RESEARCH ARTICLE - EMPIRICAL

How agile coaches create an agile mindset in development teams: Insights from an interview study

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Abstract

Since the publication of the agile manifesto in 2001, many companies implement an agile—or at least more agile—software development process. However, only including agile methods or practices in the overall process does not guarantee being agile. The mindset of the people involved in the process, including the development team, the customers, and the management, is of particular importance. As such an agile mindset cannot be enforced, the process of creating a suitable mindset needs to be handled with care. In an interview study with nine agile coaches, we analyzed which aspects they perceive being of particular importance during an agile transformation. One of these aspects is the agile mindset. We figure out how they support the creation of such a mindset. We identify 12 categories related to the process of creating an agile mindset. These categories include the collaboration between the coach and the management as well as the necessity to internalize the agile values. The main factor for succeeding with the creation of an agile mindset, however, can be hardly influenced: The success strongly depends on the personal prerequisites and attitudes of the individuals involved in the process, mainly the development team. We synthesize the results of our study into a timeline describing the process of how an agile coach can support the development team creating an agile mindset as part of the transformation towards an agile development process.

KEYWORDS

agile mindset, agile software development, interview study, social factors

1 | INTRODUCTION

For several years, agile software development is becoming increasingly important and agile methods are present in a wide variety of development processes.[1–3] The promised benefits of an agile development approach such as shorter release cycles or more satisfied customers and developers[4,5] lead to an increasing number of companies that include agile methods and practices in their development process.[6] Although recent studies found so-called hybrid methods to be state of the practice,[6,7] most development processes contain methods and practices that originate from agile software development.[3,6,8] Kuhrmann et al[3] analyzed, which of these methods and practices influence the perceived degree of agility. According to their results, there are few methods and practices only that lead to a shift in the degree of agility (when they are used vs. when they are not used), but there is not a single method or practice that guarantees being agile throughout the whole software process.[3] For example, the integration of Scrum in a process significantly influences the perceived degree of agility for almost all project disciplines, without necessarily

leading to an agile process (such a process is just _more agile_ than a process without Scrum).[3] Therefore, Kuhrmann et al[3] conclude that "additional factors need to be taken into account when trying to implement or improve agility in a software company." One of these aspects going far beyond agility on process level is _being agile_ rather than _doing agile_.[1]

According to Gren and Lenberg,[9] agility can be defined as the ability to react to changes in situations where not all required knowledge is available. Gren and Lenberg's[9] idea of agility goes along with the idea of the originators of the manifesto for agile software development[10] as analyzed by Hohl et al.[1] However, agility is often understood to be present as soon as an agile method such as Scrum or eXtreme programming is used,[1,11] which contradicts the results of Kuhrmann et al.[3] Just implementing methods or practices leads to a team _doing agile_ instead of _being agile_.[1,11] While doing agile can be described as _just implementing agile methods and practices_,[1] being agile requires to _live the core idea of agile software development_,[1] namely, the agile culture including its values and principles. The most common starting point for these values and principles is summarized in the manifesto for agile software development.[10] However, the manifesto should only be seen as a document in time, summarizing the results of a meeting in 2001.[1]

The aspect of _living the agile values_ is often referred to as _having an agile mindset_, going beyond the ideas summarized in the manifesto. Still, it remains unclear what is meant by _having an agile mindset_ beyond living agile values. Miler and Gaida[12] define an agile mindset as "a set of one's attitudes, behaviors and ways of thinking that enhance their and their team's effectiveness in working."[12] Based on a literature review and an interview study with practitioners, Miler and Gaida[12] extract 70 aspects of an agile mindset. They identify aspects such as "searching for a solution to the problem instead of finding the guilty," "being motivated," "helping each other," and "mutual listening" as most relevant aspects.[12]

Miler and Gaida,[12] as well as other researchers,[9,13] try to grasp and externalize the idea behind an agile mindset. Besides, research frequently reports on the necessity of internalizing the agile mindset in order to succeed with agile software development.[3,14–17] Despite the relevance of an agile mindset on individual level, there are very few approaches describing how the state of _having an agile mindset_ can be achieved. However, as long as a team is _doing agile_ rather than _being agile_, it is unlikely that the promised benefits of agile software development will be present.[3,11]

In this paper, we investigate what agile coaches can do to support the creation of an agile mindset on an individual level when a team (or a company) starts implementing an agile development process. We analyze this aspect from the viewpoint of agile coaches who are often present during the agile transformation to support both the teams and the company.[18]

We conducted an interview study with nine agile coaches from Germany and Spain to extract requirements on organizational and individual level such as personal characteristics and approaches how the agile coaches support the creation of an agile mindset. All interviews but the first were done with two interviewees at the same time, resulting in five interviews. We analyzed the data in a three-step approach consisting of open, axial, and selective coding.

Based on the interviews, we extracted three aspects on the very top level that are of particular importance and that need to be actively integrated in the process of creating an agile mindset: the team, the agile coach, and the organization. For the team, we extract five categories that should be taken into account: (1) personal prerequisites and attitudes, (2) what the team has to provide for the collaboration with the coach, (3) problems on team level, (4) the team's needs, and (5) what the team needs to learn. Aspects related to the agile coach are (1) observing and understanding (the team), (2) activities of the coach, (3) making agile tangible, (4) perception of agile by the coach, and (5) experiences of the coach. The organization needs to take care of (1) the collaboration between coach and management and of (2) misconceptions and obstacles. For all these categories, we provide deep insights on which aspects need to be considered during the creation of an agile mindset. We synthesize all results in a timeline that summarizes best practices based on experiences described in the interviews.

Outline. The rest of this paper is structured as follows: In Section 2, we present some background information and related work. In Section 3, we present the research method including the research objective, the study design, and the data analysis. In Section 4, we present the results of the study which we interpret and discuss in Section 5. Section 6 concludes the paper and outlines future work.

2 | BACKGROUND AND RELATED WORK

In this section, we present background information about agile values and agile coaching, as well as related work.

2.1 | Agile values and agile coaching

In the manifesto for agile software development, Beck et al[10] mention four values to characterize agile software development. However, it does not suffice to know the values. For succeeding with agile, it is important to internalize and to live these values.[19] Note that the agile values are not limited to the four values explicitly mentioned in the manifesto for agile software development[10] but include other typical agile values such as courage, focus, willingness to change, and many more. These values are less technical than those presented by Beck et al[10] but rather related to individual attitudes and morality.

van Manen and van Vliet[13] present results of a literature study in which they identify an "agile mindset" as a crucial factor for a successful adoption of an agile way of working in large companies. They describe an agile mindset to be based on aspects such as trust, continuous improvement, and collaboration. Bider and Söderberg[20] also identify an agile mindset to be of particular importance when transforming from a traditional work environment to an agile. Often, this transformation is supported by agile coaches.[21]

Agile coaching is considered helpful for two scenarios.[22] In the first scenario, a company already uses agile methods and an agile coach supports individuals or teams in the use of agile methods and helps them improve their way of working.[23] In the other scenario, a company wants to perform a transformation towards an agile way of working. In this case, agile coaches can ease the transformation and solve problems.[24] An agile coach can either be part of the company or team or be externally hired.[22]

Stray et al[23] conducted a systematic literature review to investigate the tasks and responsibilities of agile coaches and their required skills. According to their results, the primary task of agile coaches is the development and training of teams. They help them to master agile practices like self-organization. Agile coaches also support the understanding of agile methods among stakeholders and managers in order to manage an agile transition and make them understand their new roles. However, the implementation of agile methods is only half of the job of an agile coach. Agile coaches have to further facilitate and monitor the effective use of agile methods to prevent misuse and solve problems. Often, agile methods cannot be used right away. Instead, agile coaches have to understand the context in which they are used and have to adapt them accordingly. Implementing the right values is important for agile development. Agile coaches help companies to define the values they want to work with and the direction the company ought to take. An important value of agile development is trust. Agile coaches build trust among the employees by an open communication. Further, agile coaches are responsible to facilitate teamwork and remove obstacles that hinder an effective teamwork.

Agile coaches need first of all leadership skills.[23] This includes good communication skills and an understanding of team constellations and teamwork. Agile coaches have to be able to solve conflicts and have team building abilities. However, agile coaches also need project management skills. This includes skills in change management, risk management, and knowledge management. In order to be an agile coach these persons have to posses an profound knowledge of agile methods and practices. Agile coaches often work with IT teams. Therefore, they also need technical knowledge. They also often function as connection between business teams and the developers. Therefore, it is important to understand both sides and be able to facilitate the communication between both.

