Managing VUCA Challenges with Agile Project Management – focusing on Scrum

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Abstract

Title: Managing VUCA Challenges with Agile Project Management – focusing on Scrum

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This thesis delves into the role of Agile Project Management (APM) and specifically the Scrum Methodology when dealing with challenges such as VUCA (Volatility; Uncertainty; Complexity; Ambiguity) challenges. The need for adaptive project management approaches in a fast-paced business environment is present. Agile and Scrum have become popular tools for addressing unforeseen events due to their flexibility and collaborative nature.

Through 13 in-depth, qualitative interviews, several key findings were derived, which were analysed using the Gioia method. APM serves several critical success factors (CSFs) when dealing with challenges. These include embracing change, creating transparency, flexibility, and adaptability, while communicating and cooperating in a proper manner. These factors are supported by the application of APM and Scrum. Scrum is acknowledged as a useful tool in addressing VUCA challenges. This research provides aspects to further focus on when facing one of the VUCA situations. However, it is limited by the ability to distinguish between the challenges and thus identifying how to approach the four challenges differently. This hinders the full utilization of the VUCA model in relation to Scrum.

Consequently, this research contributes both to academic circles and the industry by offering actionable insights on improving project management in turbulent environments.

Keywords: Agile, Scrum, VUCA, Volatility, Uncertainty, Complexity, Ambiguity, Project Management, Collaboration, Continuous Improvement, Critical Success Factors, Gioia Method, Flexibility, Communication, Trust, Iterative Approach, Stakeholder Value, Customer Satisfaction, Key Performance Indicators, Adaptability, Team Collaboration, Transparency

Sumario

Título: Gerindo Desafios VUCA com Gestão Ágil de Projetos - com foco no Scrum

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Esta tese investiga o papel do Gerenciamento Ágil de Projetos (APM) e especificamente da metodologia Scrum para lidar com desafios como VUCA (Volatilidade, Incerteza, Complexidade, Ambiguidade) – a necessidade de metodologias de gestão adaptáveis num ambiente empresarial e de mercado de ritmo acelerado. Agile e Scrum tornaram-se ferramentas populares para lidar com eventos inesperados em um ambiente de negócios acelerado devido à sua flexibilidade e natureza colaborativa.

Através de 13 entrevistas qualitativas aprofundadas, foram obtidos vários resultados cruciais, analisados pelo método Gioia. APM serve vários factores críticos de sucesso (CSF) ao lidar com desafios, incluindo acolher a mudança, criar transparência, flexibilidade e adaptabilidade, e garantir comunicação e cooperação eficazes. Esses fatores são apoiados pela aplicação de APM e Scrum. No entanto, o estudo é limitado pela capacidade de distinguir entre desafios e, assim, identificar como abordar os quatro desafios de forma diferente.

Esta investigação contribui tanto para os círculos académicos como para a indústria, oferecendo conhecimentos práticos sobre a melhoria da gestão de projectos em ambientes turbulentos.

Palavras-chave: Agile, Scrum, VUCA, Volatilidade, Incerteza, Complexidade, Ambiguidade, Gestão de Projectos, Colaboração, Melhoria Contínua, Factores Críticos de Sucesso, Método Gioia, Flexibilidade, Comunicação, Confiança, Abordagem Iterativa, Valor para as Partes Interessadas, Satisfação do Cliente, Indicadores-Chave de Desempenho, Adaptabilidade, Colaboração da Equipa, Transparência

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List of Abbreviations

Abbreviation	Full word
CSF	Critical Success Factor
KPI	Key Performance Indicatior
APM	Agile Project Management
VUCA	Volatility; Uncertainty; Complexity; Ambiguity
PM	Project Management
PO	Product Owner
SM	Scrum Master

1. Introduction

Prediction of the future is impossible. Not being able to know what the future brings, but having to plan for it is a challenge for project managers. They use a variety of tactics, such as risk management, decision milestones, and sequential iteration, but projects frequently experience schedule delays, budget overruns, compromised requirements, or even failure (De Meyer et al., 2002). Efficient project management needs a more complex method of handling challenges that goes beyond traditional project management approaches, which do not include the possibility to change plans frequently (Atkinson et al., 2006). To get out of a reactive mindset and enhance organizations' capacity to deal with change, they need to adopt a more proactive and adaptable approach to project management. Handling difficult situations and having knowledge of Agile methodologies were previously identified as weaknesses in project managers' skill sets. There is now a growing recognition of their importance (KPMG, 2023). Recognizing and effectively addressing these factors that may undermine organizational performance becomes increasingly difficult. The work environment is changing as the age of digital transformation dawns, implying that project managers should adapt to a volatile, uncertain, complex, and ambiguous (VUCA) environment (Bennett & Lemoine, 2014). APM includes dynamic responses and flexibility regarding changes. This research is tackling the issue of managing VUCA challenges within projects and has potential to offer project managers and organizations insights and solutions into how to effectively use Scrum Methods in APM when facing those challenges.

The motivation behind this study arises from the need to respond to constant volatility, uncertainty, complexity, and ambiguity in a business environment that is unpredictable. As traditional project management struggles to address these issues, it will focus on Agile methodology. Several methodologies such as Scrum, which are promoted by the agile mindset are developed and used to lower project risks (Anes et al., 2020). Scrum is the most used agile approach (State of Agile, 2022; Balaban & Đurašković, 2021). A trend was discovered that with an increase from 58% in the 14th survey to 87% in the most recent study, Scrum has maintained its dominance of most used Agile methodologies over the last three years of the survey (State of Agile, 2022). As this approach is becoming more popular, it motivates to figure out how Scrum can contribute to deal with VUCA challenges.

The objective of this research is to investigate how Scrum within APM can contribute to tackling VUCA challenges. By identifying strategies that project managers can use to

mitigate risks, the impact of Scrum on the projects' success can be assessed. Based on literature and qualitative data collection recommendations for project managers will be provided. Within the scope of this research the focus is on Agile and Scrum principles in regard to project management. It primarily concentrates on how these concepts can be applied to encompass changes within a project caused by unforeseen challenges.

The methodology follows inductive research, by collecting qualitative data from one-to-one in-depth expert interviews after having reviewed literature.

The research is based on a comprehensive literature review where the VUCA model is explained, Scrum is presented and the role of APM when facing challenges is investigated. Conducting qualitative research with expert interviews, strategies and best practices will be uncovered allowing for a comparative analysis and aiming to provide recommendations.

2. Research Methodology

This section describes the research methodology employed for investigating the usefulness of Scrum in APM when facing VUCA challenges. A qualitative, exploratory methodology was applied in this study, with a focus on expert interviews. It includes a comprehensive literature review, followed by interviews to gather insights from experts using Scrum and Agile methodologies. The aim is to establish understanding of how Scrum can be used to face challenges such as volatility, uncertainty, complexity and ambiguity in projects and what the critical success factors in APM application when facing those challenges are. As a result, a thorough evaluation of the research goal informs the choice of technique and allows for a detailed examination of current knowledge. This chapter outlines the procedures employed for selecting, recruiting, and conducting expert interviews along with the description of analyzing the results.

2.1. Qualitative Data Collection

2.1.1. Qualitative Research Approach

When deciding whether to choose quantitative, qualitative or a mixed-method approach, one should consider the research objective to select a suitable method (Hair et al., 2020). In the case of this research, a qualitative research approach is selected as the human application of a method, in this case Scrum and APM, and their experience with it is crucial and based on non-numerical data. Qualitative research is being described as "the classification and interpretation

of linguistic (or visual) material to make statements about implicit and explicit dimensions and structures of meaning-making in the material and what is represented in it" (Flick, 2014). "Qualitative research is discovery oriented, with analysts using the data collected to generate ideas and theories, and it is therefore based on inductive reasoning " (Hair et al., 2020). It aims to deliver in-depth insights on the research topic, whereas quantitative research produces general statistical outcomes (Hair et al., 2020). This research does not include quantitative analysis as the topic "does not lend itself to precise quantification" (Hair et al., 2020). Whereas a lot of literature on APM and Scrum in general is available, the literature specifically focusing on how Scrum can assist in dealing with VUCA challenges is scarce. Therefore, this research gap has led to the intent to understand the impact Scrum has when facing challenges in an APM context. This way, qualitative findings support the generation of deeper insights and the ability to classify the findings for better understanding.

2.1.2. Expert Interviews

Expert interviews serve as the cornerstone of data collection, providing a platform for in-depth exploration of the insights and experiences of professionals well-versed in Agile methodologies. This approach ensures a comprehensive understanding of the practical challenges and strategies related to APM.

Expert interviews form the basis for the data collection strategy, offering a platform to dive deeply into the insights and experiences of professionals well-versed in Agile methodologies. In general, all criteria are chosen to contribute towards closing the research gap and answering the research questions. In assembling a diverse and suitable participant sample, various strategic search methods were employed. These included tapping into professional networks, leveraging LinkedIn connections, and adopting the snowball sampling technique. Participants were specifically selected based on their expertise in APM using Scrum, employing snowball sampling as a non-probability method rooted in personal networks and professional connections. Additional participants were recruited through referrals, expanding the sample size and diversifying perspectives. In the data collection section below, the snowball sampling method will be elaborated on. To ensure expertise required to answer the research question, all selected experts had to fulfil the following three criteria: (1) they should have experience as a project manager; (2) they should have applied or supervised an Agile or Scrum Method; (3) they should have worked in a changing business environment. Table 1 provides an overview of the industry they operate in, the years of project management (PM) experience and the main

role they have taken within Agile or Scrum. One needs to be aware of constraints on time and resources leading to a limited number of 13 interviewees, nonetheless, recurring themes within certain relevant categories could be identified.

ID	Industry	PM experience	Main Aglie / Scrum Experience
I1	Construction	> 10 years	Agile Coach
I2	FMCG	> 15 years	Scrum Master; Product Owner
I3	Textile	> 5 years	Scrum Master
I4	Construction	> 20 years	Agile-Scrum Coach; Scrum Master, Product Owner
I5	Manufaturing	> 10 years	Leading Teams that apply Scrum
I6	FMCG	> 10 years	Agile Application in Projects
I7	Food	> 5 years	Agile Transformation
I8	Technology	> 10 years	Scrum Master
I9	Pharma	> 15 years	Scrum Master; Agile Project Management
I10	FMCG	> 5 years	Scrum Master; Product Owner
I11	Manufacturing	> 10 years	Agile Application in Projects
I12	Consulting	> 5 years	Coach; Scrum Master, Product Owner
I13	FMCG	> 15 years	Transformation Coach; Scrum Master

Table 1: Overview of Expert-Interviewees

2.1.3. Sampling Strategy

Snowball sampling is referred to as “a random sample of individuals is drawn from a given finite population” (Goodman, 1961). Also known as a referral sample, this technique starts by using probability-based approaches to choose respondents, which then help to identify other members of the target population (Hair et al., 2020). The sampling strategy is integral to capturing diverse perspectives within the realm of APM. A non-probability sampling technique, specifically convenience sampling and snowball sampling, is applied to identify experts with varied roles, experiences, and geographical locations. This approach is particularly suitable for exploratory research, ensuring a quick and effective data collection process. Due to the rather limited timeframe to conduct this study, the researcher’s fertile network was used to find suitable experts that are available to be an interview partner. While recognizing the potential biases introduced by snowball sampling, such as participants sharing common perspectives, this method was instrumental in extending the range of experts.

2.1.4. Semi-Structured, In-Depth Interviews

Qualitative research was gathered by semi-structured, one-to-one interviews with experts from different industries. The semi-structured interview format is employed to strike a balance between flexibility and structure during data collection. The interview protocol is meticulously designed to cover key topics systematically, allowing for depth in responses while maintaining consistency across interviews (Hair et al., 2020). Engaging with each respondent directly was achieved through in-depth interviews. To be precise, semi-structured interviews were conducted, in which a list of predetermined questions is provided, enabling the investigation of particular questions in depth (Queirós et al., 2017). In the case of this study, the interview questionnaire was prepared in advance in form of a list of questions which has been created based on the literature review and the objective of answering the research question. Semi-structured interviews consist of main themes and additional follow-up questions (Kallio et al., 2016). Therefore, during the interviews the order was adapted according to the answers of the respondents as well as additional questions were asked to react to opinions and clarify answers. The interaction is important to deepen the understanding of how challenges in agile projects are navigated.

On the opposite side, semi-structured interviews also include disadvantages. One critique is that the generated findings have a low level of generalizability and the selection of participants may cause biases (Queirós et al., 2017). However, the method has been selected with the aim of semi-structured interviews to capture retrospective and real-world phenomena (Gioia et al., 2013).

2.1.4. Interview Protocol and Process

The online interviews took place in English and German via Microsoft Teams video-calls. All interviews had a length of 25 to 35 minutes and were recorded to ensure not to miss out on information. The qualitative research approach allows for exploration of data to understand the experiences of practitioners of APM and Scrum, which enables an in-depth evaluation of practices. Furthermore, the objective to build a holistic understanding of the use of APM and Scrum is addressed by gaining insights from users of these methods.

