement existing industrial plants. These target the improvement of the operational efficiency by leveraging data and combining it with the expertise that is available in the company. To achieve this, the department with around 30 employees collaborates with departments from the existing matrix organization while reporting to the Chief Executive Officer. The department is spread in several geographical locations. Each location is capable of sustaining their daily operation. The only task that is centralized, is the product development. Key stakeholders outside of the department are the IT department which executes the software application development, and the process engineering departments that contribute their expertise to the development and operation. The department is organized in geographical clusters where each holds separate teams within for development, implementation and operation of products.

During the interviews with the IT department, the employees voiced a need for steady interfaces that provide clearly defined and prioritized input for the development of new product features. This had been emphasized by the process engineering departments, too. Further, such interfaces were stated to require stewardship of sufficiently proficient people. Such should be capable of understanding both ends of the interface translate the needs of each to the other. In this arrangement, the departments within the matrix structure are the ones executing e.g. the development tasks like coding or conducting technical studies. The innovation department governs the customer interaction, project management, implementation and operation of the products. ("Evaluation of a data-driven innovation department", 2022) If transferred to the elaborated responsive organization approaches, the partner departments described their demand like the tasks of Product Owners. These shall provide the input for the development of product features and execution of tasks.

During the interviews with the team members, several individuals expressed that they experience a high level of trust within the department resulting in high levels of agility and motivation. Furthermore, they highlighted the good communication and customer-orientation that allows them to be innovative at a high speed. All of these aspects, where voiced to be present at the time of the interviews and considered the cause for the success of the department. Yet, two challenges were given in the interviews, too. The main constraint to the working speed was pinpointed to the decision making, that was with the head of the department at most times. Due to this accumulation of decision power, this created a bottleneck for progress due to the inadequate speed of decision-making. Additionally, in several occasions the team reported the need for streamlined performance as due to unclear role responsibilities, the operational efficiency was being strained through occasional uncoordinated efforts. Furthermore

resulting from unclear responsibilities, the interviewees indicated that they were overburdened with the amount of tasks and that accountability at times was missing which fostered the wish for strategic guidance for providing personal and operational orientation. To address these topics appropriately, the interviewees described the aspects above as important for a suitable structure and process organization for them, when asked for it. (“Evaluation of a data-driven innovation department”, 2022)

Deducting from the interviews, the interviewees in their own words referred to some of the aspects concluded in chapter 4.1. Besides the streamlined processes, especially the “distribution of managerial responsibility” in the form of e.g. accumulated decision power with the head of department and the need for “strategic guidance” were clearly voiced. Moreover, the insufficient role descriptions and responsibilities in a broader sense refer to the “decoupling of responsibilities”. The main difference to the conclusions in the previous chapter is the granularity of the described reduction of inter-connectivity. While the conclusion from the organization approaches is reducing dependencies of administrative and operational responsibilities. What was mainly criticized in the interviews was the high interconnection of development, project management, market-facing responsibilities. Hence within the operational responsibilities itself. This might result from the small size of the department that does not allow to apply such a function-oriented separation into homogeneous teams, but it certainly deviates from the conclusions drawn from a structural organizational perspective.

4.3. Confrontation

Comparing the key results from the desktop research with the challenges described in the interviews, a majority of the demands expressed in the interviews could be met.

High-quality development requirements

Starting with the demand for steady interfaces that provide defined and prioritized inputs, such could be met with a proper organization of operations that is complemented with detailed responsibilities of involved roles. Prior falls into line with the functions of an organization structure complemented by the responsibilities defined in the process organization. However, as the interviewees described a feeling of overwhelm with regard to the multifacetedness of their roles, the traditional organization structure that was applied didn’t meet such demands for targeted responsibilities. Instead, the overwhelm was created by the diverse set of tasks brought to the individuals that lacked of tapered responsibilities and accountability that were distributed among multiple persons. An improved organization therefore would include tapered responsibilities to increase the working efficiency and reduce the need of employees to switch between multiple topic areas to fulfill their role. Once such clear roles had been established, it could be carried forward by reducing dependencies and distributing operational responsibilities further.