2.2 | Related work

The topic of agile mindsets was frequently subject to research. Based on a literature review and an interview study with practitioners, Miler and Gaida[12] extract 70 aspects of an agile mindset. They identify aspects such as "searching for a solution to the problem instead of finding the guilty," "being motivated," "helping each other," and "mutual listening" as most relevant aspects.[12] van Manen and van Vliet[13] present results of a literature study in which they identify an agile mindset as a crucial factor for a successful adoption of an agile way of working in large companies. They describe an agile mindset to be based on aspects such as trust, continuous improvement, and collaboration. Bider and Söderberg[20] also identify an agile mindset to be of particular importance when transforming from a traditional work environment to an agile.

Sureshchandra and Shrinivasavadhani[25] present their experiences as agile coaches which they made when accompanying teams during the transformation. In their publication,[25] they focus on test-driven development and stand-up meetings. According to the authors' experience,[25] a shift in the mindset is required in order to succeed with the agile transformation. They go as far as to state that "if some people are inflexible and refuse to change their ways, it is best not to have these people in an agile project."[25] Heidenberg et al[26] describe a method to systematically overcome refusals such as resistance to change using piloting. They propose to have so-called *agile awareness trainings*. In addition, continuous learning plays a major role in their concept.[26]

Hoda and Noble[17] identify five aspects of an agile transformation that need to change in order to succeed. These five aspects are "change in the development and team practices," "change in the management," "change in the practices on reflection," and "cultural change."[17] Dikert et al[16] describe similar aspects. Based on a literature review, they identify challenges many teams in large companies face during the transformation and which factors decide on being successful.[16] In another literature review on agile transformation in large companies, Klünder et al[21] identify the cultural change to be of particular importance during an agile transformation.

Soares and Brodbeck[27] investigate relationships between different aspects of agile culture and agile practices. The authors develop a model as a basis to decide which agile practices should be implemented at different points in time during the agile transformation.[27] The authors propose to start with practices that depend only minimally on an agile company culture—if at all. Over the course of the transformation, it is possible to integrate other practices and to change the company culture one small step at a time.[27]

Küpper et al[28] conduct semistructured interviews with agile coaches to analyze factors that support the creation of an agile company culture. The authors identify the management and the support by the management as most influential factors. Besides, Küpper et al[28] underline that behavioral aspects of the development team need to be considered. Such behavioral aspects are also in the focus of Madi et al.[29] According to their results, the values related to the *people factor* are most important when selecting and implementing suitable agile practices.[29]

Most of these publications investigate the agile mindset either as a precondition the developers and other team members need to fulfill or the relation of the agile mindset with the organizational culture. However, as far as we know, it has not yet been investigated how such a mindset can be created on individual level.

3 | RESEARCH METHOD

We performed an interview study to get an overview of agile coaches' experiences on how the creation of an agile mindset can be supported. The research process consisted of four steps, which we describe in more detail in the following subsections.

1. *Preparation*: We defined the research goal and the research questions (Section 3.1). In addition, we decided upon the methodology to be used (Section 3.2), the selection of participants (Section 3.2.2), and the preliminary structure of the interview (Section 3.2.3).
2. *Conduction of the interviews*: We conducted semistructured interviews with nine participants (Section 3.3). During the data collection, we step-wise refined the questions to get more insights.
3. *Data analysis*: We analyzed the data using a three-step coding approach in order to allow themes to emerge from the data[30] (Section 3.4).
4. *Interpretation and synthesis*: We interpreted the results and synthezised them into a timeline (cf. Section 4).

3.1 | Research objective and research questions

Our overall objective is *to understand what agile coaches (can) do to create an agile mindset*. In addition, we want to analyze prerequisites for creating an agile mindset on individual and on team level. To achieve these goals, we pose the research questions presented in Table 1.

3.2 | Study design

We performed an interview study with nine agile coaches to answer the research questions posed in Table 1 from the coaches' point of view. We used semistructured interviews with open questions. This allowed us to explore the field. Due to the pandemic situation caused by SARS-CoV-2, all interviews but one took place virtually as physical meetings were forbidden.

3.2.1 | Study type selection

We opted for an interview study to get an overview of the field. According to Wohlin et al,[31] in particular, semistructured interviews help to explore a field both descriptively and explanatorily. Compared with a survey study, an interview study has several advantages, starting with the reduced risk of misunderstandings. In addition, it is more likely to retrieve comprehensive answers to open questions that are neither too detailed nor too coarse grained. In our specific case, we invited two interviewees, who know each other, at the same time, which would have been impossible in a survey study. This setting reduced the risk of implicit knowledge and increased the number of insights because an anecdote described by one interviewee often led to another anecdote by the other interviewee. Choosing the interview study led to fewer answers (smaller *n*), but the participants provided deeper insights than in a survey study. In addition, we checked in advance whether the participants fit our target group.

TABLE 1 Overview of the research questions of this study

	Research question and rationale
RQ1	*What is important for agile coaches when they start accompanying a new team?*
	Answering this questions helps identify factors that appear to be of particular importance for the agile coaches with regard to the upcoming transformation.
RQ2	*How can agile coaches support developers when creating a mindset supporting agile software development?*
	As values and mindsets cannot be taught, we want to analyze how the creation of an agile mindset can be supported by agile coaches.
RQ3	*What personality characteristics hinder or support the adoption of an agile mindset?*
	It is likely that personality characteristics influence whether or not an agile mindset can and will be adopted and how much effort is required to internalize the agile values. Answering this research question provides an overview of supportive and hindering characteristics.

3.2.2 | Selection of participants

Getting support of an agile coach during the transformation towards an agile development process positively influences and smoothes the process.[32] Due to the agile coaches' knowledge and experience on mindset building strategies, we considered persons working as agile coaches as suitable participants in our study. We concentrated on persons having experience as agile coaches, that is, who already supported agile transformations, instead of requesting a formal education (e.g., demonstrable by a certificate). We invited agile coaches from our extended personal networks to participate (i.e., we used direct personal contacts and asked the contacted persons to invite other suitable persons to participate in the study). In total, we invited 10 agile coaches by e-mail, leading to nine positive answers. All interviews but one were done with two persons at the same time, as we expected that this allows for discussions and new ideas that are impossible when interviewing a single person.

We invited the participants stepwise and decided to end sending further invitations as soon as the results saturated. Note that this saturation is not a "real" saturation (it is almost impossible that we fully explored the topic with a total of nine participants), but gaining deeper insights requires further studies going far beyond the focus of our study. Of course, this small number of participants limits the generalizability of our results. We discuss possible threats introduced by this decision in Section 5.3.

3.2.3 | Interview structure

We derived our starting set of interview questions based on literature (cf. previous studies[20,28,33,34]). After each interview, we adjusted the questions based on the experiences we gained in the interviews.

The interviews consisted of four blocks of questions: (1) demographics, (2) working in a new team, (3) experiences and observations, and (4) closure. The final set of questions and their relation to the research questions is presented in Table 2. Note that we did not ask questions

TABLE 2 Interview guide

	Questions and rationale	Relation to RQ?
	Demographics	
	This set of questions ensured a sufficient amount of experiences in agile work environments and, hence, that the participant represents our target group.	
1.	*Where do you work?*	-
2.	*What is your job title?*	-
3.	*How long are you working in your current position?*	-
4.	*How long are you, in total, working in agile environments?*	-
	Working with a new team	
	We asked these questions to get insights of the daily life of the interviewee.	
5.	*Do you work with one fixed team or with changing teams?*	-
6.	*How does your initial contact with a new team look like?*	RQ1
7.	*Are there aspects gaining your special attention when you meet a team for the first time?*	RQ1
8.	*Are there aspects of the agile mindset or agile working that are of particular importance for your work in teams?*	RQ2
9.	*According to your experience, are there concepts in the agile mindset that are easier for teams to adopt than others?*	RQ2
	Experiences and observations	
	We asked these questions to get to know about the agile coaches' experiences made during their time with the teams.	
10.	*How do you notice a team's progress or success?*	-
11.	*At what point the team is ready to work alone and does not need your help anymore?*	-
12.	*Have you ever met a person you would describe as "incompatible with agile working"? Or can you imagine someone with this characteristic?*	RQ3
	Closure	
	These questions closed the interview and asked for additional comments that were not covered by the previous questions.	
13.	*What is "agile" to you?*	RQ1 and RQ2
14.	*Do you want to add something to the aspects you raised in the interview?*	-

TABLE 3 Demographics of the interviewees

Interview No.	Date	Conduction	Duration	Interviewee ID	Experience as agile coach	Formally educated?	Country
1	Mar 10, 2020	Personal	15 min	1	2 years	No	Germany
2	Mar 31, 2020	Online	45 min	2	4 years	Yes	Germany
				3	2 years	Yes	Germany
3	Apr 17, 2020	Online	45 min	4	1 year	Yes	Spain
				5	1 year	Yes	Spain
4	May 11, 2020	Online	45 min	6	6 years	Yes	Germany
				7	2 years	No	Germany
5	May 14, 2020	Online	45 min	8	1 year	Yes	Germany
				9	2 years	Yes	Germany
				Mean:	2.33 years		
				Min:	1 year		
				Max:	6 years		
				SD:	1.56 years		

explicitly pointing to the agile mindset to avoid biasing the interviewees. We wanted the interviewees to point to the relevance of an agile mindset (if they consider it relevant) instead of the interviewer leading the interview in this direction. That is, we did not assume per se that an agile mindset is mandatory to succeed with agile, but left room for different ways (that were not presented in the interviews).