2.2. Data Analysis

After the data in form of interviews has been collected, textual data needs to be coded by developing themes and categories (Hair et al., 2020). This chapter focuses on the data analysis process proposed by Gioia et al. (2013) to employ the qualitative content analysis methodology. This robust approach was chosen to establish a profound foundation for analyzing the impact Scrum has on dealing with a VUCA environment.

2.2.1. Gioia Methodology

Gioia's systematic approach involves the iterative development of a category system, reducing categories, and developing themes and dimensions. This method facilitates a deeper understanding of the research topic, ultimately leading to the creation of a grounded theory. The structured nature of this approach not only organizes the data effectively but significantly enhances the transparency of the research process (Gioia et al., 2013). Moreover, Gioia's framework is well-suited for inductive research, allowing researchers to follow the lead of experts and explore new concepts. The inductive approach was adopted to align with the exploratory nature of the research questions, remaining open to unexpected findings not initially anticipated. Overall, the Gioia methodology contributes to a comprehensive analysis of qualitative data (Gioia et al., 2013), enhancing the understanding of Scrum practices when facing challenges in an APM environment.

2.2.2. Data Analysis Process

Moving to the data analysis process, the first step involves transcribing the semi-structured interviews to create a textual database for subsequent analysis. The recordings are transcribed using the program "Transcriptor". Manual review and editing were conducted to fix mistakes made by the program to ensure reliability of the qualitative findings. In the following step, transcripts undergo screening to identify a broad range of expert terms, codes, and categories, forming first-order categories. The initial stage involves open coding, breaking down the data into smaller units based on content, and deriving first-order concepts directly from participants' wording (Gioia et al., 2013). This collection process is systematically documented in an extensive Excel spreadsheet. The screening identifies initial overall clusters, such as Scrum benefits, Scrum Teams, Scrum Events, CSFs, Key Performance Indicators

(KPIs), and the relationship of Scrum methods to the VUCA Model, which are further subdivided and specified. The second step, groups the relationship between first-order concepts into broader themes, offering a more abstract formulation (Gioia et al., 2013). These second-order themes are identified, but continually refined by navigating between data, themes, concepts, and the overarching research topic, ensuring grounding and alignment. In the final step, these second-order themes are distilled further to construct aggregated dimensions. These aggregated dimensions illustrate the high-level concepts of the data and form the basis for developing a theoretical model that contributes to the theory in the researched area (Gioia et al., 2013).

This structured approach ensures that the analysis remains rooted in the collected data, increasing the likelihood of discovering meaningful patterns and relationships while contributing to the theoretical understanding of the subject. “Table 3” (Appendix) and the summary in “Table 2” provide a visual representation of the analytical process. This table serves as a guide for readers to comprehend the origin of the synthesized findings within the data.

To conclude briefly, desk research allowed analyzing the current state of APM and Scrum. To gather information on gaps between desk research and literature, semi-structured, one-to-one interviews were conducted. Recorded interviews were transcribed and analyzed using the Gioia Method. By taking validity and reliability factors into account, the research approach attempts to maintain the integrity of the study.

3. Research Questions

RQ1: What are the critical success factors to address VUCA challenges with Agile Project management?

RQ2: How does the integration of Scrum enhance a project manager’s ability to address and navigate the challenges posed by the VUCA model?

Hypothesis 1: Adoption of Agile methodologies, such as Scrum, positively correlates with a project manager’s ability to adapt to changing business environments.

Hypothesis 2: Scrum application in APM is effective in addressing the four challenges presented by the VUCA Model: Volatility, Uncertainty, Complexity, and Ambiguity.

4. Literature Review

The focus of this literature review is to examine and analyze the use and effectiveness of Scrum when facing VUCA challenges. To structure this review, several topics have been identified, including the VUCA Model, APM, and Scrum as one of many Agile methodologies. Firstly, VUCA will be defined and explained. Thereafter, APM will be defined in the context of changing environments. Further, the review aims to provide an analysis of the contributions of Scrum in responding to challenges within Agile projects.

4.1.1. VUCA concept and definition

The basis of VUCA is to capture the volatile, uncertain, complex, and ambiguous nature of the world since the end of the Cold War (Kingsinger & Walch, 2012). What is "VUCA"? – Social scientists at the U.S. Army War College developed this acronym to describe potential future operational environments for their students (Baran & Woznyj, n.d.). While the acronym itself emerged in the 1990s, it was not until the September 11th terrorist attacks that both concept and acronym became widely known. Afterwards VUCA was adopted by strategic business leaders as a way of expressing the turbulent and rapidly changing business landscape now called "new normal" (Lawrence, 2013).

It is argued by Bennett and Lemoine (2014) that the combination of four factors collectively known as VUCA – Volatility, Uncertainty, Complexity, and Ambiguity, characterizes the nature of some problematic environmental conditions for organizations. To be able to manage processes competently it is crucial to understand these factors and methods of reducing their impact (Bennett & Lemoine, 2014). The authors propose a guideline to identify and respond to events generated by the four factors of VUCA, which will be elaborated on in the next section about navigating VUCA challenges in projects. Lawrence (2013) defines VUCA challenges in relation to today's dynamic world which have been widely adopted across different organizational contexts as a means of describing a business environment. Taskan et al. (2022) provided key terms associated with each aspect of the VUCA framework in brief from their literature review. The study delves into diverse definitions of VUCA found in selected literature while identifying various constructs underlying the acronym. The following section examines those dimensions according to these three studies on volatility, uncertainty, complexity and ambiguity.

Volatility is characterized by a relatively transient state of unstable change, where information is present but the situation is marked by frequent and sometimes unpredictable shifts. These include complexity, critical knowledge gaps, doubt about outcomes of critical events (Bennett & Lemoine, 2014). Also in terms of most frequently used term associated with volatility, according to Taskan et al. (2022), it is arising out of the notions of changeability, uncertainty, dynamism and instability. Furthermore, there are other terms such as nature, speed, volume, magnitude and dynamics of change that Lawrence (2013) uses to describe volatility.

Uncertainty indicates lack of knowledge on whether an event will lead to significant consequences with an understanding of cause-and-effect but unsureness about whether the event is capable of bringing about meaningful changes. It does not feature sudden changes in magnitude as opposed to volatility (Bennett & Lemoine, 2014). Additionally, uncertainty relates closely to unpredictability, lack of information, and unknowns (Taskan et al., 2022). Similarly Lawrence (2013) refers to it as issues' unpredicatability. The idea of uncertainty in projects emphasizes how they involve adjustments, resource allocation within limitations, and the significance of specific goals (Chapman & Ward, 2003).

Complexity is characterised by several parts, which are interrelated to form a complicated network of information and processes, sometimes multiform and tortuous, but not necessarily changing (Bennett & Lemoine, 2014). Complexity is a combination of many factors, relationships between them, confounding variables, chaos and confusion (Taskan et al., 2022). This is consistent with the definition of complexity as the messy interplay of things and surrounding chaos in an organization (Lawrence, 2013). Therefore a complex situation requires an appropriate response that demonstrates the danger of not comprehending and defining precisely what an organization's challenges are.

Ambiguity refers to a lack of knowledge about "the basic rules of the game", whereby cause-and-effect relationships are unknown and no precedent exists for prediction. It is different from uncertainty because it involves doubting causality (Bennett & Lemoine, 2014). Ambiguity relates to an inability to understand and interpret things based on inadequate clarity, lots of interpretations, doubt, and other distracting factors (Taskan et al., 2022). It also implies a lack of clearness or mixed meanings in situations or conditions (Lawrence, 2013).

The authors show how each construct has some distinct meaning without overlapping them so that managers operating under difficult situations can be more precise. The visual representation reveals that volatility generally has a strong direct link with change while uncertainty mostly deals with unpredictability of events; complexity has many components that

interact with each other extensively and a lot; ambiguity is characterized by the difficulty of understanding or interpreting the meaning of events, sometimes due to lack of clarity or multiple interpretations (Taskan et al., 2022).

4.1.2. Navigating VUCA Challenges in Projects

One possible general strategy for dealing with VUCA challenges involves developing organizational agility, which is defined as the ability of an individual, team, or organization to quickly sense and respond to change (Baran & Woznyj, n.d.). Yarger (2006) emphasizes "the role of the strategist is to exercise influence over the volatility, manage the uncertainty, simplify the complexity, and resolve the ambiguity, all in terms favorable to the interests of the state and in compliance with policy guidance." Therefore, the secret to dealing with any component of VUCA, is understanding the opportunities and threats inherent in the situation.
In the following it is investigated how to navigate the four VUCA challenges in a project environment.

Handling volatility requires agility, which involves aggressively directing resources to build slack and create future flexibility (Bennett & Lemoine, 2014). Referring to flexibility another research suggests a flexible project model, which is meant to ensure the project remains manageable and delivers business value despite volatility. Volatility requires a different approach to projects, one that puts project managers and business managers in control (DeCarlo, 2004).

Addressing uncertainty involves obtaining information as much as possible and beyond existing sources to collect new perspectives and data (Bennett & Lemoine, 2014). Also, the idea of uncertainty in projects emphasizes how they involve adjustments, resource allocation within limitations, and the significance of specific goals. Planning, coordination, setting milestones, and changing control are all examples of effective project management techniques that address managing uncertainty. However, a lot of project management tools do not examine how uncertainty management might be more thoroughly included into projects to achieve better results (Chapman & Ward, 2003). Alternative project management approaches like "lean" or "agile", which emphasize adaptability, collaboration, and the understanding that plans are intrinsically imperfect owing to external influences, have evolved in response to uncertainty (Cicmil et al., 2006).

Bennett & Lemoine (2014) argue that restructuring internal operations to match external complexity is the best way to handle it. In addition, project complexity needs integration via

coordination, communication and control (Baccarini, 1996). Another study recommends more emphasis on facilitating and supporting continuous change towards creative and critical reflection, a self-organized networking, virtual and cross-cultural communication, self-knowledge growth, teaming with others aimed at increasing performance by encouraging the development of high-performing teams (Thomas & Mengel, 2008).

Reducing such ambiguity is more about experimentation than having slack resources, gathering information or reorganizing. Therefore, intelligent experimentation helps firm leaders determine beneficial strategies in situations where traditional business rules no longer apply (Bennett & Lemoine, 2014). Moreover, for successful project management, it necessitates taking charge of all such ambiguous aspects such as resources, schedules, roles, responsibilities, objectives, priorities, key stakeholders' relationships, communication as well as other conditions leading to ambiguity (Hagen & Park, 2013). Another study suggests that ambiguity acceptance should be practiced by project managers. This consists of being flexible, having leadership qualities such as motivational skills and directing others, problem solving and innovative thinking, as well as confidence learned over the years (Gray & Ulbrich, 2017).

Suggestions on how to deal with VUCA challenges, include key words that are related to agility. However, the suggestion is generalized and can be applied in project management. Therefore, the aim of this study is to investigate whether there is a positive relationship between APM and management of VUCA challenges.

RQ1: What are the critical success factors to address VUCA challenges with Agile Project management?

The literature review continues with a definition and explanation of the APM concept, with a focus on a constantly changing environment.

4.2. Agile Project Management

The word "agile" as an adjective is defined as being "able to move your body quickly and easily" or "to think quickly and clearly" (Cambridge Dictionary, 2023). However, in a business context, agile means dealing "with new situations or changes quickly and successfully" (Cambridge Dictionary, 2023). "Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements" (Project Management Institute, 2004). The project management procedures of "initiating, planning, executing, monitoring and controlling, and closing" are applied and integrated to

complete a project, which the project manager is in charge of (Project Management Institute, 2004). Linking agile to a project management approach, APM "is an iterative approach to planning and guiding project processes. It breaks project processes down into smaller cycles called sprints, or iterations" (Gillis, 2023).

The Agile Manifesto, which was put forth by 17 software developers in 2001 to effectively meet client needs and specifications, is where the agile philosophy began. It claims that the best approaches to design software will be discovered via practice and assistance from others. The fundamental goal with this strategy is to stay in regular contact with clients throughout the planning and execution of projects in order to prevent rework, unanticipated delays, extra expenses, and dissatisfaction of customers (Beck, K., et al., 2001).

Value is added by emphasizing certain values over others: "Individuals and interactions over processes and tools", "working software over comprehensive documentation", "customer collaboration over contract negotiation", "responding to change over following a plan" (Beck, K., et al., 2001). The latest will be focused on within this research. It links to one of the 12 principles of the agile manifesto, which includes that even late in the development process, changing needs are accepted. Agile methodologies embrace change for the benefit of the customer's competitiveness (Beck, K., et al., 2001).