Strategic steering

Further feedback from the interviewees included the need for strategic guidance and adequate decision making. Both are common traits that the organization structure shall provide to an organization. Yet, it was not bound to a responsive organization but to the general concept of an organization structure. The accumulated decision power in the department head hereby wasn't perceived as appropriate, opening up the question if an organization following traditional approaches is appropriate to meet this demand.

Streamlined internal operations

An aspect that could be seen associated to a responsive organization explicitly, was the presence of streamlined processes. Resulting from such good internal alignment in the adduced innovation department, high development speed and customer orientation were the expressed result. The interviews hereby showed that this was one of the demands toward an organization and that was not met with the past organization structure that comprised a silo-like separation of task clusters. To circumvent the structure-implied procedures, the department had tried several agile methodologies like Scrum resulting in working procedures that are independent from processes imposed by the organization structure. Therefore, the characteristic that was implicitly stated as a success factor for the department, was the independence of the process from the structure organization that was already implemented despite the traditional structure of the department.

Interpretation

The demands expressed in the interviews with the stakeholders of the innovation department could be met with an appropriate structure and process organization. The setup that was applied in the case of the interviewed innovation organization hereby developed from a traditional setup due to the procedural constraints that the structure organization imposed on the department. Aspects of discontent toward the previous organization structure, included e.g. inappropriate speed of decision making, lack of defined and poor separation of responsibilities. Such offered the potential to be improved by applying elements of responsive organizations like defining responsibilities and reducing inter-dependencies. Later had been developed as of the constraints that occurred and that resulted in a certain disconnect from the process and structure organization. Finally, during the interviews cultural aspects were identified that could not be attributed to any of the aspects of organization. Such included trust in and motivation of the team members that generally arose from the productive work environment and personal satisfaction of the interviewees. A large extend of the interviewees' feedback exhibited a connection to the organization's setup though. Such allowed to incorporate the stated priorities into an organization setup by leveraging elements of responsive organizations as described in previous chapters.

5. COMMENTARY

5.1. Summary

Resulting from studies performed in the last years, a demand for alternative approaches to innovation organization has become apparent and has materialized in a range of means. This ranges from the implementation of different organization approaches separating innovation and day-to-day operations to applying different procedural approaches. All as countermeasures for achieving innovation while upholding an organizational structure. The need for alternative approaches to innovation organization hereby is a consequence of the expressed lack of fitness of traditional organization structures to meet the unique demands that innovation has towards an organization. The demand alternative approaches however, is not limited to certain industries but spans companies of all sectors. Certain, like software-developing firms, have been at the forefront while others fall behind. Late adopters are located in especially but not limited to the physical product development and production.

By analyzing different means of organization approaches, it has become apparent that different aspects of an organization are being addressed. While some target the organization structure that provides the structural coordination of activities and definition of managerial authorities to meet defined goals, others target the process organization that dynamically answers for defining responsibilities and allocating tasks. Beyond that, some of the responsive organization approaches that stand opposed to traditional ones like line and staff, as well as matrix organizations, moreover define working methodologies that are closely interlinked with corporate working culture and procedures. To evaluate the different organization approaches, the cultural aspect of the organization hasn't been incorporated in this thesis. Instead, the focus was set to the structural and procedural aspects that define an organization and which has been matched with several case studies and the working reality of an innovation department that was interviewed for this purpose. All examined aspects have been regarded in the context of traditional and so called responsive organizations. Latter are claimed to address common issues of organizations that are setup with traditional approaches by e.g. incorporating elements of flexibility, changing the organization of working procedures and applying a different concept to decision authority.

A dimension of difference between traditional and responsive organization setups that has been extracted from the analysis of different organization approaches is the extend to which working methodologies or organization structures are described. On the one hand, organizations applying traditional setups do not explicitly define working approaches based on the organization structure. The sole aspects that are being defined by such, are the organization structure that defines the communication paths, hierarchies and eventually the sectoral responsibilities through the distinction of operating areas. In essence, traditional organization approaches define the structural allocation of resources with regard to product and function. Responsive organization approaches on the other hand, often provide a more vivid set of organizational aspects and in almost all cases do not solely address the organization structure but target different aspects of the procedural and structural organization instead. For example, the most prominent methodology to address organizational responsiveness, Scrum, solely describes the methodological approach of one team up to nine people entirely without

describing structural aspects. Sociocracy on the other hand, mainly addresses the structural organization that includes decision making authority and the collaboration of teams. As all organization approaches, both traditional and responsive, do not provide tailored plans for implementation and definitions of all its elements, significant room for interpretation is induced. Also, in most cases certain elements to describing a holistic organization are missing, e.g. the definition of managerial authority, the structural integration of procedural working approaches, or the resource allocation to tasks and structure elements in the larger context. The basis for the evaluation and further use thus is formed by the descriptions that, if possible, has been extracted from the original literature and institutions that developed it.