The set of questions presented in Table 2 is rather an interview guide than a hard policy, as we conducted semistructured interviews. Hence, the interview guide assured that all relevant topics were covered, but we could also go into detail at some point and inserted new ideas raised by the interviewees. Note that, although we present the English version of the interview guide, most of the interviews were done in German to use the native language of the interviewees (and the interviewer). Only one interview was conducted in English.

3.3 | Participant selection and data collection

In total, we interviewed nine agile coaches in five interviews between March and May 2020. An overview of the interviewees is summarized in Table 3. All interviewees work in companies located in Germany or Spain. Seven of the nine interviewees are formally educated agile coaches. The others are also experienced agile coaches but without a formal education (e.g., a certificate). On average, the interviewees have more than 2 years of practical experience as agile coach (min: 1 year, max: 6 years) indicating that they already supported many teams during the agile transformation. Even the two agile coaches without a formal education have 2 years of experience in which they gained knowledge that is typically transported during such an education. Thus, we consider all interviewees being adequate subjects for our study.

We conducted all interviews but one in German (Interview No. 3 with two interviewees from Spain was conducted in English). The first interview was done face to face as part of a university course on the Scrum framework. The four other interviews were done online using Skype, Google Meet, or Zoom—based on the participants' preferences.[*] All interviewees were interviewed by the second author of this paper. The first and the third author reviewed the process and helped analyzing the data.

We stopped the data collection after two interviews that only confirmed previous insights but did not raise new aspects.[†] All interviewees agreed upon audio-recording the respective interview. We manually transcribed the audio-recordings. All interviews except the first were done with two interviewees at the same time. We decided to use this structure to allow extending the other interviewee's ideas or thoughts. This way, we obtained more information and more implicit knowledge which might not have been presented in interviews with single persons (and which was indeed not presented in the first interview with only one interviewee).

The overview of the length of the interviews is presented in Table 3. Each of the four interviews with two persons lasted 45 min, whereas the first interview with one person had a duration of only 15 min.

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[*]The online data collection was caused by the SARS-CoV-2 pandemic. At the time of the first interview, personal contact was allowed by the government and the university administration, but the other interviews took place during the first look-down period in Germany (and almost all over the world).

[†]This number of nine interviewees allowed us to gain several interesting insights, but we must not assume that we reached a saturation of insights. Future research is required to strengthen these results.
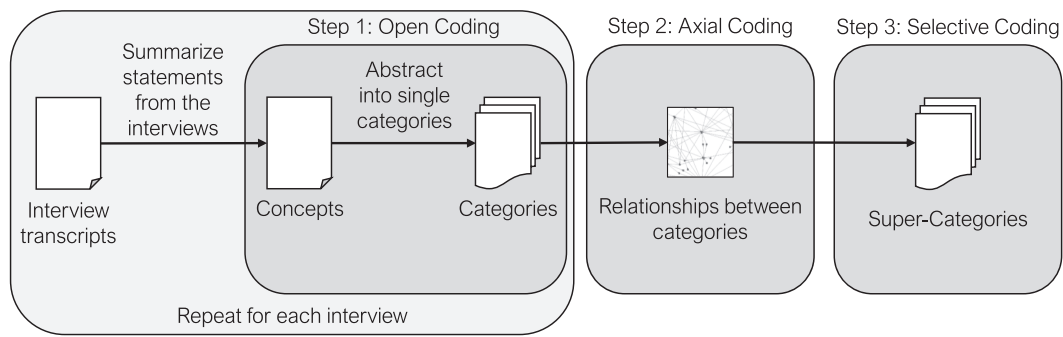
FIGURE 1 Three-step data analysis

3.4 | Data analysis

The data analysis consisted of three steps visualized in Figure 1. We started with an open coding leading to categories emerging from the interviews, followed by axial coding to find relationships between the categories, that are summarized in core categories as part of the selective coding. This helped to reveal new insights and aspects that have not been explicitly mentioned in the interviews.

For each interview, we started with summarizing the statements, extending the insights of the previously analyzed interviews, if necessary. That is, for each statement made in the interviews, we either defined a new code (which was the condensed statement) or we were able to assign the statement to an already existing code). We performed this step iteratively until we reached a saturation, that is, no new insights could be added from the interview transcripts to the result set of categories.[‡] Afterwards, we started the coding process visualized in Figure 1.

- Open coding: We search for concepts or ideas presented in statements or sentences of the interviews. For example, the statement "The people who don't want to change, won't change" (Interviewee 5) can be summarized as "willingness to change." Afterwards, the concepts are synthesized into categories, such as, in the case of the statement mentioned before, "what the team has to provide."
- Axial coding: This step analyzes the dependencies and influences between the categories themselves. For example, the category "what the team has to provide" is related to the category "personal prerequisites and attitudes," because if some imprint or attitude leads to the neglect of changes, the team (or a single member) cannot provide this required willingness to change.
- Selective coding: In this step, we identify core categories based on the categories and their dependencies. Each core category describes a phenomenon and can help to explain the investigated topic, in our case, the main driver for adopting an agile mindset.

We randomly chose Interview No. 5 to start the data analysis. First, we extracted codes (representing concepts or coarse ideas) from the transcript. Afterwards, we merged the codes into broader categories which we defined based on the concepts. Next, we analyzed Interview No. 2. Again, we extracted concepts from the transcript and added the codes to the already existing categories. As we found some codes that did not fit into one of the categories, we extended the set of categories by defining a new category. Next, we analyzed Interview No. 3 following the same procedure as before. Again, we added one category. The next coded interview was No. 4. In this step, we were able to align all the codes to one of the already existing categories. Last, we analyzed Interview No. 1. Again, we aligned all codes to one of the categories. This fact again supports the claim of having reached the theoretical saturation with respect to the questions asked in the interviews. Thus, there was (for the moment) no necessity to perform more interviews than these because it is unlikely to find more concepts and categories. However, this is only theoretically true. We discuss the threat of potentially missing input in Section 5.3.

As we extended the set of categories during the process, we went over all the interviews once more to ensure that all codes still belong to the best matching category. In this step, we also merged multiple occurrences of the same concept or idea mentioned in more than one interview.

During the axial coding, we put the categories in relation to each other by looking at the codes aligned to each of the categories. These relationships helped deriving core categories during the selective coding. Each core category had a relationship or dependency to several other categories. We explored these dependencies based on the descriptions and the codes and derived both a dependency graph and a coarse timeline.

[‡]Note that, if we would have been able to add new insights from the last interview to the result set, we would have performed additional interviews until we reached a saturation.

3.5 | Validity procedures

We implemented different procedures to improve the validity of our results and to mitigate risks. We applied a thorough review process, that is, one of the authors performed the interviews and the analysis and the other authors reviewed each step carefully. In case of doubts regarding the interpretation of specific sentences or results, all authors discussed the results, or talked to the respective interview partner again to clarify the findings. In addition, we mitigated the risk of misinterpretation during the interviews by repeating what the interviewer understood and asking the interviewee whether this interpretation or understanding is correct or not. In addition, we conducted each (except the first) interview with two interviewees to decrease the likelihood of implicit knowledge assumed by the interviewees. That is, we wanted to get all information required to understand what the interviewees were talking about during the interviews. Often, the second interviewee was able to clarify or concretize what the first interviewee meant by externalizing implicit knowledge. To reduce the risk of implicit assumptions by the researchers when analyzing the interviews and to reduce bias, we randomly ordered the interviews during the analysis and chose a different ordering compared with the conduction of the interviews.

Besides, we implemented a review process with the participants: Before analyzing the interviews, we sent the respective transcripts to the interviewees and asked them for corrections or adjustments. We also sent them the final results of the whole analysis to ask for feedback. Both review processes did not lead to any corrections or adjustments which is why we are confident that the interpretations and the conclusions we made based on the interviews reflect the interviewees' opinions and experience.

4 | RESULTS

We conducted the study and analyzed the data as described in Section 3.