According to Chin (2004), APM can be perceived as a new foundational component that assists in supporting additions of the traditional project management so that its users can manage projects more successfully in an environment of uncertainty. A consistent finding in the literature is, that although the Agile methodology has its origins in the software development sector, it has proven to be effective in other sectors (Balaban & Đurašković, 2021). Various industries have adopted the successful Agile approach as part of their project management (Anes et al., 2020). Agile methodologies were first concentrated on creating software incrementally and step-by-step, as it is a technique for handling change. Research on agile transformation presents that 77% of respondents use Agile principles and practices in their business units, which shows that Agile is being adopted outside of IT areas (KPMG, 2019). However, not all problems can be addressed with agility, therefore, organizations must specify what they aim to accomplish (Balaban & Đurašković, 2021).

4.2.1. Importance of APM in Changing Environments

The following section covers the effect changing environments have on projects and examines to what extend APM can help tackling issues resulting from it.

Often the effective planning horizon is constrained by the increasingly dynamic nature of projects and corporate contexts. Therefore, in APM the focus is shifted from planning to execution. Important choices that affect the projects' success or failure are made during project execution. This does not suggest project planning to be abandoned, rather, the emphasis will change from making all decisions beforehand to supporting those made during the course of the project (Chin, 2004). These findings are similar to the ones of other researchers. These days, projects must be handled in a complex setting with quick and frequent changes to the environment, tools, and methodologies. Agile projects help manage changes and high risk caused by numerous changes in technologies, consumer demand, environments, or procedures (Elkhatib et al., 2022). It is argued that traditional approaches must be restructured to create an innovative framework that rethinks the definition of projects and planning activities assisting the project execution (Chin, 2004). Such as this finding, several studies have consistently shown, that the recognition for APM has grown as conventional approaches are more limited. This is further supported through an extensive literature review by Balaban and Đurašković (2021), which concludes that the required objectives of innovative initiatives are frequently not met by the conventional project management techniques. Therefore, APM techniques are increasingly used because they give businesses more flexibility to adjust to rapidly changing surroundings (Balaban & Đurašković, 2021). Even earlier studies have recognized the need for more flexibility. According to research undertaken between 2008 and 2009, the demand for responsive and adaptable project management that can handle complex and unpredictable projects has increased. This has led to further development of agile practices, including project management (Fernandez & Fernandez, 2009). Chin (2004) and Fernandez and Fernandez (2009) share the opinion that businesses and especially project managers benefit from more flexible approaches in projects. One states, companies that are forward-thinking today and, in the future, understand how important it is to push the limits of project management. The project managers behind these innovative initiatives are aware that their initiatives go against standard project management expertise (Chin, 2004). Additional research shows, alternative project management methods are especially needed in a highly volatile environment with imprecise goals and uncertain solutions. Project managers perceive the effort to adapt to APM methodologies and develop a flexible and adaptable way of working as a good investment (Fernandez & Fernandez, 2009.). Project management must evolve into a useful tool that aids organizations in achieving their goals so that it is not just a theoretical practice (Chin, 2004). The success of a project depends on how well the project management technique

is matched to the project. Nonetheless, deciding to be "agile" once may not be enough for the organization or even for the duration of a certain project (Fernandez & Fernandez, 2009).

Other advantages are displayed by the 16th State of Agile Report (2022) which demonstrates research findings representing a variety of small, medium, and large corporations including 3.220 respondents. When surveyed about how Agile practices are evaluated, over 50% of respondents answered that speeding time to market is the top priority. Also, one major advantage is being able to move rapidly while retaining predictability (State of Agile, 2022). In another research, over 120 respondents from 17 different countries participated in the European study performed by KPMG in 2019. When given the choice of three primary drivers for agility, researchers discovered that 68% of businesses viewed faster product delivery that was adjusted to shifting consumer needs as the primary driver. According to 45% of respondents, moving towards agility was mostly motivated by greater flexibility. The Agile manner of working requires a greater ability to adapt when faced with change, which is becoming increasingly important to prevent becoming obsolete (KPMG, 2019). Due to higher success rates for project development, Agile methodologies have gained popularity in recent years compared to structured design methodologies (Alqudah & Razali, 2017). The research uncovered important elements including "the nature of the project, development team skills, project constraints, organizational culture and customer involvement" (Alqudah & Razali, 2017) that project managers may use to choose the optimal Agile method for their needs, lowering project costs and risk of failure in the process.

4.3. Agile Methodology – Scrum

Having laid the foundation of APM and the VUCA model, the focus will now lie on the Scrum as one of the Agile methodologies.

4.3.1 Scrum Theory

Scrum divides an organization into cross-functional teams that organize themselves. The work is broken down into a list of specific deliverables, which are then given a relative effort estimate and given a priority. Scrum uses brief, predetermined iterations that last one to four weeks on average. Information gathered from reviewing the release after each iteration allows to continuously improve the release strategy and priorities. Scrum includes frequent retrospectives to better optimize the process. The methodology uses small teams who work for

shorter periods of time on more achievable tasks rather than a big group working on a big project for a long time (Kniberg & Skarin, 2010).

Scrum is also described as process tools, that give directions on how work is organized. Utilizing the appropriate set of methods and tools suitable for one's situation or project is important to decide on. The Scrum methodology is built on time-boxed iterations in which the team completes work on a predetermined set of items, presents the outcomes, and conducts a retrospective to analyze the process. The pace of the team's work is established by this iteration cycle. As an alternative, it concentrates on limiting work in progress (WIP) at different workflow states. Planning, process improvement, and work release can all be scheduled as needed or done whenever the team decides. Essentially, the authors emphasize how flexible process tools like Scrum can be tailored to meet the unique requirements of a team or project, offering a framework for efficient project management while allowing for flexibility and continuous improvement (Kniberg & Skarin, 2010). Placing this in the context of today's environment where VUCA challenges impact businesses, this research aims to answer the following research question:

RQ2: How does the integration of Scrum enhance a project manager's ability to address and navigate the challenges posed by the VUCA model?

Before collecting information from interviews, Scrum will be explained focusing on its events and team structure.

In 2016, Sutherland and Schwaber published the Scrum Guide, in which they define Scrum as "a framework within which people can address complex adaptive problems, while productively and creatively delivering products of the highest possible value". Scrum is based on empirical process control theory, emphasizing that knowledge is gained through experience. It uses an iterative, incremental approach to enhance predictability and manage risk. The core principles of this approach involve three pillars: transparency, inspection, and adaptation. Regarding transparency, it needs to be ensured that everyone can see and understand the important parts of the process, which means using the same language and defining the status "Done". The second principle inspection includes to check Scrum work and progress regularly, but not too often, to find problems. Skilled inspectors should do this where the work happens. Adaptation is referred to if deviations outside acceptable limits are detected during inspection and the resulting product will be unacceptable, adjustments to the process or materials must be made quickly to minimize further deviations. Scrum includes four formal events for inspection

and adaptation: Sprint Planning, Daily Scrum, Sprint Review, and Sprint Retrospective (Sutherland & Schwaber, 2016).

4.3.2. Scrum Team

The Scrum Team includes a Product Owner, a Scrum Master and a Development Team.

Firstly, the Product Owner is in charge of determining and prioritizing tasks and verifying that the work to be done. The work to be done is referred to as the Product Backlog and its prioritization is in line with the project's or product's main goals. The Product Owner must decide which features are necessary, communicate the vision to the Development Team and other stakeholders, and be accessible to respond to inquiries and offer clarifications. As the primary decision-maker, the Product Owner makes sure the team is focusing on the most important tasks (Sutherland & Schwarber, 2016).

Secondly, the Scrum Master supports the Product Owner in grasping agile concepts, effectively managing the backlog, and clearly defining items. The Product Owner and the Development Team receive coaching and facilitation from the Scrum Master. The Scrum Master assists the Development Team in self-organization, removes obstacles from their work, and makes sure Scrum events work without any problems. In addition, the Scrum Master is essential in planning Scrum implementations, encouraging Scrum adoption across the company, and promoting improvements to boost team output (Sutherland & Schwaber, 2016).

Thirdly, the Development Team is in charge of executing the project or product. They are cross-functional, which means they possess all the abilities required to finish the duties, and self-organizing, which means they choose how to complete the work. The team collaborates to produce possibly shippable product increments in brief intervals, which are known as sprints and keeps improving their processes (Sutherland & Schwaber, 2016).

4.3.3. Scrum Events

The sprint is a time-boxed, one-month-long or shorter process that results in a "Done", useable product increment. It includes development work, sprint planning, daily scrums, sprint reviews, and sprint retrospectives. No adjustments are made during the sprint that could compromise the Sprint Goal, and the quality targets cannot drop (Sutherland & Schwaber, 2016).

Regarding the termination of a sprint, if circumstances change to the point that the Sprint Goal is no longer relevant or makes sense, the sprint may be cancelled before it is completed.

Product backlog items that are finished undergoing review, work that may be released is approved, and unfinished items are estimated again (Sutherland & Schwaber, 2016).

Considering the sprint planning, the Scrum team collaborates to plan the work for the next sprint during a meeting known as “sprint planning”. It provides answers to questions regarding what can be completed in a sprint and how that work will be done. The group estimates its capabilities and establishes a Sprint Goal (Sutherland & Schwaber, 2016).

A Sprint Goal is established for the sprint that directs the efforts of the development team. It gives the team freedom in terms of the functionality implemented inside the Sprint, and they keep it in mind when developing to meet the target. The team works with the product owner to modify the sprint backlog as work deviates from the original plan (Sutherland & Schwaber, 2016).

In the Scrum framework, retrospectives serve as the primary mechanism for teams to concentrate on continuous improvement. Consequently, retrospectives offer Scrum teams a systematic approach to recognizing and addressing issues that affect team performance (Sutherland & Schwaber, 2016).

Conclusion

To conclude, this literature review has presented a comprehensive exploration of why APM and specifically Scrum can be beneficial for managing challenges. All of these research investigations contribute significantly to our understanding of how projects actually work and shed light on how project management practitioner development needs to evolve in order to take these project realities into account. By bringing together numerous previous research efforts from other sciences, this research contributes to the body of knowledge on uncertainty in project management. Generally, the need for flexibility is recognized and advantages of Agile methodologies have been proven. Additionally, literature has given insight on how Scrum can contribute to managing uncertainty. However, literature lacks in providing deeper understanding of how these methodologies can specifically be used to face VUCA challenges and which CSFs are needed in general. To elaborate on this, the analysis and result chapter has a focus on the two research questions.

5. Analysis and Results

Table 2: Thematic analysis summary of the interviews based on Gioia et al. (2013)

First-order Concepts	Second-order Themes	Aggregate Dimensions
Critical Success Factors		
Scrum pillars: transparency, inspection and adaptation Attitude to embrace change Freedom for variation Commitment to agile principles	Agile principles and mindset help to embrace change	(5.1.) CSFs: Achieving Success with an agile mindset to navigate change and foster collaboration to continuosly improve
Working on a small scale Iterative processes to respond to unforeseen challenges Constant review Iterative approach to adapt and prioritize	Iterative and adaptive approach to respond to unforeseen challenges	
Respect across all teams Teamwork Team building Trust and openness Personal responsibility A collaborative culture that values feedback "Low hanging fruits"	Team collaboration and trust by celebrating small results for motivation and respecting one another	
Culture of continous improvement Retrospectives Lesson learned	Creating an environment where issues can be addressed for continuous improvement	
Challenges turn into opportunities for advancements Pivot quickly and deliver faster Adjust priorieties Respond to market changes Flexible approach Testing to seek opportunities Changes add value	Flexibility to tackle challenges while seeking opportunities and faster delivery	
Transparency creates trust Flat hierarchy Embrace feedback Learn with time Open communication and coordination with Stakeholder	Transparency and communication to utilize employees best ability for success	
KPIs		
Customer Satisfaction Time to market	Customer Satisfaction and Time to Market as measurements of success	(5.2.) KPI's: Measuring customer satisfaction and stakeholder value to evaluate the effectiveness of agile projects
Stakeholder value Agile skills and development	Success is measured by the implementation of stakeholder value and the satisfaction expressed in sprint reviews.	