A fundamental principle that was uncovered during the research about responsive organizations is that most approaches focus on value delivery toward the customer or to pursue the organization's purpose. Both inducing collaboration across fields of competence into the organization and either defining the way the organization is structured or how operation is being upheld. Confronting this with traditional organization approaches, there teams mostly work independent from other departments, like in single-line and divisional organizations, or they receive input from different persons like in multi-line and matrix organizations. All pursuing independent goals that can but don't have to be aligned with each other, but contribution to the same organization's purpose. Comparing both categories of organizations, this arouses the impression that responsive organizations have the potential to address conflicting objectives within the organization better than traditional organizations as these do not independently address separate aspects of the value generation but building around the holistic value generation is the underlying theme of the responsive organization approaches. Depending on the kind of value generation, this may include software product delivery to customers or supporting a solidarity agriculture business. Hereby, a range of studies among companies applying responsive organization approaches confirm that the organization around the value generation results in improved output of the organization. Traditional arrangements in comparison tend to perform well in governance and meaningful grouping of resources based on their activity.

Associated to that, governance is one of the aspects where there are the most significant differences between traditional and responsive organizations. While traditional organizations can follow a spectrum of management approaches, management in responsive systems can only refer to the objective as division of labor typically is limited to low-level teams that work on the same product feature. In such, the only precisely measurable performance is the team's output. However, since the collaboration within such a team is very close, the dependence on the other team members is much higher compared to traditional setups. Instead of reducing dependencies within teams, responsive organizations intend to optimize throughput of the teams rather than the individuals. Pursuing the same, traditional organizations face the challenge that the structural dependencies in between teams are inhibiting. E.g. when multiple products are being produced in single- or multi-line organizations, and conflict for capacity occurs within matrix organizations. In such cases, decision-making becomes exceedingly important as such possibly impede the progress.

Comparing this to the organization approaches elaborated in chapter 3.2, decisions are intended to be made on the lowest possible level, often being the working level that

demands for decisions. In such a way, decision-making power is being distributed throughout the organization, rather than accumulated in managerial positions, which limits the delay caused by decision-making. Thus, the amount of responsibilities of the management can be reduced so that decision-making does not become a bottleneck inhibiting the performance of the organization.

Another aspect that differentiates traditional from responsive organizations, is the fact that operations and structures often aren't closely interconnected with each other. As e.g. exposed in 3.2.6 Scaled Agile Framework (SAFe), the operational setup that is described in the Scaled Agile Framework is implicitly backed by a structural setup. Yet, such a structural setup remains in the background of the organization and does not determine the organization of operational processes. Such a differentiation between structure and operation can be seen with all responsive concepts, except for Dynamic Governance which outlines the setup of a structural organization driven by its operational processes.

By definition, the structural setup of an organization supports its operations. Within responsive organizations, this aspect however often exhibits differences. Due to the weak or not existing interconnection of organization structure and processes, one of the aspects could undergo alteration without significantly influencing the other aspect of the organization. This implies that cross-qualification of staff through e.g. allocating employees to interdisciplinary teams rather than functional teams within a project could benefit the responsiveness on an organization. This results from the loose link that functions have with a specific project or product development and which is replaced by strong interconnections with working interdisciplinary working teams. The main difference between traditional and responsive approaches consequently is, that traditional structures have a high interconnection of products and functions whereas responsive organizations loosen such connection through the implementation of interdisciplinary working teams. In none of the responsive setups, function and product are interlinked closely, nor is there a connection to the structural aspect of the organization. By applying such, the inter-dependencies of the different aspects of an organization are reduced and the responsiveness of the organization is increased. The better the knowledge management and training of the staff in such a context is, the more versatile organizational capacities can be used and the faster these can be shifted if required.