4.1 | Coding results: Open coding

The first step of the coding using the process described in Section 3, namely, the open coding, led to 12 different categories that are related to the adoption of an agile mindset. These categories can be divided into three super-categories that are summarized in Figure 2. In the following paragraphs, we describe each category in detail.

4.1.1 | Super-category: Team

In this super-category, we summarize all aspects related to the team with the team members' characters and different attitudes. In addition, this super-category contains the aspects that affect the team on a higher level, such as problems and needs of the team to succeed with agile. However, these problems and obstacles only occur if they originate from within the team and not from the organization. Figure 3 gives an overview of all categories and subcategories summarized in the super-category "Team." Note that the order of the subcategories is arbitrary.
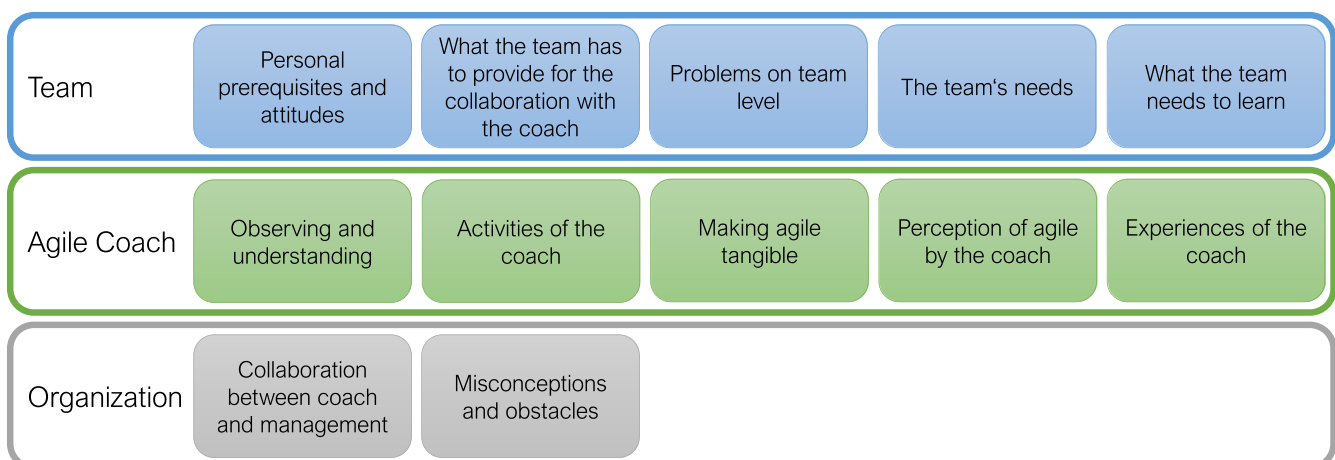
FIGURE 2 Overview of the three super-categories with the respective categories

Personal prerequisites and attitudes

| Open towards the agile way of working | Open-minded and open to changes | Willingness to reflect on the own behavior | Personal imprints | Willingness for continuous learning | Willingness to reflect |

What the team has to provide for the collaboration with the coach

| Actively participate in the process | Give feedback on what the team needs | React on impulses from the coach | Request hints and ideas from the coach |

Problems on team level

| Fear to fail | Missing commitment on team level | Overload and confusion | Missing information flow | Different imprints | Different ideas of how to solve a problem |

The team's needs

| Involvement during the process | Smooth transformation | Acceptance of personal attitudes | Open organizational culture | Understand the vision of the management | Trust |
| Agile and flexible coach | Common goal |

What the team needs to learn

| Consider their work to be valuable | Reflect on already existing knowledge | Self-reflection | Accept problems and solve them |

FIGURE 3 Overview of the super-category "Team"

Personal prerequisites and attitudes

In order to succeed with agile, there are some prerequisites concerning personal attitudes and the behavior of the team members. First of all, each team member needs to be open towards the agile way of working. Without such an open mind, the required motivation to try using agile practices would be missing. This also includes the necessity to be generally open-minded and open to changes. It does not suffice if the team is open towards the new way of working, each team member also has to be open towards other team members including their attitudes and diverse opinions. Agile working is meant to allow handling situations with insufficient information adequately.[9] This requires to reconsider the own opinion and viewpoint—and to adjust them if necessary. This requires that the team members are open towards external influences on their opinion. Missing willingness to change was described as an attitude a coach cannot influence:

> The people who don't want to change, won't change. (Interviewee 5, Interview 3)

In addition, living an agile mindset requires the willingness for continuous learning, as well as the willingness to reflect on the own behavior and the learned insights in order to draw conclusions for future work. These conclusions can also include personal consequences, which again indicates the need to be open minded.

These issues appeared also in the context of the personal imprint. Every human being unites different imprints in oneself. Although the interviewees were not able to explain this concretely, they observed a strong correlation between the openness to change and the personal imprints in the projects they supported during the agile transformation. The individual imprint also allows conclusions on how a person will likely react to criticism, as this reaction depends on personal experiences.

Summarizing, the aspects in the category "personal requisites and attitudes" represent characteristics the coach can hardly change or influence. Characteristics and imprints (and people) can change over time, being the first step towards an (agile) mindset. However, starting an agile transformation with an unflexible team that is not open to changes is more difficult than with another team.

What the team has to provide for the collaboration with the coach

The collaboration between the coach and the team needs to be supported from both sides. In the following, we describe what the team should do and provide in order to allow the coach to support the agile transformation.

It is of particular importance that the team actively participates in the process of the agile transformation and the mindset building, i.e., in the coaching process. On the one hand, this implies that the team reacts on impulses from the coach and that it does not neglect them. On the other hand, it implies that the team requests hints and ideas from the coach and that the team gives feedback on what it needs in order to improve the

process. For example, the team can actively tell the coach that the process has progressed so far that it does not need the coach anymore. Even if this does not happen very often, it shows how the team can actively form and control the process to have a good and satisfying collaboration. The following excerpt (translated from German) from Interview No. 5 describes this situation:

> Interviewer: Is there a point at which you say that the possibilities to help [the team] are slowly exhausted?
>
> Interviewee 9: At latest when the team says they don't need us anymore.
>
> Interviewer: Does this happen?
>
> Interviewee 9: Well it hasn't happened to me yet. When you manage a team, you manage a wide variety of issues. What can happen is that the team says that it doesn't need any more help with a certain topic for the time being.

Problems on team level

This category summarizes problems that either appear on team or personal level or that the team itself faces with external entities such as the management or other teams (e.g., caused by an incompatible workflow).

The difficulties on personal level, that is, the difficulties affecting single team members, often result from the personal attitudes described before. In particular, the personal imprint can cause problems. For example, the fear to fail can be part of the personal imprint, which would create a conflict with an agile work environment, as fail fast is—roughly spoken—one of the agile principles. In addition, using a plan-driven development process for a long time can complicate the willingness to try the agile way of working and, consequently, the adoption of an agile mindset.

However, the individual imprints can not only create problems and difficulties affecting a single person. Different imprints leading to different ideas of how to solve a problem can cause team-internal conflicts.

In addition, an agile transformation often causes some overload and confusion:

> No matter which order you choose [first agile methods or first the agile mindset], people always feel overwhelmed in some way. But that's the typical change process: At the beginning there's a lot of confusion, then there is a defensiveness if you loose people on the way. And when you have gone through all that, then you have a lot of willingness to take people with you on a journey. And then, suddenly, the process and the culture work. (Interviewee 9, Interview 5, *translated from German*)

Another huge issue is missing information flow, for example, between the team and the management. If the team does not know about the overall idea and motivation for the agile transformation, this can cause problems as missing information can increase the risk of missing commitment on team level which is required for a successful transformation.[21]

The team's needs

This category summarizes all aspects that enable or facilitate the transformation process, including the adoption of an agile mindset.

One frequently mentioned aspect is the participation in the process. For most teams, it is helpful to be involved in each step of the agile transformation. This increases the identification with new aspects and thus the chance to implement these new aspects.

In addition, including already existing and known facets during the transformation can also create the feeling of a smooth transformation which helps the team to get used to new aspects step by step. The team also needs to understand the vision of the management. Without such an understanding, it is difficult for the team members to identify themselves with the new way of working. A missing identification can lead to the team rejecting the new process. Consequently, it is important that the motivation for the agile transformation is either led by the team (bottom-up approach) or by the management (top-down), but it needs to be an internal decision (and not led by the agile coach).

Another factor is the organizational culture that needs to allow the team to follow ideas, to experiment, and also to fail with new approaches. This requires some kind of trust: The organization needs to trust the team and every single developer or team member. This trust has to be communicated to the team members to decrease the fear to fail as described before. This trust also includes the acceptance of personal attitudes by the coach and the organization. For example, if a developer notices that his or her attitude and his or her idea of working cannot go along with the new development approach, both coach and management need to accept this decision and look for solutions—together with the developer.