Scrum Teams		
Support Be approachable Mutual trust Manage product backlog Create clear picture by managing stakeholders Manageing and being aware of challenges	Product Owner's Role in establishing trust, manage stakeholders and the product backlog while being approachable for the development team.	(5.3.) Scrum Teams: The importance of trust, effective communication, obstacle removal, and collaborative implementation for the overall success and cohesion of Scrum teams when dealing with challenges
Remove obstacles for the team Make the team comfortable Provide feedback Facilitate communication Empower the team to work independently and self-organzised	Scrum Master's role in removing obstacles and facilitating communication.	
Implementation Contribution to value creation Input for evaluating changes in the Environment and effects on implementation escalate challenges	Development Team's role in implementation, with each member contributing to evaluating changes and value creation.	
Scrum Events		
Daily Scrum for alignment Daily Scrum to inspect the plan and to create transparency Daily Scrum for reorientation and coordination Daily Scrum to ensure synchronization	Daily Scrum for regular alignment, reorientation and synchronisation.	(5.4.) Scrum Events: Scrum events give structure for continous improvement when facing challenges by interconnectedness of alignment, synchronization, transparency, and feedback
Sprint planning to manage the backlog and create structure Sprint planning to prioritise Sprint planning to take countermeasures	Sprint planning to act against challenges, prioritise and structure.	
Retrospectives facilitates continuous Improvement by addressing uncertainties and challenges encountered during the Sprint Retrospectives to develop action items to be solved during sprints Retrospectives for team development	Retrospectives for continous improvement within the team and the process.	
Sprint review for motivation to constantly deliver Sprint review increases project predictability Sprint review decreases uncertainty, increases transparency, include everyones ideas Sprint reviews for feedback from stakeholders Sprint reviews to manage changes	Sprint reviews to drive project success through motivation, transparency and inclusion of ideas and feedback.	
Learning and refinement gives insight into what the team can implement in the given iteration Combination of Scrum events assists in navigating challenges such as the VUCA challenges Teams can plan which Scrum events support them in which frequency	Customization of Scrum events based on needs to navigate challenges.	

Volatility		
Fail early and learn Embrace mistakes to continously improve Check changes in initial hypotheses	Embracing mistakes, learning from them, and acknowledging that not all efforts may yield positive results, but focus on continuous improvement.	(5.5.) Facing Volatility: Volatile project environments require the ability to learn from failures, adapt to changing conditions, and adjust capacity
Flexibility by reflecting the situation Standard events to react to market changes Refinement planning to adopt to changes Reassess priorities and make adjustments to stay flexible	Scrum's iterative and incremental approach aligns with volatile project environments, providing a structured rhythm and the ability to be flexible in unstable conditions.	
Capacity readjustment to react to challenges Stop resources with no impact on time Sprints to adjust capacities	Capacity can be readjusted to react to challenges in volatile conditions.	
Uncertainty		
Test and experimentation Flexibility and speed Experiment, reflect and learn	Testing solutions quickly to navigate uncertainties effectively.	(5.6.) Facing Uncertainty: Combining experimentation, effective coordination, communication, and a positive stance toward change within the context of uncertainty
Coordination and communication between PO and developers Scrum Master to keep disruptions away Time and power of PO to resolve issues Communicate with recipients of the benefits	Coordination and communication, particularly between the product owner and development team, are essential to cover uncertainties.	
Implement advancements in short cycles Sprint Review and Daily Scrum to continually validate and adjust Opportunity for advancement Scrum Master to keep disruptions away	Scrum embraces uncertainty for new opportunities to implement in cycles.	
Complexity		
Transparency through Scrum events Divide whole project into smaller parts Slicing and prioritising Breakdown of complex projects into managable components	Breaking down complexity into smaller, digestible pieces and visualize work to create transparency.	(5.7.) Facing Complexity: Breaking down complex tasks, adapting and using an iterative approach to navigate complexity with Scrum
Use Scrum toolbox based on needs Test and experimentation Small, cross-functional teams Refine and prioritise product backlog during sprint planning Learn from previous experience Define scope at beginning of project and sprints and remain adaptable	Scrum provides adaptability, allowing teams to experiment, learn and adjust their approach based on evolving understanding.	
Iterative approach to manage complexity step by step Short cycles to adjust each sprint Regualar reviews to incorporate new findings Regular reviews to check if objectives have been achieved Regular stakeholder exchange to get new information	Scrum encourages an iterative approach to tackle complexity, emphasizing short cycles, regular reviews, and interactions with stakeholders to adjust and incorporate new findings.	

Ambiguity		
Use Scrum events to communicate and visualise goals Create common understanding in each sprint Collaborative and interative approach helps Regular communication, feedback, and prioritisation Clear Scrum roles and responsiblilities	Clear roles and responsibilities to enhance collaboration and common understanding in navigating ambiguity.	(5.8.) Facing Ambiguity: Collective learning and role definition to tackle ambiguity
Learn from previous experience Learn from generated data Understand cause-and-effect relationship with planning	Learn from the past and understand relationships as much as possible.	

This analysis aims to answer RQ1 and RQ2 with insights from expert interviews. The results are extracted from "Table 2" (Appendix) focusing on the aggregate dimension to cluster the findings. "Table 1" above displays the summary of the first-order concepts, while displaying identical second-order themes and aggregate dimensions as in "Table 2".

5.1. CSFs: Achieving Success with an agile mindset to navigate change and foster collaboration to continuously improve

The interview findings underscore a strong alignment with Agile principles and a mindset geared towards embracing change within the project management context. First of all, a participant highlighted the pillars of Scrum – transparency, inspection, and adaptation – as fundamental components guiding the Scrum approach (I12). These pillars serve as a foundation for fostering an attitude that welcomes and adapt change (I4, I3, I13). Furthermore, the commitment to Agile principles was emphasized as a driving force behind the willingness to embrace change, emphasizing an agile attitude and iterative improvement (I3, I11, I13). The freedom for variation within the Agile framework emerged as another finding, providing teams with the flexibility needed to adapt to evolving project requirements (I2, I3, I10).

Another finding includes the iterative and adaptive approach to respond to unforeseen challenges. Interviewees mentioned that for working on a small scale it is crucial to take small steps and readjust plans, while maintaining an overview of which changes resulted in success (I1, I6, I12). Reviewing what has been worked on gives the chance to discuss further steps towards the goal (I2). In Scrum, the iterative approach allows changing the backlog and setting priorities (I3, I6).

Team collaboration and trust by celebrating small results for motivation and respecting one another has been identified as another CSF. Therefore, respect across all teams is crucial, as teamwork was constantly mentioned as important for success (I6). Team building and a trained leadership team are necessary to establish common grounds for open communication

and collaborative culture (I5, I6, I7, I11). Trust and openness should be created amongst the teams. This then leads to personal responsibility, where everyone feels responsible in being successful (I1, I2) and feedback is valued (I11). To motivate the team, working on so-called "low hanging fruits" can be a suitable approach to celebrate small achievements and make the goal more approachable (I9).

Another CSF is creating an environment where issues can be addressed for continuous improvement. A culture of continuous improvement is desirable. Retrospectives help to reflect, and a lot can be learned from past projects. This can be useful for following projects, where improvements can be applied (I1, I9, I11).

Flexibility to tackle challenges while seeking opportunities and faster delivery is additionally critical for success. When challenges arise, they can be seen as opportunities for advancements and opportunities for adding value (I3, I6, I9). This is because Agile methodologies allow to pivot quickly, deliver faster, and respond to market changes (I2, I6, I7). Interviewees have mentioned that in some cases they do not use the Scrum Framework fully but use the freedom of Scrum to adjust Agile methods for their needs, thus, rather use it as a toolkit and structure (I9, I10). In that sense flexibility is created, which is also achieved in relation to adjusting priorities (I6).

One last CSF that was emphasized is transparency and communication to utilize employee's best ability for success. Transparency creates trust and assists in managing expectations (I1). Flat hierarchies encourage people to share ideas and learn with time (I1, I3). Open communication, feedback and coordination with stakeholders is seen as an important aspect, especially when facing challenges (I1, I2, I4, I6, I11).

5.2. KPIs: Measuring customer satisfaction and stakeholder value to evaluate the effectiveness of agile projects

KPIs are useful tools for assessing the effectiveness of Agile projects. The main identified KPIs emphasizing their significance are measuring customer satisfaction, time-to-market, and stakeholder value.

Customer satisfaction is a primary KPI that emphasizes the importance of delivering end results that add value. In comparison to traditional approaches, APM's agility is attributed as contributing to faster outcomes. The measurement of customer satisfaction was suggested as a key evaluation criteria (I1, I3, I4, I9, I10). Time to market is another measurable KPI targeting prompt delivery of agreed features or solutions. The emphasis on faster delivery in Agile also implies relevance of timely project completion (I1).

Moreover, delivering stakeholder value is how success in Agile projects can be determined. Feedback on satisfaction expressed during sprint reviews becomes a real metric that agrees with Agile's focus on customer involvement and cooperation. Stakeholder value acts as a measurement of project achievement (I5). This goes in hand with KPIs related to agile maturity beyond traditional project measures, where the team's development of agile skills is measured during sprint reviews (I7).

5.3. Scrum Teams: The importance of trust, effective communication, obstacle removal, and collaborative implementation for the overall success and cohesion of Scrum teams when dealing with challenges

This section looks into the different roles of the Product Owner, Scrum Master, and Development Team pointing out how they contribute to the ultimate success and cohesion of Scrum teams when faced with challenges. A culture based on trust, open communication and proactive problem-solving makes Scrum teams well placed to tackle challenges and achieve project success.

Firstly, trust between the Product Owner and the Development Team emerges as a critical element for successful collaboration (I1). Moreover, it is emphasized that the Product Owner should be approachable as well as establish a good relationship with the team (I2, I10). In addition, effective communication including listening to the team's inputs is part of what makes an outstanding Product Owner (I2, I3, I10). The role of a Product Owner occurs in a feedback loop between customers' needs and project outcomes through which they act as key connectors between stakeholders and teams and are able to manage challenges that occur along the way (I3, I4, I10, I13). The Product Owner addresses challenges by prioritizing the product backlog and slices the project into smaller tasks (I2, I11).

Considering the Scrum Master's role, it was found that removing obstacles so that the team works optimally is crucial (I2, I3, I11). Their responsibility includes making a comfortable environment for their teams while facilitating communication among them and connecting relevant people in order to make sure that work goes on smoothly during project timelines (I11, I12, I13). Being able to give negative feedback when required is said to be one major function of the Scrum Master in promoting improvement within the team (I2, I10). Especially when dealing with unforeseen challenges the Scrum Master should ensure that there are no obstacles for the team to do their work. It may require talking to managers or other stakeholders to address issues, reprioritize and allocate resources appropriately (I3, I13).

Viewing the role of the Development Team, their main purpose is the implementation, where its members contribute their expertise to deal with uncertainties and adapt to changing circumstances (I2, I3, I5). The Scrum toolkit is a key ingredient of the team's success (I2, I10). As it implements changes in the environment, also reviewing those changes is another important duty of this team. While the Product Owner occupies some kind of high ground in this arrangement, they collaborate with the team when assessing how these changes would affect the implementation process, whereby every member of the team has a say in decision-making (I3, I5).

5.4. Scrum Events: Scrum events give structure for continuous improvement when facing challenges by interconnectedness of alignment, synchronization, transparency, and feedback

Daily Scrums have been identified as useful in challenging situations as they offer regular alignment, reorientation, and synchronization. When conditions have changed the daily meeting allows to inspect the plan and synchronize accordingly (I6, I12). Transparency is developed through the team members' daily alignment meetings, in which they gain insights into one another's work (I1, I6). This event has been highlighted for its role in keeping a reasonably accurate record of the team's activities, promoting coordination, and reorientation and fostering a collaborative environment (I1, I2, I3).

Sprint planning is one of the significant scrum events that enable planning of project timelines and objectives. It helps to set clear goals for the next sprint by deciding upon tasks, responsibilities, and deadlines. Realism in planning and prioritization is stressed as it helps anticipate possible problems and take countermeasures, so that they do not escalate out of proportion (I1, I11). The importance of sprint planning as a crucial event that clearly defines priorities based on stakeholder input has been acknowledged (I7, I11).

Moreover, sprint retrospectives help in dealing with challenges by encouraging continuous improvement within the team and the process. Retrospectives offer a safe place where feedback can take place hence promoting continuous improvement (I6, I11, I9). This approach allows the team develop, learn, and adapt as a whole, considering both positive and negative aspects (I3, I11, I9). Therefore, the aim is to have a concrete outcome of the retrospective (I2, I9).

Sprint reviews drive project success through motivation, transparency, and inclusion of ideas and feedback. The event improve predictability through alignment to help teams coordinate their efforts effectively (I6). The sprint review meeting has been emphasized as a

critical event for managing obstacles through immediate feedback. It forms valuable time for stakeholders to interact with teams whereby stakeholders can perceive evaluate and feedback on delivered features (I4, I7). This transparency is important in decision-making processes and enhances overall project management, where everyone is encouraged to share ideas (I4, I9).

In conclusion, these events are closely connected and arising challenges can be solved proactively.

The followings section (5.5. – 5.8.) presents findings specifically related to the VUCA Model aiming to answer RQ2. In exploring the challenges posed by the VUCA Model, qualitative research indicates that Scrum serves as an effective methodology for navigating and managing these.