Comparing the key takeaways from the organization approaches with the challenges described in the interviews with the members of an innovation organization, a majority of the demands stated in the interviews can be met with responsive organization approaches. Besides steady interfaces that provide defined and prioritized inputs, also reduced inter-dependencies between different operational areas and an increased focus for individual roles can be supported. Further feedback from the interviewees included the need for appropriate decision-making that mainly referred to the speed to which decisions can be made by the manager. Inappropriate speed or quality hereby inhibited the performance of the organization which could be addressed with distributing authority among the organization to increase the speed with which issues can be addressed by the working level itself. A demand that was outlined and that was already achieved in the current setup by establishing work processes that are independent from functions and instead tackled by working teams, was the high degree to which

processes are streamlined. Resulting from a good internal alignment in the adduced innovation department, high development speed and customer orientation were the stated result. The interviews hereby showed that this is one of the demands toward an organization and that couldn't be met with the past organization structure that comprised a silo-like separation of task clusters. Therefore, the characteristic that was implicitly stated as a success factor for the department, was the reduce interdependence of the process from the structure organization that had already been implemented despite the traditional structure of the department.

Concluding, most demands stated in the interviews with the innovation organization can be met with an appropriate combination of structure and process organization. One of the findings of this thesis had been implemented at the time of the interviews already: The department had reduced the interconnection of the structure and process organization to a certain degree, by implementing interdisciplinary project teams so that the working efficiency could be increased. Such came naturally and resulted from the procedural constraints that the structure organization imposed on the organization. Furthermore, many of the other aspects that were termed in the interviews included references to the organizations setup contributing to this thesis.

5.2. Discussion

5.2.1 Research Question 1

What is the deployment profile of alternative organization approaches addressing textural flexibility in organizations according to literature provided by consulting and industry reports?

According to the available literature, only a limited number of organization approaches are commonly applied to increase the responsive capabilities of organizations. The majority of them is based on the agile methodology Scrum that was invented and gained industry traction through the increased operational productivity that was created with it in software development. However, Scrum does not qualify for large organizations nor does it address the structural setup of an organization. To scale the methodology to larger organizations, a range of derivatives have been developed which all in all possess the most significant deployment footprint of alternative organization approaches for increasing the flexibility of organizations. Besides the operational aspect of organizations, only few alternative organization approaches target the structural organization which accounts for the coordination of activities and personnel, as well as the definition of authority and directing processes. Here, the number of proven alternatives is limited. Overall, key aspects of the deployment profile of alternative organization approaches included:

- Process landscapes that are streamlined for the efficient execution of value-adding activities
- Reduced inter-dependencies in working processes
- Loose interconnections of the process and structure organization
- Lucid prioritization of work in combination with clear orientation

5.2.2 Research Question 2

What use cases were attempted to address with alternative organization setups? What findings have been created during and after the deployment?

Derived from a variety of use cases spanning all industries, organization sizes and fields of activity, it became clear that alternative organization setups have been deployed in all kinds of organizations already. Thereby, the findings included that implementing an alternative organization setup for the sake of implementing it, did not always lead to the intended result. It was necessary to understand clearly how the setups function, what the limitations of them are and where they can add value. Only then, a suitable concept can be developed which setup pays attention to the organization's specifics.

5.2.3 Research Question 3

According to a group of interviewees, what are high priority success factors for an innovation organization? How do such relate to alternative organization approaches?

Occupying a non-market oriented perspective, high priority success factors stated in interviews with an innovation organization included a streamlined process landscape that is directed by the value-adding activities, clearly defined and prioritized input for development, an appropriate segmentation of tasks and strategic guidance. Such in general have shown significant similarities with the claimed benefits of alternative organization approaches which would result in a good fit for the demands of innovation organizations. However, the degree to which responsive organization setups live up to the demand varies. To create a good fit between demand of the organization and offer by the setup, the individual characteristics require attention and might need alteration.