> If someone says that this is not the way they want to work, then I have to accept that and I think the company has to accept that as well. You have to talk to the person and talk and talk and talk and see what alternatives there are. (Interviewee 8, Interview 5, *translated from German*)

It is also important that the coach adjusts his or her proceeding to fit the specific requisites of the team with its individual members. The coach has to be flexible and agile himself/herself in order to react to new situations and changes. This also includes the selected practices. One example for such a necessity to react to specific characteristics was given by one interviewee describing what a team member thinks about the necessity of a daily stand-up meeting:

> Each day, we sit together for 15 minutes drinking coffee and sharing information. Why do we need to do a daily in addition? (Interviewee 7, Interview 4, *translated from German*)

For the team, it is important to not just know about a decision, most likely why agile should be implemented, but also to understand the rationale behind it. Therefore, the team also needs to understand the rationale behind single practices they shall implement (in particular, if they appear to just be time-consuming such as a huge amount of meetings). As soon as the team considers a practice to be useful, it is more likely that the team will continue using this practice after the coach has left the team. In case of practices the team does not want to use, it is likely that they will not be implemented anymore as soon as the team itself can decide on the used practices.

A common goal can also facilitate the adoption of an agile mindset as it helps defining the orientation of the team and the transformation process. This, in turn, increases the chance that each team member feels responsible for the success and knows how to support being successful by identifying with the process and the team.

What the team needs to learn

This category contains all aspects related to the learning curve of the team, that is, what the team needs to know and to learn in order to succeed. All aspects summarized in this section require a continuous learning process as they refer to knowledge that can not only be learned but needs to be internalized.

One aspect is that the team and each single team member considers their work to be valuable for the project. In addition, the relation of the value of the own work (and hence being valuable for the team) goes along with the agile values of openness and courage.

The team also needs to learn to reflect on already existing knowledge, and to adjust it, if necessary. The already mentioned aspect of self-reflection is also very important and needs to be internalized during the process of the agile transformation. Accepting problems and solving them should also be part of the continuous learning process.

4.1.2 | Super-category: Agile coach

This super-category summarizes all aspects mentioned by the interviewees that are related to the coach, that is, how the coach can support the team and what he/she needs to do in order to create an atmosphere that allows the team to learn. Figure 4 gives an overview of all categories and subcategories summarized in the super-category "Agile Coach." Note that the order of the subcategories is arbitrary.

Observing and understanding

During the transformation, the coach needs to carefully observe the team. This helps to gain implicit knowledge about the team and insights the team does not talk about. Therefore, observing the team is of particular importance.

As the coach works with different persons having different backgrounds, he or she has to get to know these backgrounds, the team members' experience, their attitudes, and the like. This includes doubts of single team members or reservations against the new way of working. Knowing about these subtle problems allows the coach to develop suitable solutions (in collaboration with the team). To develop such solutions, the coach needs to understand the already existing way of working, the processes, the team's motivation, and the team's needs—before, during the transformation and each time when something is about to change. Besides the team's motivation, the coach needs to know about the organization's motivation as this can influence the further transformation process.

Due to the work with different persons and the relevance of social aspects, the coach also needs to observe the interpersonal behavior in the team. This includes, for example, problems on a relationship level that are not necessarily limited to the work environment. Solving such problems can facilitate the collaboration.
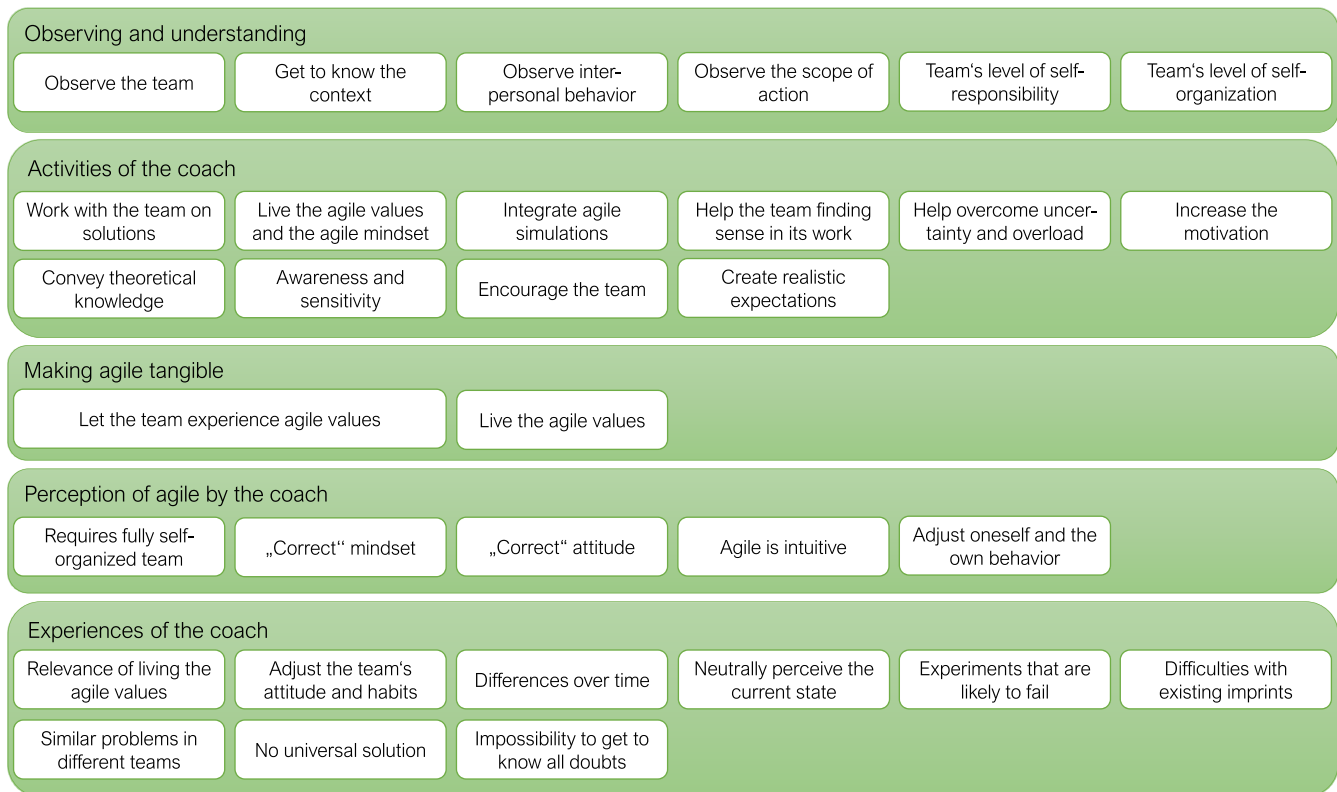
The level of self-organization and self-responsibility of the team is also of particular importance for the coach. Related to this, the coach also needs to observe the scope of action defined by the organization giving the team freedom for own decisions.

All these observations and the knowledge are important when evaluating and planning possible next steps.

Activities of the coach

This category describes activities of the coach during the process. These activities are, however, rather abstract concepts than concrete methods. Therefore, these abstract concepts need to be adjusted to the respective team based on its specific characteristics and social aspects.

Most of the concepts in this category result from the needs and the problems the team faces. Consequently, one of the coach's activities is to work—together with the team—on solutions for specific problems. This can support the collaboration. However, there are problems the team might not be aware of. This is a difficult situation for the coach, because on the one hand coaches do not want to create artificial problems. On the other hand, the coach has to draw attention to problems influencing the teamwork and can introduce a new point of view on a specific problem.

Observing and understanding

| Observe the team | Get to know the context | Observe inter-personal behavior | Observe the scope of action | Team's level of self-responsibility | Team's level of self-organization |

Activities of the coach

| Work with the team on solutions | Live the agile values and the agile mindset | Integrate agile simulations | Help the team finding sense in its work | Help overcome uncertainty and overload | Increase the motivation |

| Convey theoretical knowledge | Awareness and sensitivity | Encourage the team | Create realistic expectations |

Making agile tangible

| Let the team experience agile values | Live the agile values |

Perception of agile by the coach

| Requires fully self-organized team | „Correct" mindset | „Correct" attitude | Agile is intuitive | Adjust oneself and the own behavior |

Experiences of the coach

| Relevance of living the agile values | Adjust the team's attitude and habits | Differences over time | Neutrally perceive the current state | Experiments that are likely to fail | Difficulties with existing imprints |

| Similar problems in different teams | No universal solution | Impossibility to get to know all doubts |

FIGURE 4 Overview of the super-category "Agile Coach"

I'm not going to tell a team that they have a problem if that's just how I feel. [...] If I notice that there is a discrepancy, I can try to clarify this first for myself with questions. And then I also make people aware that this can perhaps be a topic that we can then work on. (Interviewee 8, Interview 5, *translated from German*)

Several interviewees described the main activity of the coach as living the agile values and the agile mindset:

I always try in such situations [situations in which the affected could behave *better*] to go ahead as a good example, that it can be experienced by me. (Interviewee 8, Interview 5, *translated from German*)

This can help the team to experience the values and the mindset. Upon request of the interviewer, the interviewees also mentioned to use agile simulations§ to let the team experience some ideas behind agile software development. However, most interviewees rarely use agile simulations as these are mainly useful for short-term collaborations between the coach and the team, that is, if the team should experience the agile idea in a short time, for example, in a training or a workshop. As the coaches usually collaborate with the team for a long time, it is not necessary to have concrete experiences enforced by an agile simulation.