5.5. Facing Volatility: Volatile project environments require the ability to learn from failures, adapt to changing conditions, and adjust capacity

Firstly, embracing mistakes, learning from them, and acknowledging that not all efforts may yield positive results is crucial while focusing on continuous improvement in a volatile project environment (I1). In other words, even if just some efforts lead to some partial success or failure (I1), teams are encouraged to extract insights. In this regard the retrospective can help in reviewing what went well, where improvement is needed, and what has changed from the initial hypothesis (I13).

Secondly, Scrum's iterative and incremental approach aligns with volatile project environments, providing a structured rhythm and the ability to be flexible in unstable conditions. Scrum's flexibility enables teams to adequately react to evolving conditions, providing a strategic advantage within volatile contexts (I2, I3, I6, I11). It is vital that projects are handled flexibly because volatile business conditions call for prompt response from team members (I3, I11).

Thirdly, volatility can be dealt with using capacity readjustment. Changing capacities because of challenges in the volatile project environment were underlined by the interviewees. By adjusting capacities due to changes in circumstances Scrum allows teams to deal with volatility and react to it effectively (I2, I5, I12). The short cycles not only facilitate regular reassessment of priorities but also are accepted by the project environment. For navigation through volatility effectively, Scrum avoids long-term commitments (I5).

Therefore, embracing failures for continuous improvement, utilizing Scrum's structured rhythm for flexibility, and adjusting capacities to meet challenges collectively contribute to Scrum's effectiveness in addressing volatility in project contexts.

5.6. Facing Uncertainty: Combining experimentation, effective coordination, communication, and a positive stance toward change within the context of uncertainty

Addressing uncertainty in project environments demands a multi-faceted approach as revealed by interview findings.

To start with, experimenting and testing solutions quickly are highlighted as essential practices (I1, I2, I3, I7). Some of the interviewees suggest that uncertainties provide chances for experimenting, iterating or pivoting when necessary. Proof of Concept (POC) and minimum viable product (MVP) approaches are said to be useful tools in handling uncertainties that enable teams to learn from experiences without investing much resource on unproven solutions (I2, I3, I7).

Another aspect regarding the handling of uncertainty is effective coordination and communication between the Product Owner and Development Team. The interviewees stress the need for constant communication to cover uncertainties (I2, I4, I13). The time availability of the Product Owner is deemed crucial, emphasizing the significance of these roles collaborating closely to address uncertainties effectively (I2). Participants underscore the importance of listening, being open to change, and embracing new ideas as essential elements in fostering effective communication and coordination in the face of uncertainty (I4). Within a sprint, the Scrum Master is tasked with keeping disruptions away from the team, emphasizing the need for a protective role in ensuring a focused and undisturbed work environment, even in the face of external uncertainties (I9).

Further to consider when facing uncertainty is seeing opportunities. Short cycles and continuous feedback loops allow teams to adapt and validate assumptions, turning uncertainty into a strategic advantage. The acceptance of uncertainties and the avoidance of rigid long-term planning assist those situations (I3, I5, I6, I9).

Scrum provides a robust framework for teams to adapt, learn, and see the positive side of uncertainties.

5.7. Facing Complexity: Breaking down complex tasks, adapting and using an iterative approach to navigate complexity with Scrum

First of all, the interviewees underscored that transparency can be promoted through Scrum. Transparency is achieved by visualizing work, breaking down complexity into smaller, digestible pieces, and prioritizing tasks through methods like the backlog. It is highlighted by participants that it supports cross-functional collaboration by simplifying tasks thereby making complexity transparent (I11). Also, encouraging teamwork while breaking down silos allows everyone to understand complex projects better (I11). The interviewees talk about slicing which involves visualizing work and breaking down complexity into manageable units. Scrum contributes towards transparency by transforming complex challenges into smaller digestible pieces (I1, I3, I6, I10, I11) thus facilitating more adaptable planning (I9, I11) and prioritize what is needed to be done (I3).

Secondly, Scrum provides adaptability, allowing teams to experiment, learn and adjust their approach based on evolving understanding. The interviews revealed a toolbox approach where Scrum allows the flexibility to address high complexity through experimentation and learning from experiences (I1, I2, I3). Participants emphasize the need for refining and prioritizing the product backlog during Sprint Planning so that important project elements are never left unaddressed. Sprints are used to change goals as requirements emerge or feedback comes in, which shows how adaptive Scrum is (I4, I6, I7, I10).

Lastly, to address complexity, an iterative approach is encouraged by Scrum with an emphasis on short cycles, regular review sessions and interactions with stakeholders to adjust for new learnings. The interviews underscore the commonality of an iterative approach among Agile methods particularly in dealing with complexity. The participants highlight the inefficiency of exhaustive upfront analysis in complex situations and demonstrate the importance of a step-by-step iterative process (I1, I3, I5). Scrum has been found to be especially effective at navigating the complexities of large projects within expanding industries (I10). Short cycles are iterative in nature and this becomes a crucial factor in managing complexity. Without them projects will never be finished or need to be stopped before time (I10).

5.8. Facing Ambiguity: Collective learning and role definition to tackle ambiguity

It is difficult to handle ambiguity in project environments as revealed by interview findings. This analysis covers two major topics: clear roles and responsibilities aimed at improving collaboration and a focus on learning from past experiences and understanding relationships as much as possible.

Scrum events are expected to help resolve ambiguity as they have defined goals for each event, where effective communication is critical both within and outside these events (I2). The interviews show how asking questions, visual aids, and keeping things clear are used to address ambiguities especially regarding the interaction with the Product Owner (I2). Scrum is regarded as an excellent way to align top management and executives. This methodology helps set up projects since it contains various aspects of stories, sprint, etc. that clearly define what should be done. The emphasis on clarity is seen as critical in handling ambiguity thus enabling all members of the team to have a common understanding about the project elements (I10). The Product Owner, Scrum Master, and Development Team play different roles that help bring clarity into project goals while facilitating communication making sure that implementation is done effectively. Even under trying conditions this structured approach proves relevant in managing ambiguity (I6).

The other factor to consider regarding ambiguity is to learn from the past and understand relationships as much as possible. Participants highlight the importance of leveraging past experiences especially when dealing with ambiguous situations (I7). Well-established experienced agile teams are considered important for navigating through ambiguous situations. According to I4, continuity of a consistent attitude even with unexpected challenges would help teams facing ambiguity. Scrum's collaborative emphasis and iterative approaches align with viable structures for handling ambiguity effectively.

6. General Discussion

The interview findings serve to enrich the theoretical concepts presented in the literature. The findings largely confirm what existing literature provided but develop a more detailed insight into real-world examples and applications, providing a more comprehensive and nuanced understanding of Agile's role in Project Management when facing challenges.

Interaction and focus on individuals as well as customer collaboration are stressed as vitally important by the Agile Manifesto (Beck, K., et al., 2001). This is reflected in the interviews where participants gave examples of teamwork, trust and open communication. In addition, participants mention instances such as team building, trained leadership, collaborative culture to support collaboration as found in the literature.

In a rapidly changing environment, continuous improvement is depicted as a major theme within the Agile Manifesto (Beck, K., et al., 2001). Some of the interviewees gave examples of organizations where a critical success factor was a culture of continuous learning. Mentioning retrospectives for reflection and learning from past projects is an instance of continuous improvement principles.

Agile methodologies are not only flexible but are also shown to be extendable beyond their software development origins (Balaban & Đurašković, 2021; Anes et al., 2020). Interviewees indicate that some participants do not follow the strictly Scrum framework, instead preferring instead taking a flexible approach tailored to their projects. Thus, this application corresponds with the insight provided by earlier studies when they argue that organizations should clarify their goals after adopting Agile methodologies (Balaban & Đurašković, 2021).

The Agile Manifesto emphasizes customer collaboration and advocates for openness in responding to change (Beck, K., et al., 2001). Critical success factors identified during interviews included transparency, open communication, and stakeholder coordination. It was noted by respondents that these factors fostered trust among them hence managing expectations becomes easier for all parties involved. Interviewees provided practical examples showing how these factors engender trust as well through predictability which aligns with literature's emphasis on collaboration and communication.

Agile methodologies enable quick responses to challenges and changes (Elkhatib et al., 2022; Balaban & Đurašković, 2021). This idea is also mentioned by participants who state that problems can be viewed as opportunities for advancement on an agile platform. These examples from interviews show that Agile methodologies allow quick pivoting and response to market changes as mentioned in the literature.

Literature refers to the State of Agile (2022) that prioritizes respondents' speeding time to market. The interviewees agreed that it is important to have faster delivery of products and adaptability to changing customer needs. They stressed the need for rapid movement while maintaining predictability consistent with accelerated delivery aspect of Agile methodologies.

The literature highlights the Product Owner's role in prioritizing tasks, maintaining a clear vision, and ensuring alignment with project goals (Sutherland & Schwaber, 2016). The interviews emphasized the importance of trust between the Product Owner and the Development Team. They highlighted the Product Owner‘s role in feedback loops, prioritization of the product backlog, and addressing challenges through effective communication.

The literature describes the Scrum Master's responsibility in assisting the team and facilitating coaching to the Product Owner and the Development Team (Sutherland & Schwaber, 2016). The interviews reinforced the role of the Scrum Master in obstacle removal, creating a comfortable environment, and also giving negative feedback when necessary.

Moreover, the literature emphasizes the cross-functional and self-organizing nature of the Development Team, responsible for executing the project and continuously improving processes (Sutherland & Schwaber, 2016). The interviews supported these points by highlighting the Development Team's focus on implementation, collaboration, and adaptability to changing circumstances. The Scrum toolkit is identified as a key factor in the team's success.

The literature provides theoretical background on the role of Scrum events. Scrum includes frequent retrospectives to better optimize the process (Kniberg & Skarin, 2010). This is in line with interviewees emphasis of retrospectives for continuous improvement within the team and the process. Generally, the interviewees stressed how Scrum events contribute to alignment, synchronization, transparency, and feedback within the team. Daily meetings are seen as crucial for mutual support, sprint planning for setting clear goals, sprint reviews for improving predictability, and retrospectives for continuous improvement.

Scrum uses brief, predetermined iterations that last one to four weeks on average. Information gathered from reviewing the release after each iteration allows to continuously improve the release strategy and priorities. Scrum includes frequent retrospectives to better optimize the process. The methodology uses small teams who work for shorter periods of time on more achievable tasks rather than a big group working on a big project for a long time (Kniberg & Skarin, 2010).

Overall, the theory and practice of Scrum teams and events aligns. Interviewees gave further insights on how these are used in challenging situations and stress the need to extract Agile and Scrum methods and adapt them as needed for the project.

The VUCA model, its individual components, and strategies for navigating VUCA challenges in projects, particularly through APM with a focus on Scrum methodology, is explained as part of the literature review. The subsequent interview findings shed light on how practitioners perceive and experience the application of Scrum in addressing VUCA challenges.

The importance of agility in dealing with volatility, advocating for flexibility, and directing resources is emphasized by two papers (Bennett & Lemoine, 2014; DeCarlo, 2004).

The interviews echoed the literature, highlighting the significance of learning from failures, embracing flexibility, and adjusting capacity as essential practices to navigate volatile project environments. Scrum's iterative and incremental approach was acknowledged as a key factor in providing flexibility.

Alternative project management approaches, which emphasize adaptability, collaboration, and the understanding that plans are impacted by external influences, have evolved in response to uncertainty (Cicmil et al., 2006). The interviews aligned with the literature, emphasizing the importance of experimentation, effective communication, and coordination. The practitioners also stressed the need for a positive attitude toward change and the ability to see opportunities in uncertainties. Scrum's short cycles and continuous feedback loops were identified as tools for adapting and validating assumptions.

Bennett & Lemoine (2014) argue that restructuring internal operations to handle complexity. Interviewees suggest breaking down complex tasks, promoting transparency, and using an iterative approach. Scrum uses brief, predetermined iterations that last one to four weeks on average (Kniberg & Skarin, 2010), which seem beneficial from interviewees point of view. In addition, project complexity needs integration via coordination, communication and control (Baccarini, 1996). In contrast, these factors were mentioned by interviewees regarding uncertainty. Instead, for complexity, they highlight Scrum's role in promoting transparency by visualizing work and breaking down complexity and allowing teams to experiment and adjust their approach.

Clear role definition, effective communication, and a focus on learning from past experiences were identified as strategies for handling ambiguity (Bennett & Lemoine, 2014; Hagen & Park, 2013; Gray & Ulbrich, 2017). The interviews reinforced the literature findings, emphasizing the importance of clear roles and responsibilities in addressing ambiguity. Participants highlighted the value of learning from past experiences and maintaining a consistent attitude in ambiguous situations. Scrum's structured approach, with defined roles and events, was seen as beneficial in handling ambiguity.