5.3. Review of the research

Studying the topic of alternatives organization structures with the intend to increase the responsiveness of organizations, proved to be multifarious due to the nature of the topic. Besides a variety of aspects with regard to the setup of organization, also change management approaches, cultural organization specifics and operational challenges came to fruition. Whilst this work had set its focus on the structural and operational aspects of organization design, several topics could not be regarded, either from the start on or as the topics came up during the processing. Also, putting the results of this thesis into a practical perspective, it will not be sufficient to simply match a responsive organization approach to the demands of an organization that is to be restructured. Both the preparation as well as the implementation will require much deeper analysis of the initial situation and based on such understanding, a tailoring of the responsive setup and a suitable change process. However, as such cannot be provided on a universal basis and based on the limited number of qualified literature, the research elaborated in this paper provides a good overview and understanding of available alternative organization approaches and outlines how such relate to the practical needs of innovation organizations.

To improve the results further, it is advisable to conduct independent studies with organizations that have deployed some of the referred responsive organization approaches as the publicly available information widely is of low quality and little detail. Only through large quantities of sources, sufficient insights could be generated about the practical reality of both the deployment and utilization. Furthermore, an increased focus on certain aspects of the wide-ranging topic can lead to deeper insights into the topic, yet such was taken a pass on as the practical relevance of the topic was targeted in this case. For such, the results have proven to be appropriate as the interviewed innovation department has rolled out a new organization concept based on the findings described in the previous chapters few months before the publication. The new organization concept applies some of the key findings materialized in selected elements from the responsive organization approaches that are elaborated.

Despite the relatively young scientific field of what often is called “new work” and which taps into agile working, responsive organizations, as well as distributed, virtual organizations and many more associated topics, the contribution made by this work may be used as a starting point for organizations of all kinds to challenge their current setup and to be inspired by the assortment of alternative organization approaches. As such might be capable of addressing organizational difficulties better than traditional setups, the findings allow a targeted search for suitable means to address them and evaluate available organization setups based on their merit. Despite the accumulation of rare sources providing considerably detailed information, the set of both theoretical as well as practical information is yet too thin to create universal truths about organizational responsiveness. Yet, the both-sided evaluation of organization approaches gives a lead on judging such and the aspects that must be regarded when tailoring them to the need of the individual organization.

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LIST OF ABBREVIATIONS

<u>Abbreviation</u>	<u>Meaning</u>
CPO	Chief Product Owner
CRM	Customer Relationship Management
DevOps	Software development and IT operations
DoD	Definition of Done
DVS	Development Value Stream
EAT	Executive Action Team
EFIS	Empower, Focus, Integrate and Scale
EMS	Executive MetaScrum
FDA	Federal Agency U.S. Food and Drug Administration
ISO	International Organization for Standardization
LeSS	Large-scale Scrum
PO	Product Owner
QA	Quality Assurance
ref.	referring to
SAFe	Scaled Agile Framework
SDS	Scaled Daily Scrum
SoS	Scrum of Scrum
SoSM	Scrum of Scrum Master

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Appendix A. KEY CONCEPTS IN REGULATED ENVIRONMENTS

(Fitzgerald et al., 2013, p. 864)

Term	Definition
Quality Assurance	<ul style="list-style-type: none">• Systematic and inherent quality management underpinning a controlled professional process• Reliability and correctness of product
Safety and Security	<ul style="list-style-type: none">• Formal planning and risk management to mitigate safety risks for users• Securely protect users from unintentional and malicious misuse
Effectiveness	<ul style="list-style-type: none">• Satisfying user needs, and delivering high value to users with high usability
Traceability	<ul style="list-style-type: none">• Documentation providing auditable evidence of regulatory compliance and facilitating traceability and investigation of problems
Verification and Validation	<ul style="list-style-type: none">• Embedded throughout the software development process (user requirements specification, functional specification, design specification, code review, unit tests, integration tests, requirements tests)

Appendix B. SEMI-STRUCTURED INTERVIEW QUESTIONS

1. Explain what interview is about: motivation, purpose
2. How would you describe your relationship /interaction with _____?
3. How would you describe the current organization of _____?
4. What do you see as beneficial in the current structure?
5. Where are the biggest difficulties?
6. How do you imagine a suitable structure for _____?
7. What are important things to consider when designing a structure for _____?
8. What role do you see for yourself in the future of _____?
9. What recommendations do you have for me going further with my work?