One implicit activity mentioned by an interviewee is to support the team finding a sense in its work and to increase the motivation. A very concrete activity is to convey theoretical knowledge on the used methods and practices. With this knowledge, the team can more easily comprehend the used methods and practices. As mentioned before, it is not unusual that the team is temporarily overburdened during the transformation. In this case, the coach should encourage the team and help the team overcome this period of uncertainty and overload.

In addition, the coach needs to create realistic expectations both on team and on organizational level related to the agile way of working. Some coaches explicitly mentioned that an agile work environment is not necessarily the best decision based on the preconditions and given needs:

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§Note that, in this publication, we use the wording "agile simulation" instead of "agile games." One interviewee explained that agile simulations consist of a briefing, the conduction, and a debriefing. In addition, in contrast to a game, an agile simulation always has a specific educational objective.

It's not a panacea and it's not going to solve the problems that a team is supposed to have but it's a tool to make those problems transparent and once you get to that state then the real work starts and there will always be setbacks. (Interviewee 6, Interview 4, *translated from German*)

Besides, the interviewees mentioned frequent misconceptions regarding agility. These misconceptions are described in detail later on. However, in these cases, the coach tries to correct the expectations in order to allow the team to reach the expectations during the process. One of the interviewees drastically described that it is also an option for the coach to leave the organization if the divergence between the coach's idea and understanding of agile and the management's ideas is too high.

Besides all these activities, the coach needs awareness and sensitivity to adjust these abstract concepts to the team's needs.

Making agile tangible

As already described before, the coach needs to live the agile mindset and to let the team experience the agile values. This typically happens by the coach actively and consciously living the agile values and the agile mindset. In addition, agile simulations can help letting the team experience some specific agile concepts.

Perception of agile by the coach

This category summarizes statements about how the interviewed agile coaches perceive "agile" as a concept. The coaches implicitly illustrated that an agile work process requires the correct mindset or the correct attitude. Related to this, the interviewees mentioned that a fully agile working can only be implemented in a fully self-organized team:

If I cannot manage myself as an individual and I am not allowed to organize myself, then I find it difficult to adapt to what is happening around me. In my head this very simple explanation is why agility equals self-organization. (Interviewee 9, Interview 5, *translated from German*)

If the team is fully self-organized, the agile work is very intuitive (if internalized by the team). In addition, for the interviewees, agile means to adjust oneself and the own behavior to the given context and to experiment with different aspects, even if these experiments are likely to fail.

Experiences of the coach

This category summarizes experiences of the interviewed agile coaches that are helpful in their daily work.

One issue raised in several interviews is the relevance of living the agile values. The coaches observed teams undertaking these values and the idea after some time.

There was a retro, I had been in the team for three, four, five months, the head of department was there for the first time and a participant presented [...] an idea that he wanted the head of department to have their backs when they dare to experiment. That was very exciting because I keep propagating to my teams that we dare to experiment and then look at it after period X and see whether something has changed and if so, how. But it took so long to get it in his head. (Interviewee 6, Interview 4, *translated from German*)

In addition, the experiences the team gains during the transformation help the team to adjust its attitude and habits. These attitudes also influence other teams that get to know about the success of the experienced team as other teams become more open towards the agile way of working.

In addition, the obstacles the team faces also differ over time. In one interview, the two coaches mentioned that it is helpful for them to neutrally perceive the current state in the organization (instead of being biased like an internal coach would be). It is more likely that internal coaches (compared with external coaches) do not notice some problems they are "used to having":

In the last year we have seen that this works pretty well because [...] the main challenges we had as agile coaches inside companies are that, very easily, you get intoxicated by the same culture. You are one voice that has a color and not everybody sees you as a neutral entity that can help the whole company. So moving outside and being able to be considered as a neutral voice that helps everybody has been something very useful for us. (Interviewee 4, Interview 3)

Different teams often face similar problems. Nonetheless, it depends on the team how to solve the respective problem. Although problems might be similar to each other, the solution always has to be adjusted to the respective team's need. There is no universal solution for a problem.

The coaches also experienced difficulties with existing imprints when trying to adapt an agile mindset and when transforming towards agile. In this case, missing openness can complicate the progress in the team. In addition, it is important that the organization supports the transforming team. For example, the aspect of conducting experiments that are likely to fail can only be considered when the team knows that the organization supports this way of trial and error.

Some coaches also raised the issue of the impossibility to get to know about all attitudes, reservations, and opinions related to the agile way of working. If they do not know about these aspects, they cannot take them into account and try to solve them.

4.1.3 | Super-category: Organization

This category refers to aspects related to the whole organization respectively the company, in particular influenced by the management. Figure 5 gives an overview of all categories and subcategories summarized in the super-category "Organization." Note that the order of the subcategories is arbitrary.

Collaboration between coach and management

The collaboration between the coach and the management is of particular importance. All interviewees stated that the first contact between the coach and the company takes place with the management. The coach reaches out to the management before he or she talks to the team for the first time. This first contact with the management helps the coach to get an idea of the objectives the management wants to reach.

In Interview 3, the interviewees described an explicit dialogue with the management:

> Usually, its the leaders who are hiring us and we say: [...] "we will do this observation and we may come back to you. Saying some things that are uncomfortable for you. Are you okay with that?" We try to get this commitment from the very beginning to not get the people defensive. (Interviewee 5, Interview 3)

According to their experience, the management's commitment is required right from the beginning. This also includes an appropriate communication between the management and the team. Although the coaches mainly work with the team during the agile transformation, they share problems with the management that are not team-internal but affect the team. In addition, they have to ensure that the management does not get a rejecting or repelling attitude towards these issues. In this case, it would be impossible to resolve problems outside the team. The coaches use these issues to show new perspectives and to allow a further development of the organization after the coach has left the team.

Misconceptions and obstacles

This category summarizes misconceptions and obstacles that may come up during an agile transformation. These aspects are mainly related to the management level.

One frequently mentioned aspect is the idea of what "agile" means and what it does not mean. An example is the belief that only the development teams need to be agile. The interviewees described "agile" as a buzzword that is often misunderstood. This wrong or insufficient knowledge of what agile means leads to an unclear motivation why agile should be implemented. This is an obstacle that needs to be considered. As described before, the team needs a clear vision in order to perform the agile transformation more smoothly and successfully. Wrong knowledge about agile leads to difficulties in the process, mainly if the management equates "agile" with "increasing the teams' effectiveness" without considering the other aspects:

> Paraphrased: In the corporate world, when we speak of "agile," the difficulty is always that agility is equated with the fact that the teams "below" work in an agile manner. (Interviewee 8, Interview 5, *translated from German*)
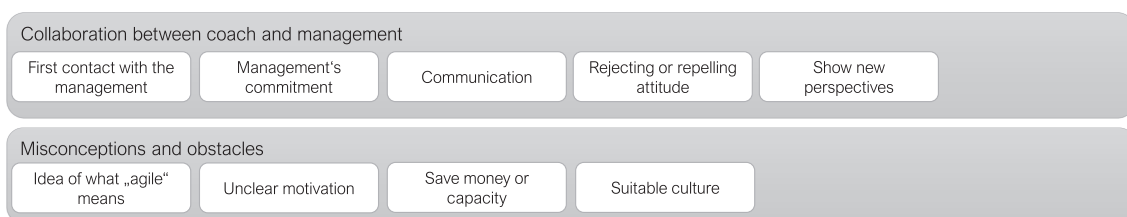
FIGURE 5 Overview of the super-category "Organization"

Another obstacle is the aspect of misjudgments. One interviewee described the following fictive scenario: The management thinks that the teams' effectiveness needs to be improved, but according to the coach's judgment, the communication between the management and the team is rather the problem. Another possible misjudgment appears when the management tries to save money or capacity of presumably unneeded things such as actions or workshops to improve the team building. Although these things have no obvious measurable positive impact for the management, they are important to the coach and the team.