The literature proposed that Scrum, with its iterative and flexible nature, is well-suited to address VUCA challenges (Sutherland & Schwaber, 2016). The findings from the literature and interviews converge on several key points, emphasizing the importance of agility, effective communication, adaptability, and transparency amongst others in addressing VUCA challenges. Scrum, as an APM methodology, aligns well with these principles and provides a practical framework for project teams to navigate the complexities of VUCA. The integration

of Scrum is perceived positively by practitioners, offering a structured yet flexible approach that complements the strategies recommended in the literature. The alignment between the literature and interview findings reinforces the relevance and effectiveness of Scrum in managing VUCA challenges in project environments. As organizations continue to operate in dynamic and uncertain landscapes, the insights derived from this study contribute to a holistic understanding of how Agile methodologies, specifically Scrum, can be leveraged for successful project management in VUCA conditions.

7. Limitations

Before any conclusion can be drawn, the limitations of this research have to be acknowledged. The study has been conducted using a sample of 13 managers who operate or have operated in Agile and Scrum environments. In reference to time frame and sample size, it is adequate for representing the project management landscape characterized by continuous change that needs to be dealt with. However, it must be admitted that selecting interview partners through the snowball sampling technique could result in selection bias thereby limiting the range of experiences and perspectives derived from the data collection process. Although there are some restrictions on the samples, Agile and Scrum can be practiced over a wide range of business fields, which are challenging in terms of capturing most experiences for this research limited by its findings' generalizability and application. This qualitative analysis therefore calls for the researcher's bias. Efforts were made by using the Gioia Method to reduce bias during analyzing the interviews, however, quotations were manually coded into categories hence the possibility of subjective manipulation of results. There is little practical advice contained within these enlightening outcomes for managers. While they point to the challenge of managing challenges and the benefits of Scrum and Agile, they give little insights on providing actionable recommendations for the practical process. Also, two of the interviewees are working in the software development sector, which is not the focus of this research. Nonetheless, their insights were related to the management of these software related projects, which enables to generalize the findings for the purpose of this study. Even though the majority of the interviewees was familiar with the VUCA model, some had trouble distinguishing between the four challenges, which might impact the findings. To avoid misunderstanding the VUCA model was explained and if needed examples were given.

8. Future Research

The examination of Agile and Scrum methods in project management as they relate to VUCA challenges has opened up more research possibilities. It is important to explore further some specific issues and gaps that arise from the present study as the field of project management evolves. The following are some areas where future research might be concentrated.

In future research, the individual impact on project success could be understood by studying each identified CSFs (Embracing change, fostering collaboration, continuous improvement, transparency, effective communication, and flexibility) in detail. For example, case studies can be conducted, or analyses may also be done to assess how these factors lead to sustained performance of projects. Moreover, since this research did not specify on an industry, future research could investigate how Agile and Scrum principles have been applied and adapted across different industries. This comparative analysis can offer insights into the best practices and challenges within different sectors. Literature has shown that it is important to properly integrate Agile methodologies into an organization. Therefore, further research could focus on how organizations change their traditional project management approaches into Agile methodologies considering factors that influence success or challenges faced during this shift. KPIs such as customer satisfaction and time to market have been mentioned in the interviews. Additionally, advanced measure for evaluating Agile and Scrum project performance could be developed to provide a more comprehensive picture of success than traditional project management indicators can offer.

9. Conclusion

Conclusively, this thesis examined the practical application of Agile and Scrum methodologies in project management, focusing on challenges related to the VUCA model. Insights from expert interviews were analyzed with reference to existing literature in order to offer a clear picture of how Agile and especially Scrum principles are practiced in dynamic project contexts.

The research disclosed CSFs which act as a basis for successful APM. Key values guiding Agile practitioners to success include embracing change, adapting an iterative approach, fostering collaboration, continuously improving, flexibility, transparency, and communication, which have significance in relation to support navigating change. Therefore,

the adoption of Agile methodologies has a positive impact on a project managers' ability to adapt to changing business environments, which validates the first hypothesis. Success of Agile and Scrum methods can be measured by customer satisfaction, time to market and stakeholder value.

Also, Scrum Teams including Product Owner, Scrum Master, and Development Team were examined with emphasis on trust, effective communication, obstacle removal and collaborative implementation. The study found Scrum events like daily stand-up meetings, sprint planning, sprint reviews and retrospectives provide structure and address challenges through alignment, synchronization, transparency, and feedback.

The study further explored how the integration of Scrum enhances a project manager's ability to address and navigate challenges posed by the VUCA model. Every element under VUCA was broken down indicating that the agility, adaptability, and transparency are the key aspects that are used to overcome such obstacles, which is why Scrum can be beneficial. Agile's CSFs should be considered when facing challenges. The application of Scrum offers specific elements to focus on, nonetheless, they do not cancel out CSF. This leads to a partially validation of the second hypothesis. Scrum application in APM is effective in addressing the four challenges presented by the VUCA Model. Nonetheless, the areas to focus on overlap with overall CSFs, making it difficult to distinguish between the four challenges to know how to act in challenging project environments. Moreover, it needs to be considered that Agile methodologies must be selected carefully to the project needs.

By blending theoretical foundations from literature with insights derived from interviews with experts' reliability of this study is enhanced while providing a more nuanced perspective on Agile's role in project management. Interviews showed how Agile or Scrum principles are not limited to mere theoretical frameworks but are practically applied when dealing with difficulties within different projects' environments.

Results provide resources for practitioners to enhance practices in project management by incorporating Agile and Scrum principles. The main identified key factors to address each of the VUCA challenges gives insights on what project managers can particularly draw their attention in certain situations. However, since results overlap with the CSFs it must be taken care that the important practices for success are not neglected while focusing on the best practices for one of the VUCA components.

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Appendix

Table 3: Thematic analysis of the interviews based on Gioia et al. (2013) - full version

First-order Concepts - Direct Quotations -	Second-order Themes	Aggregate Dimensions
Success factors		
"The pillars of Scrum are transparency, inspection and adaptation and everything you do, i.e. every method or every event that you carry out in Scrum, pays off in order to enable an empirical approach, i.e. to actually integrate a kind of scientific approach into the work" (I12) “if you're going to the agile is the being open for changes and to adapt to that. If you look into Interrelations, yeah, Agile is very much about working together instead of working based on a plan or or strict or contracts.“ (I4) “Is is well, mainly from the for me is it's the agile part that is the the attitude part and how you deal with other people, how you work together and how you are embracing change. That is the most important difference for me.“ (I4) "Scrum is a tool that gives employees a lot of freedom"(I10) "It's not a religion in that sense. Scrum as I see it and how we live it should support us here, as well as possible." (I2) "So I find this mindset and this openness" (I3) “Scrum brings the structure how to run an agile project.“ (I4) "The first thing that agile starts with as a philosophy is that everything changes and that you can't know everything from the outset, that's the starting hypothesis in all forms of agile working... And in the environment we live in, where things are so volatile and so fast, I think that's the way to look at the world." (I13) “Whats important for success I’d say a strong commitment to Agile principles, people need to have the mindset and also open communication within the team, a collaborative culture that values feedback is needed.“ (I11) "I think an open attitude like that is super important" (I3)	Agile Principles and Mindset help to embrace change	CSF: Achieving Success with an agile mindset to navigate change and foster collaboration to continuosly improve

"Awareness of when we are sure enough to tackle something and if you are unsure about large parts, maybe take small steps and be able to readjust flexibly so I would say work on a smaller scale." (I1) "Not trying to do too many things at the same time, that is perhaps also a practical issue. If I change a lot of things at the same time, within a sprint, i.e. work on many different functionalities and then try to measure the results at the end, then I will find it really difficult because I can no longer really determine where these results come from." (I12) “I think its the continuous communication and iterative processes to respond to unforeseen challenges. The emphasis on teamwork and rapid iteration can help as well.” (I6) "Review again and again. are we where we want to be?" (I2) "the iterative approach and the extreme adaptability, so that I have the chance to prioritize and change my backlog again with every Scrum cycle or I do that constantly" (I3)	Iterative and adaptive approach to respond to unforeseen challenges	
"and if you address an issue that is not going well, that someone else may have done, respect comes into play, it's not that you did something wrong, but that we as a team can get better" (I2) "The emphasis on teamwork and rapid iteration can help as well.” (I6) "It's incredibly important to build trust. Especially when you work in distributed teams in international environments. So I would invest a lot in team building" (I1) "Openness and respect are topics that are extremely important. Because only when we address issues, what's going well, what's not going well, can we develop further" (I2) "Everyone is aware that everyone is responsible for making it a success and not just the agile project manager or someone who trusts this understanding. Personal responsibility and speed." (I1) "And what I also see, of course, is that this team character. But that simply applies to the fact that you also have a certain affiliation and responsibility of the people, that is, you have all the people at the table who can then also say something about it and otherwise something like that or another project is usually not, it is flushed upwards in the organization and then some division manager should say something about it and decide. And that happens less. Because actually everyone who knows something sits at the table and feels responsible. And then they stop, because they can do it best anyway." (I5) "So the environment has to be reasonably transparent. Of course, the Scrum values of trust and focus are needed." (I5) “Whats important for success I’d say a strong commitment to Agile principles, people need to have the mindset and also open communication within the team, a collaborative culture that values feedback is needed.“ (I11) "Yes, so what I always emphasize in project management is that you focus on the smallest productive results, so that you always have that in mind... That once again someone has said something motivating, concentrate on the fact that we don't always have the big, perfect one in mind, but also see that you have small results that you can already use." (I9)	Team collaboration and trust by celebrating small results for motivation and respecting one another	

"then this topic of low hanging fruits, which you sort of, well that also comes out of this methodology, that you say, hey, what do you have quickly? And it already has a certain added value for someone. I'll get to it straight away, because I can make it available at the moment." (I9) „But if you want to work agile and I've seen it here now, I think it's great that there's a focus on the people need to be also leadership team need to be trained. If leadership team just thinks agile is fast, then we need to train them again.“ (I7)		
"There is a continuous improvement process, usually with retros, that you say what can we learn from the last time, what went well, what went badly." (I1) “What I would say has helped us in projects a lot is a culture of continuous improvement. So we have retrospectives and this actively seeking and people asking for feedback from stakeholders this helps to improve.” (I11) "So the motivation and this focus on yourself should always be there, this continuous improvement, yes, you often have far too little of that in another project and this lesson learned is important as well" (I9)	Creating an environment where issues can be addressed for continuous improvement	
“Navigating uncertainties becomes not just a challenge but an opportunity for advancements” (I6) “Through Scrum, we could pivot quickly, adjusting priorities in response to market shifts.“ (I6) “So I think then in that way Scrum really helped us to get things to the market quickly and also adjust to the priorities and the business needs“ (I7) "Scrum in general has enabled us to become much faster" (I2) "Scrum is a tool that gives employees a lot of freedom" (I10) "you just plan more logically than if you said a year in advance, let's say, on day X I'll do this or that, but you stay more open in your head, as you are so strictly on such a track where you no longer notice anything to the right or left" (I9) "Well, I think in today's world it's just that almost no matter what project you do on a larger scale, you rarely really know at the beginning what will come out 100% in the end. You often have a rough idea of what you want it to be, but you rarely really have the exact details in my experience. That's why we were always looking for a tool that supports this and where you can manage and map these changes accordingly." (I10) “this is our minimal viable work, let's go live. Maybe it's not perfect, but at least we have something that people can start using. Next we might need to change the, priorities because of ABC. So then we didn't have like our static waterfall plan already until year end, but we said, OK, let's move this up or let's move this down.“ (I7) "I actually always use excerpts from it, for example, we have an initiative that we want to harmonize our work a little more in the department" (I9) "So now we've put all this time and resources into it and somehow it doesn't work out and we have to reorient ourselves again, but somehow it should always be seen as an opportunity" (I3)	Flexibility to tackle challenges while seeking opportunities and faster delivery	

"It is precisely the background of Scrum or agile project management methods that changes are not perceived as a disruption, but as added value." (I9) “embrace feedback as an integral component, and maintain a flexibility of approach“ (I6) "And by adopting Scrum, we are simply much closer to the market, can react more quickly to these changes and have also achieved much better interaction between technical and non-technical roles." (I2)		
"You can create transparency in the work... you can make visible who is working on what, what the expectations are... ability to provide information" (I1) "This transparency creates trust, you don't always have to agree. But you can create trust by saying, here's the board, here's what we do" (I1) "So there's no one who can't somehow develop a good idea, that you also listen to them and don't have a kind of hierarchical way of thinking because someone is senior." (I1) “embrace feedback as an integral component, and maintain a flexibility of approach“ (I6) "admitting and being aware that I may not know everything for sure until the end of time, that my head is not the only source of truth." (I13) “Whats important for success I’d say a strong commitment to Agile principles, people need to have the mindset and also open communication within the team, a collaborative culture that values feedback is needed.“ (I11) "When I think back to the classic waterfall time... There was a lack of this constant coordination that we now have in the Scrum process." (I2) “Being interested in your stakeholder, learn what they do know, what they do, why they do it.“ (I4)	Transparency and communication to utilize employees best ability for success	
KPIs		
"Customer satisfaction yes, so…. the main thing is that the end result is something that creates added value. Agile is often faster than classic." (I1) "Time to market is perhaps a KPI. When, when did we deliver what we promised the other day?" (I1) "you can then of course have to see later how your customer satisfaction is and of course your sales figures and so on." (I3) “So the customer satisfaction could have been a measurement“ (I4) "There was also a bit where they said, aha, we've now developed this and that package or this and that, i.e. strategies or ideas, and I think that's where customer satisfaction came from, so to speak" (I9) "then measure customer satisfaction again afterwards" (I10)	Customer Satisfaction and Time to Market: KPIs include customer satisfaction, time to market, and employee satisfaction.	KPI's: Measuring customer satisfaction and stakeholder value to evaluate the effectiveness of agile projects

"And if my problem is that my customers are not satisfied and I have no idea what the reason is, just a few clues, then of course I can make a change where I have indications that this will help me with customer satisfaction. And then I can measure customer satisfaction at the end of the sprint and draw conclusions as to whether my work has been successful." (I12) "If my project was completed on time, it was completed in full. And so, that's what they are for now, delivery here, on target, on time." (I10) "Customer satisfaction, so how quickly are you actually able to achieve customer satisfaction" (I3)		
"Measuring success, actually implementation and stakeholder value at the end, so what do the stakeholders say at the end in the review." (I5) “We have one is called Team agile maturity: The KPI measures the success in increasing agile maturity of the team. So we have now those teams and they need to get more mature. I also know I heard at least that they sometimes also get help from some external companies to make sure they work agile. So while you have one KPI to measure this increase in and agility of these team. Then this is procurement specific. So the procurement department procurement agile team. So they have the individual research results of the agile approach on procurement excellence team. And then we have a third one which is measure which measures which is called agile at skill in digital team. And this measures agile at skill value and adoption metrics aligned to the digital team and they even value measure of dollars value created by digital team adoption message, number of users adopting solutions created by the digital team combo of value and adoption. So that's really quantifying then it by for example them creating digital teams.“ (I7)	Stakeholder Value: Success is measured by the implementation of stakeholder value and the satisfaction expressed in sprint reviews.	
Scrum Teams		
"It is important that the product owner and development team have trust, but that the product owner does not see it as his delivery unit, which he can prioritize every 10 minutes, but that he is also internalized" (I1) "but also try to have a lot of communication with people. Just to get a feeling of who needs a little extra stroking next time." (I2) "the Product Owner ensures that the product backlog reflects stakeholder priorities and addresses uncertainties by prioritizing" (I11) "I can also clearly see that the product owner is approachable for the people and that he has a relationship with the people, that they have the feeling that they are approaching him, because I've already seen that in a project where that wasn't the case and yes, every two weeks you wondered why you might have talked past each other a bit?" (I10) "So I think the first line of defense here, the first line of defense for all queries, is actually always the product owner when it comes to technical questions, so simply always having an open ear for the employees who are then working on the project if there are questions or if there are ambiguities and I think it is very important as a product owner to create a corresponding culture in the team that you are also approachable" (I10)	Product Owner's Role trust between the product owner and development team is crucial, and effective communication is necessary for successful coordination.	Scrum Teams: The importance of trust, effective communication, obstacle removal, and collaborative implementation for the overall success and cohesion of Scrum teams when dealing with challenges.

"The product owner is important for managing challenges. As he is the one who cuts up the iceberg for us, into our small packages" (I2) "So the product owner would traditionally always be in very close contact with the customer, i.e. with or with the customers, with whom this is for and or with the market and the customers, and would have the opportunity to constantly establish an exchange between what is required or what is really desired by the customer and between what is done." (I3) "The Product Owner always has to be after this clear perspective, where is the user and also to keep the working people of the working population, the stakeholders away, so to speak." (I13) “Well, the product owner is important for sure to manage challenges because she or he knows what is needed by the stakeholders and by bringing it into the team they can take it into account. So the PO knows what the stakeholders want and where the sensitivities are and also. When you take it into account later on, when you which you review, you can what you're delivering in your Scrum team, you can well you, you can be aware of it.“ (I4)		
"As Scum Master, I am there to ensure that my team can work as well as possible. I have to make sure that they feel comfortable, that they don't have any obstacles. And I need to know who I need to connect with whom so that things move forward. Or what do I need to do to remove obstacles?" (I2) "The Scrum Master facilitates communication and removes impediments, contributing to a smoother adaptation to uncertainties or challenges in general." (I11) "Scrum masters should also be able to give negative feedback if something doesn't go according to plan. So I think that's very important, as I said, we also had an external consultancy with you on a project, I think that's also very good." (I10) "The Scrum Master is then more there to clear up problems within the organization, I would say, or to provide the team with what it needs to help them." (I3) "The Scrum Master who pays attention to the communication behavior of the people among themselves, but then also to the achievement of goals." (I13) "My job is to make sure that people find the right way to talk to each other, and I think that's the core definition of the Scrum Master." (I13) "The Scrum Master is responsible for enabling and empowering the team to live according to Scrum, i.e. to address the complexity organization and to create the framework conditions in the company's organization so that a team can work independently and self-organized and live according to the values" (I12). "So the Scrum Master sets the methodology in order to readjust the prioritization in case of doubt and ensures that everyone sticks to the schedule" (I5)	Scrum Master's role in removing obstacles and facilitating communication	

"And if this also relates to a challenge, then the scrum master would perhaps also go into communication, for example management or with the person who is responsible, with whom you can talk about it and say, well, now we just have these and the challenges we have to plan again and somehow prioritize them differently, we now need new resources or other resources, we now need someone new in the team or have to set up the team differently" (I3)		
"Of course, we have to have strong developers who know a lot, who can also coordinate with other teams in order to make the best for us out of the uncertainties and the new circumstances that arise and then escalate challenges that arise." (I2) "And so to really use this, this full Scrum toolkit, you also need a certain number of team sizes, I would say that everything about it is really worthwhile" (I10) "the team itself is mainly there for implementation and not so much for prioritization" (I3) "Apart from that, everyone is asked to step back a little from their status behavior and think a little more about how we can contribute to value creation." (I13) "But everyone already has everyone together in their role. So the Scrum Master sets the methodology in order to readjust the prioritization in case of doubt and ensures that everyone sticks to the schedule. In the end, the product owner is perhaps a little more equal than the others and the rest of the team provides input for evaluating the changes in the environment and how this then affects the actual implementation" (I5)	Development Team's Implementation and Collaboration: with each member contributing to evaluating changes in the environment and their impact	
Scrum events		
"A daily, ... because through these alignments you don't know exactly, but relatively exactly what the other people in the team are doing, you can support each other" (I1) "The daily is important to inspect my plan and to create transparency about whether it is still relevant, i.e. in the daily I can already determine whether something decisive has changed in the outside world or perhaps also something decisive in the organization" (I12). "In phases where things are in a state of flux and you have to reorient yourself in some way, perhaps the daily scrums are definitely very helpful, because then you're going in a new direction and perhaps the need for coordination is much greater at that time and that's something I've experienced differently in projects, for example." (I3) „daily scrums ensure synchronization" (I6) "In general, "Daily" of course helps me in the discussion with other roles." (I2)	Daily Scrum for regular alignment, reorientation and synchronisation.	Scrum Events: Scrum events give structure for continous improvement when facing challenges by interconnectedness of alignment, synchronization, transparency, and feedback.
"Sprint planning takes place every two weeks in the same way as the backlog is always managed in the same way. So you really have a structure for a project right from the start, which you don't have to explain to anyone, even if people have already worked with it." (I10) „And then they also have the Sprint planning and that's what I had of the Sprint planning they asked me to say hey, what is the priority for the two weeks." (I7)	Sprint planning to act against challenges, prioritise and structure.	

"Sprint planning determines what we do in the next sprint, then that's also fixed.... If you are more realistic, I find that through this: we know what we are doing, we know until when we have time and we actually know every day who is working where, that you realize very early on that something is getting out of hand here, then you can either take countermeasures" (I1). “Sprint Planning helps set clear priorities based on stakeholder input“ (I11)		
“Sprint Retrospectives facilitate continuous improvement by addressing uncertainties and challenges encountered during the Sprint“ (I11) "Similarly with the retro, you give feedback on what went well, what went badly and, above all, this focus on improvement" (I9) "I find the retro as such extremely important, especially at the beginning or after difficult phases... So retro should also have an outcome that says, hey, this is an issue, the team has a problem with it, we can improve it, we can make an action item out of it, which someone will look at in the next sprint to solve it." (I2) "The retrospective is important for the team and for the team process. This is always fundamentally important" (I3) „retrospectives serve as a mechanism for continuous improvement” (I6) "And we also map this out with our boss, who is also always there, in the retro or in the review, which we then say, actually we would and we have to concentrate more on it now, because we simply want the result" (I9)	Retrospectives for continous improvement within the team and the process.	
"In the review, first of all, this motivation, i.e. for the team of the presentation... I have no pressure now, it is a motivation and I notice it in myself, when the sprint is almost over and things are still missing, then you just get started." (I9) "in the sprint review, but I think that takes out uncertainty and the more a team works together, the more predictable it becomes" (I1) "In the review... you have this transparency, that you can review what has happened." (I9) "In the review...For example, giving a go, making decisions or giving input, saying, yes, we did this and this and this, and then maybe someone else says, oh, I had an idea. And I have to say, it's going really well, I've also noticed that the team is now always giving that as feedback." (I9) “Well, the review helps managing challenges because you get the feedback from normally what you get when you do reviews.“ (I4) “The review gives you immediately the feedback from those customers, how they perceive, perceive, what they what you have developed, what you have done, what you have created in your Sprint. And they I always say your review is the golden moment because you have contact with your stakeholder and your stakeholder cannot only see what you have done. But you can also give ask him some questions which you have for the next steps.“ (I4)	Sprint reviews to drive project success through motivation, transparency and inclusion of ideas and feedback.	

“So really to align everybody again on the priorities, the resources, the time expectations, managing any other expectations. So that weekly check in, I would say maybe then it was a weekly stand up to also escalate issues and of course that also helped us to to organise ourselves a bit.“ (I7) "the review meeting, you always look at the result, the work result, that's super important if something changes, because then you have to think again, how can we still use the previous results, what do we actually have to change?" (I3)		
"Learning and refinement is very important. We do the refinement with the business POs. Because very often there is no general idea as a feature, what do we need, what do you really want to achieve? And this planning refinement also gives us an insight into what the team can implement in the given iteration." (I2) "And then, of course, there is a permanent evaluation of the additional building blocks. This then takes place in normal Scrum events. So in the review and in the retro, a review with the stakeholders and then the planning, of course." (I5) „Sprints guide us toward project completion, daily scrums ensure synchronization, and retrospectives serve as a mechanism for continuous improvement – I would say it’s the combination that can assist in navigating challenges such as the VUCA challenges.” (I6) "Within the product teams, you have made a plan of what you think makes sense. So, a daily every day. Yes, no, do we always need a long retro, we do a short retro, they should always do it, after every sprint review, the question is how big do I make it, how much and how much. Am I already anticipating the planning?" (I5)	Customization of Scrum events based on needs to navigate challenges.	
VUCA		
Volatility		
"Fail early, learn by making mistakes" (I1) "because you get surprised here and there, you just have to deal with it, you shouldn't be desperate somehow, but teams have to be able to gain new insights or maybe it's something you did for nothing or was only half right" (I1) "What do we know better now than 10 weeks ago? And how does that change the plans we have? The release planning. We have a few projects that run on something like that and they always say that the best thing we can do is new, even if we only do it with 100 people every 10 weeks. But to see together, have we learned anything along the way? Or has something changed from our initial hypotheses and that's what Scrum suggest. Dealing with volatility." (13) "it can certainly happen that 0 to 100% are for the garbage can, but for me that's also a mental shift in my head, that you say, then let's at least have fun with it, so yes, so that we do well as a team and give our best" (I1)	Fail early and learn: Embracing mistakes, learning from them, and acknowledging that not all efforts may yield positive results, but focus on continuous improvement.	Facing Volatility: Volatile project environments require the ability to learn from failures, adapt to changing conditions, and adjust capacity.
"Because we're actually prepared for it with the way a product backlog works and how to adapt to changes and the volatility of the business. I think so. The way we do it internally with two-week iterations and the standard events and refinement planning, we are actually well prepared to react to market changes again and again." (I2)	Flexibility: Scrum's iterative and incremental approach aligns with volatile project	