An inadequate organizational culture has also been identified as an obstacle, because a suitable culture is highly important for the team to live the agile culture. Such a suitable culture on the organizational level can be used by the team for orientation and to use the support when building or adjusting an own mindset.

4.2 | Relations between the categories: Axial and selective coding

After the first step, we had an overview of three super-categories, divided into 12 categories which are again subdivided into codes that are also referred to as subcategories. According to the methodology described in Section 3, we now performed the axial and selective coding to concretize the results and to analyze them in relation to each other.

4.2.1 | Results of the axial coding process

We first identified content-related dependencies of the categories based on the included codes. Some of these dependencies have already been described in the previous subsection. Figure 6 visualizes all dependencies between the categories. Note that we only considered dependencies in general, without asking whether category A influences B or vice versa. Therefore, the lines in Figure 6 are undirected.
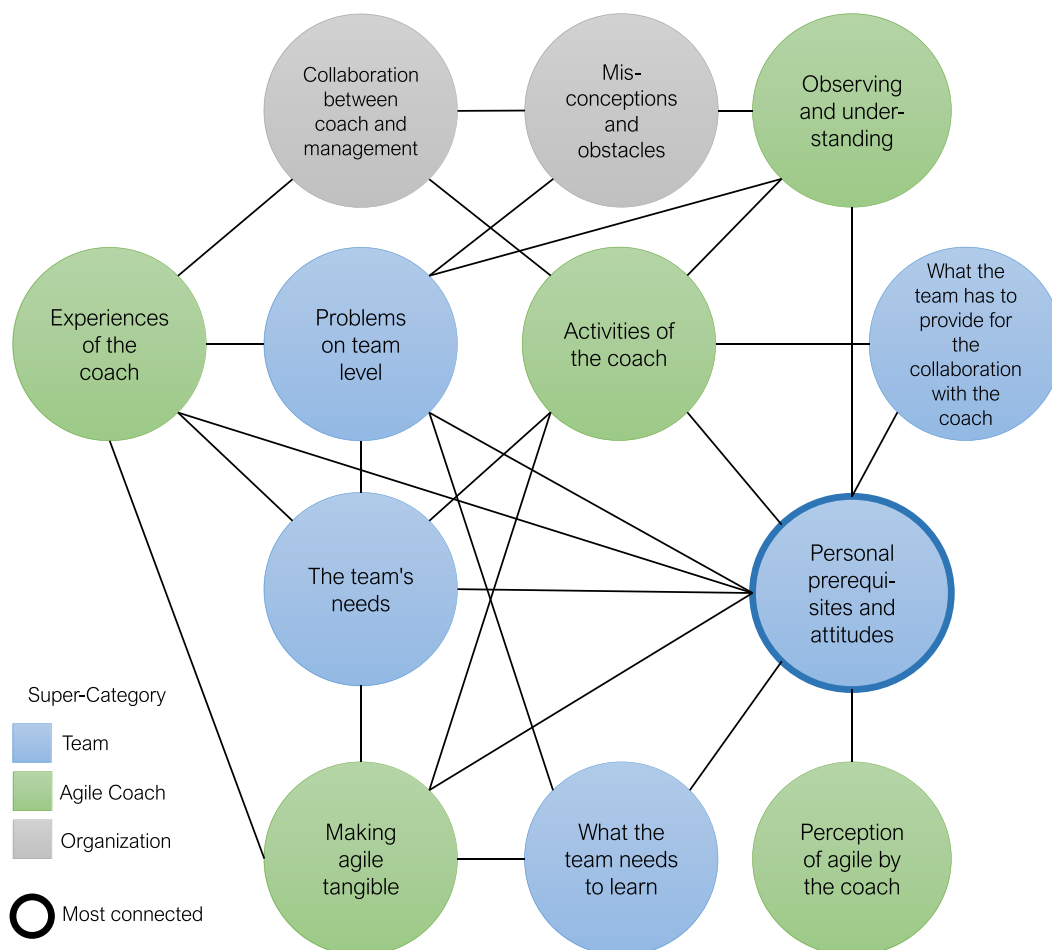

FIGURE 6 Dependencies between the categories

As evident from Figure 6, there are some categories that are rarely related to other categories, while other categories are linked with several other categories. For example, the category "Perception of agile by the coach" is only related to the category "Personal prerequisites and attitudes" which is, in turn, related to nine other categories (which is the maximum number of relations to other categories). Given the density Δ of this graph, calculated as number of edges divided by the maximum number of possible edges, of $\Delta = 26/(12 \cdot 11/2) = 0,\overline{39}$, we see that the categories are—on average—highly related to each other.

4.2.2 | Results of the selective coding process

The last step of our coding process, the selective coding, helps to identify core categories in the set of categories. Each core category represents a fundamental aspect for explaining the phenomenon under consideration, which in our case is the adoption of an agile mindset.

Figure 7 represents the absolute number of aspects per category. The category "What the team needs to provide for the collaboration with the coach" consists of few statements only. In contrast, the categories "Activities of the coach" and "Experiences of the coach" have been frequently mentioned. This can be explained by the choice of interviewees, who are all agile coaches that can best report on their daily work and their experiences.

In addition, as evident from Figure 7, there are two further categories that have been frequently mentioned: "What the team needs" and "Personal prerequisites and attitudes." These categories directly emerged from the interview data.

As mentioned in the previous section, Figure 6 presents all dependencies between the categories. The category "Personal prerequisites and attitudes" is related to nine out of the 11 other categories which is the highest number of relations to other categories. Consequently, we identify the category "Personal prerequisites and attitudes" as a core category. The category "Problems of the team" has seven relations to other categories. However, all aspects included in this category emerge from other categories (e.g., problems emerging from missing prerequisites or missing knowledge). Therefore, the category "Problems of the team" does not represent a core category.

Summarizing the results of this coding process, it becomes clear that the personal prerequisites and attitudes of the team members are the main driving success factor and prerequisite for creating an agile mindset.
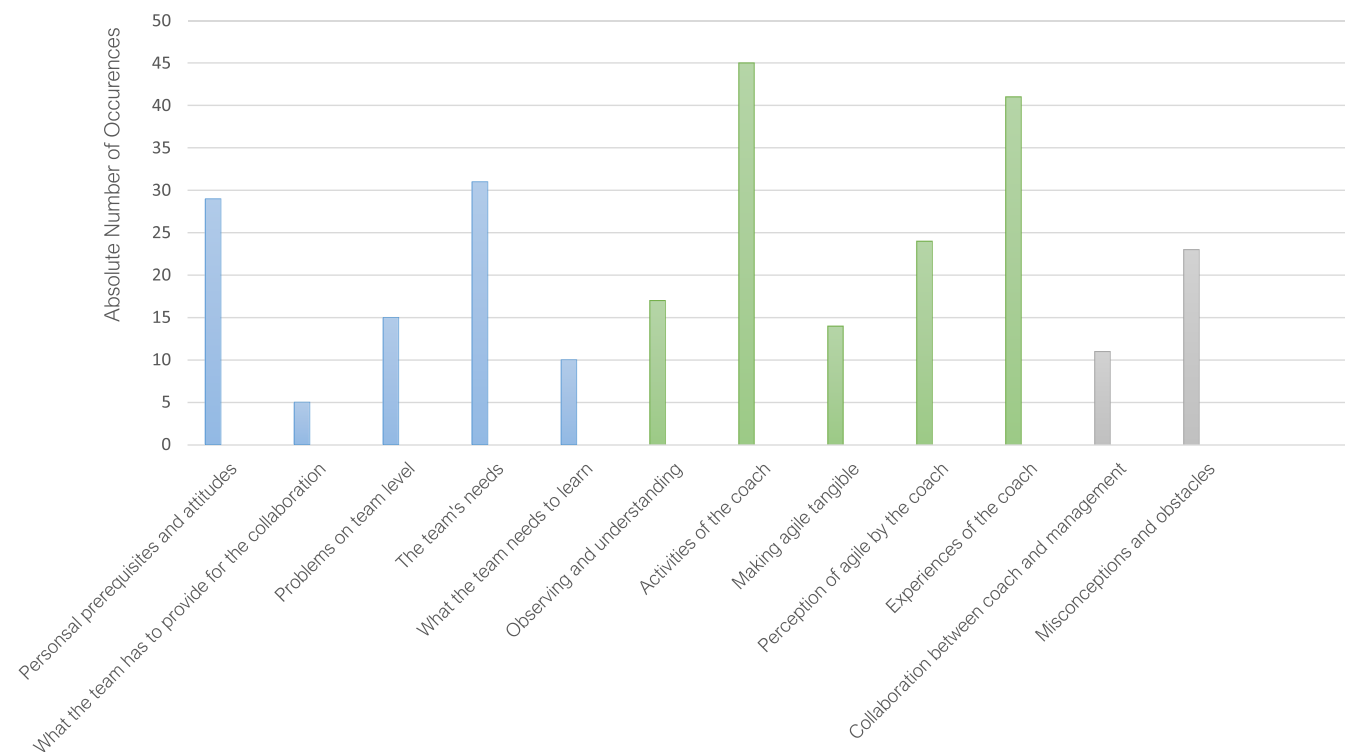
FIGURE 7 Absolute number of statements per category

4.2.3 | Synthesis of the results

In this subsection, we synthesize the results of the interview study in a timeline of the process of the mindset adaption. However, as mentioned by several interviewees, the process of the mindset adoption is highly influenced by the persons in the team. Therefore, the timeline can only be seen as a very coarse-grained starting point and should not be overinterpreted. Based on the scenarios described in the interviews, the timeline should be considered in the context of an agile transformation. Other contexts such as improving the agile way of working are too specific to derive an abstract timeline.