"Since we are dependent on upstream processes, but because of how agility is practiced... we know in detail what is happening upstream and downstream is still a little less precise when new changes come, so of course we have the opportunity to react." (I2) "you need a certain flexibility." (I3) "that I bring in a kind of flexibility by trying to talk to everyone at an early stage and involve everyone and perhaps also create transparency about what I'm doing and what I need." (I3) “Scrum's iterative and incremental approach aligns with volatile project environments I would say, because Sprints provide a structured rhythm, allowing teams to swiftly adapt to changing conditions without compromising the overall project stability.“ (I6) “Now for volatility is also the flexibility, which is very important if I reflected again to the to the situation. You never know exactly what you are finding.“ (I4) “For volatility I think its similar, you have regular opportunities to reassess priorities and make necessary adjustments. So yeah this is enabling teams to respond quickly to volatile project conditions.“ (I11)	environments, providing a structured rhythm and the ability to be flexible in unstable conditions.	
"That capacities can still be readjusted a little. To react to these challenges." (I2) "You can't manage volatility, it's just there. You can deal with it and react to it by not putting resources and something into it that is no longer urgent or important." (I5) "But the huge advantage is actually volatility and uncertainty, that you can manage that well because you implement relatively short cycles and keep looking which capacities you have and that is also completely accepted by the environment. The really important thing is ... that nobody wants to hear from me what we will be implementing in 2 years' time on Tuesday exactly" (I5) "And in order to deal with this volatility, i.e. these changing conditions, I have to be prepared to adapt quickly, to change a plan and the capacities quickly, and that is then made possible by Scrum." (I12). “Sprints..you can manage week by week or Sprint by Sprint and adjust capacities“ (I7)	Capacity Readjustment: Capacity can be readjusted to react to challenges in volatile conditions.	
Uncertainty		
"you have to try out and test a lot" (I1) "you tried to try things out as quickly as possible to prepare for this uncertainty of what the future will be like and to be flexible" (I1) "Uncertainty and flexibility go hand in hand because there are some things I just don't know what's going to happen, no, it's going to get worse, it's going to get better." (I1) "For me, the key word in uncertainty would be trying things out, testing, but also quickly, i.e. speed" (I1) "there are always other uncertainties, where we simply have to throw in more. Things we don't know. Sometimes we simply make a POC out of it. So our proof of concept where we sometimes have to say we have now developed this part 2, but it doesn't fulfill the purpose 100% as it was intended. Unfortunately, this is waste" (I2)	Experimenting and testing:trying out and testing solutions quickly to navigate uncertainties effectively.	Facing Uncertainty: Combining experimentation, effective coordination, communication, and a positive stance toward change within the context of uncertainty.

"But to create cycles where I can experiment, reflect and learn. In the past, I've found that this can definitely help with this example, which represents uncertainty." (I12) "For the uncertainty, I would say to check as often as possible whether the initial hypothesis is correct. And you can only do that by talking to the people who are supposed to use it afterwards." (13) “I would say with with MVP, because then if you have something that you can at least release, it's not costing you like 1,000,000 of dollars. But then at least you can start doing some tests and then you know if it's worth investing in more.“ (I7)		
"You need a lot of coordination. The product owner's time must be available at the end of the day. If the developer orders something, which is incredibly important to cover uncertainties and volatility. These two roles of developer and PO have to communicate a lot, a lot, a lot with each other and find time for each other." (I2) "I really see the time that the PO has and the power that the PO has in his business as the core issue to iron out these issues." (I2) "Someone once spent two weeks in a lab code at our chemists' lab and said what I thought they needed, what they really needed were completely different things because his idea of how chemistry works and how chemical engineers work was, of course, a very distant one. So you have to communicate and coordinate a lot in uncertainty. And they are now best friends and do very funny things together. They help the people who are really the recipients of the benefits. A very practical example." (I13) "Of course, there can always be an uncertainty that something comes from outside that interferes. Yes, that is also the job of the Scrum Master, to keep disruptions away from the team within a sprint, so to speak" (I9) “Again you have to open this here to listen to them and to hear what they say because you want to work together.The answer is also that that interworking and and the openness for change and embracing change actually because you have your ideas." (I4)	Coordination and communication, particularly between the product owner and development team, are essential to cover uncertainties.	
"But the huge advantage is actually volatility and uncertainty, that you can manage that well because you implement relatively short cycles and keep looking and that is also completely accepted by the environment. The really important thing is ... that nobody wants to hear from me what we will be implementing in 2 years' time on Tuesday exactly" (I5) “Agile embraces uncertainty as a given and using it you can turn it into a strategic advantage. The regular feedback loops in Scrum, things like the Sprint Reviews and Daily Scrums, ensure that teams are continually validating assumptions and adjusting course based on new information.“ (I6) "We just try not to take this feedback from the environment or what happens as drama, but somehow as an opportunity to do things differently or even better." (I3) "This data-based approach helps us to bring a little more certainty to this uncertainty and to see new possibilities in it." (I13).	Scrum embraces uncertainty for new opportunities to implement in cycles.	
Complexity		

„But also, the Scrum in project management tackles complexity as it encourages collaboration, so cross-functional collaboration and simplicity, which makes it transparent” (I11) "then try to cut the thick book into individual sentences or chapters that make the complexity as transparent as possible." (I1) "first paint something and create a common understanding of complexity and then try to slice it in some way so that each time is somehow added value" (I1) "that you try to cut it into small, digestible pieces." (I1) "In the Scrum method, the idea is that you approach it interactively, that you cut the problem into slices and then take the slices and prioritize them" (I3) "In order to plan it all, I have to take apart virtually every little shred in order to then even break it down. In this sprint itself I don't have any enormous planning security because I really then concentrate extremely on what is to be done when and then I take the whole, yes, the complexity " (I9) “For complexity I would say Scrum's benefit is that it focuses on small, cross-functional teams facilitates the breakdown of complex projects into manageable components.“ (I6) "So the first main advantage I see is that what is the saying "How do you eat an elephant, one bite at a time", so how would you eat an elephant yes, that is certainly one of the biggest advantages, so you also have very complex, very extensive projects. Which are otherwise relatively difficult to work through. And yes, if you then break it down into different packages, it's definitely a huge advantage because you automatically generate a timeline at the beginning. And then you get a relatively good, at least a rough idea of the project schedule." (I10) “I believe that especially this slicing so by breaking down complex projects into manageable iterations. The iterative nature of Sprints allows teams to respond to complexities fast and so you can adjust project goals based on evolving requirements and feedback“ (I10) “you identify the bigger chunks and split them in smaller tasks. That that will make also the the acceptance and also the feasibility for the others bigger, because often they cannot oversee the whole, but they can oversee the smaller parts.“ (I4) “Also here, breaking down complex tasks into smaller, manageable units during Sprints gives a more adaptable approach.” (I11) "You sort of set yourself a planning goal and divide it into lots of different units, so that the complexity is actually still there, of course, but it's no longer a black hole, an unknown, so to speak." (I9)	Transparency and Slicing: Transparency is achieved by visualizing work, breaking down complexity into smaller, digestible pieces	Facing Complexity: Breaking down complex tasks, adapting and using an iterative approach to navigate complexity with Scrum.
"Depending on how complex a requirement is, you naturally have different methods from your scrum toolbox for tackling these issues." (I2) "The less complex, the less deeply I would personally go into agile at this point; if the complexity is low, I would probably handle a team purely via kanban. The more complex it gets, the more I would fall back on the toolbox." (I2)	Adaptability: Scrum provides adaptability, allowing teams to experiment, learn and adjust	

"You are in a situation where you are somehow a bit dependent on trial and error, i.e. experiments and then, depending on how they turn out or depending on what experience you have had, to take the next step based on your experience, so to speak." (I3) "For complexity I would say Scrum's benefit is that it focuses on small, cross-functional teams" (I6) "The Product Backlog, refined and prioritized during Sprint Planning, ensures that the team is consistently addressing the most critical aspects of a project." (I6) "Sometimes you can already predict based on what they're learning from the past, and then if you pull something in with a lot of knowledge about that specific situation, that combined where comes something." (I7) "Sometimes you hear about a surprisingly simple solution.... We did this in different teams and then we realized, oh gosh, another team had already done what we need, we could almost copy the code 1 to 1" (I1) "That was also one of the biggest lessons I learned in subsequent projects, to define the scope much better at the beginning of the project and also every sprint. You can certainly manage complexity really well with Scrum and it's great to steer the whole thing in the right direction, which is perfect, but of course it's even better if I don't get into the situation in the first place or can pull the plug a bit before it even becomes a problem that I can no longer solve easily." (I10) "... and in the complexity in which we move and remain adaptable." (13) "If I then want to develop in the direction of the target image, I have to try to test and reflect in small steps to what extent I am approaching a meaningful target image or whether I need to change direction and that's where Scrum comes in" (I12) "As project manager what I was doing very much is talking to his people and assessing the situation and adapting the project schedule to that." (I4)	their approach based on evolving understanding.	
"This iterative approach is something we all have in common with agile methods. And in complex situations, I don't think there's any point in spending an infinite amount of time analyzing it in advance, but it's somehow enough to think about it roughly and then proceed step by step and get closer to the solution." (I3) "Scrum helps with complexity through short cycles, especially with things that you don't yet know exactly, can't yet assess, especially interactions, so that you don't commit from the outset to what will be done for the next 2 years, but that you can also adjust a small cycle, every 2, 3, 4 weeks, however long you choose your sprint phase, you have regular reviews and are in exchange with various stakeholders, so that you can incorporate new findings if you get new information." (I1) "I don't think it's much different from normal project management at that point. But you actually cut it into chunks and make it manageable. In Scrum, this happens via the artefacts and the backlog, which you then prioritize individually." (I5) "The Product Backlog, refined and prioritized during Sprint Planning, ensures that the team is consistently addressing the most critical aspects of a project." (I6)	Iterative approach: Scrum encourages an iterative approach to tackle complexity, emphasizing short cycles, regular reviews, and interactions with stakeholders to adjust and incorporate new findings.	

"There are so many influences all day on what we do. That's what Scrum teaches us to regularly check whether the planning we have done, regardless of whether we have created it, is still valid because we have learned something or because of external influences, in order to then plan again. So this iterative approach." (13) "So it became more and more complex and more and more complex, because yes, we first started with industrial engineering, then SHEQ was added and then supply chain was added and it got bigger and bigger and bigger. At some point, Scrum really helped to steer it back onto a controlled path and short cycles. Because scope creation is simply a huge issue in organizations like that. That's also a huge problem because it often means that you never finish projects or don't finish them in the time you originally planned for them." (I10) "When we talk about complexity, Scrum is a framework that was developed to develop complex products, which means that, at least according to Scrum's self-image, the way I interpret it, the method was created precisely to do justice to this complexity. And one of the ways we do this is by using an iterative process of controlled communication on certain topics, i.e. from planning over a certain period of time, to daily measurement and, at the end, checking that the objectives have been achieved." (I12)		
Ambiguity		
"So ambiguity is of course a huge issue. You have to be very, very. You have to be very, very careful that you orientate yourself a bit on the basis of the methods and how things have to run, so every Scrum event has a certain goal and if this goal is clearly communicated with all those involved and also tries to maintain effective communication, even outside the events and visually supported. And asks a lot of questions. And if you're clear, you can resolve a bit of ambiguity in the interaction with your PO." (I2) "I also noticed that there is often a very strong disconnect between top management and then the executive level, which is really the common understanding of what is generally done in a project. And that's where Scrum is really extremely helpful. So when I think about Scrum again, how you set up and interrupt the projects accordingly, that is really extremely helpful from stories to sprints, to really clearly define different elements and also to clearly highlight what is really behind it." (I10) “Ambiguity, yes Scrum is supportive, so yes by promoting a collaborative and iterative approach Scrum helps. Regular communication, continuous feedback, and the ability to adjust priorities during Sprints, this is what helps teams navigate through ambiguous projects, or where you face ambiguity.” (I11) “Scrum is clear on roles and responsibilities, which I believe can minimize ambiguity. The Product Owner defines clear objectives, the Scrum Master facilitates communication and removes impediments, and the Development Team brings clarity to the implementation, so I think these roles can help regarding ambiguity, but of course its difficult.” (I6)	Clear roles and responsibilities to enhance collaboration and common understanding in navigating ambiguity	Facing Ambiguity: Collective learning and role definition to tackle ambiguity
“Even in that ambiguous situation you have already well established, experienced agile team.“ (I7) “What you're finding is bigger and more unexpected, so you need to your attitude need to be exactly the same.“ (I4) "Talk to the people who are supposed to behave in a certain way afterwards, otherwise my business model won't work. They also know what you can take away from the past if there is ambiguity." (I13)	Learn from the past and understand relationships as much as possible	

"So that I can check this plan later, so I can't see any ambiguities? I can't understand the cause-and-effect relationships if I haven't planned and thought about how I'm going to measure what I'm doing in the end. So that I can then fall back on what I have learned in previous situations." (I12) "Exactly, and to generate data as early as possible so that you can learn from it. And that's how internet marketing works these days. You can see which cohorts on Facebook, on Insta, react to your advertising message and which don't." (I13) "Cause and effect is not so easy to determine with ambiguity" (I1)		