The overall process is visualized in Figure 8. As a first step, the coach needs to get in contact with the management of the organization. The coach needs to figure out what the management understands as "agile" and—if necessary—correct the ideas in order to avoid expectations that cannot be met.

In a next step, the coach gets in contact with the team that should be supported during the transformation. First, the coach needs to get to know the team and its way of working. In addition, the coach figures out whether the team members themselves are motivated to perform the transformation, whether they are willing to try the agile way of working, whether there are team-internal problems, and so on.

Afterwards, the coach can start implementing single agile practices. This process goes along with the one proposed by Sureshchandra and Shrinivasavadhani.[25] At this point, it is possible to adjust already existing practices to be conform with an agile development process. Adjusting existing practices instead of exchanging them smoothes the team's way through the transformation. Before introducing new practices, the team should get a brief theoretical training, including an explanation why the respective practice is helpful and should be implemented. Agile simulations can help to create a first understanding for the practice. Afterwards, the team needs to implement the practice and include it in their daily work. The coach should ensure that the practice is implemented correctly.

During the whole process, the coach should live the agile values himself or herself. For example, the coach should be respectful and open to others' ideas. This helps to create a basis for the team upon which to build the agile mindset. In case of problems, the coach should always help the team having the agile values in mind. If a problem cannot be solved, the coach has to support the team in finding alternatives. In addition, the coach should create situations in which the team can learn using these values in a safe environment (i.e., with few risks).

As soon as the team implements the practices correctly and starts living the values, the coach should start reducing his or her interventions. He or she has to observe the team in order to find a good point in time to leave the team. This is the case as soon as the team itself starts reflecting on its behavior and improving on it and when the coach cannot set any relevant impulses anymore. In this situation, the coach evaluates together with the team the further proceeding: (1) he or she can leave the team, (2) he or she can stay for a few more days and continue the observation, or (3) he or she leaves the team with the possibility to come back if necessary (with the possibility for the team to reach out to the coach in case of problems).
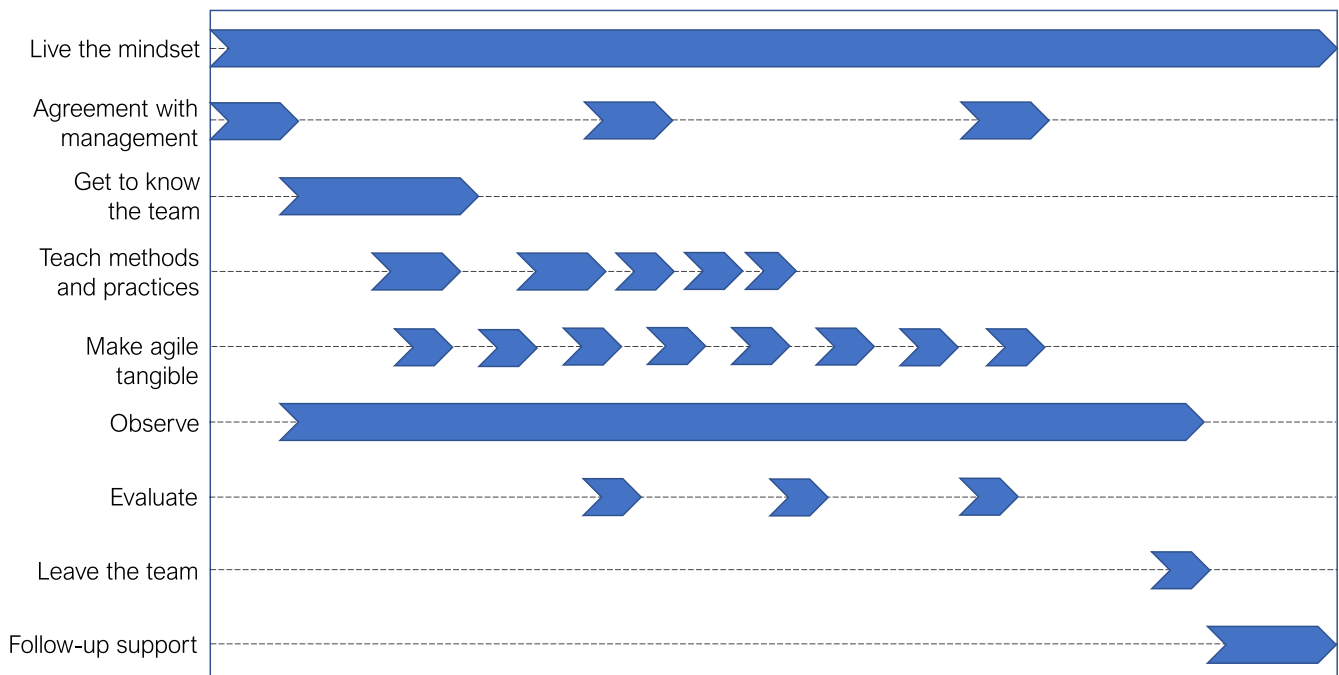
FIGURE 8 Exemplary process of the creation of an agile mindset during an agile transformation derived from the synthesized results of the study

5 | DISCUSSION

Based on our results, we conclude this paper by answering the three research questions, discussing the results, and presenting limitations.

5.1 | Answers to the research questions

Summarizing our results, we can answer the research questions as follows:

5.1.1 | RQ1: What is important for agile coaches when they start accompanying a new team?

When an agile coach comes into a new team, it is important to observe the team to get an understanding of the team dynamics, their current situation and way of working. Each team is different and filled with different personalities. What is working in one team might not be working in another team. Therefore, it is important to observe the team closely before introducing an agile mindset.

5.1.2 | RQ2: How can agile coaches support developers when creating a mindset supporting agile software development?

First and foremost, the team needs to be open to the agile way of working. Otherwise, it might be difficult to create an agile mindset. If this prerequisite (besides others) is fulfilled, in order to facilitate the mindset creation, the team should understand the vision and reasons behind introducing an agile way of working. It is also important to integrate the teams in the whole process and listen to their ideas, concerns and needs. A coach can integrate existing elements in the way of working to ease the transformation. The organization on management level should show commitment towards the agile way of working and welcome experiments. The management needs to create an atmosphere that allows development teams to fail and to try something that may or may not work. An agile coach has to be a role model for showing the agile values. By living the agile values and the agile mindsets himself/herself, an agile coach can provide insights into the agile way of working.

5.1.3 | RQ3: What personality characteristics hinder or support the adaption of an agile mindset?

Personal attitudes that can positively influence the adoption of an agile mindset are first and foremost the willingness to change and the openmindness towards other developers, the coach, and the agile way of working. Developers not having these attitudes face difficulties and can hardly adopt the agile mindset. In addition, an imprint by a contrary way of working or thinking hinders living an agile mindset.

5.2 | Interpretation

In line with previous research (cf. previous studies[1,13,21]), our results show that the right agile mindset and especially the implementation of one is important for a successful agile transformation. An agile mindset lays the foundation on which a team is working. The implementation of agile methods and practices can help to anchor an agile mindset into daily business. However, the mere implementation of agile methods and practices without an agile mindset is often pointless since the foundation is missing.[1,11] The team lacks the understanding of the rational and reasons behind agile methods and practices. Often, agile methods have to be adopted to fit a special context of a company. Without the right mindset, the methods are often adapted in a wrong way and loose their purpose. Therefore, a right agile mindset can guide a successful adaption of agile methods.

Although the importance of an agile mindset spreads constantly, the discussion around "agile" is often still based on the used method and practices.[1] Kuhrmann et al[3] investigated the influence of the use of different practices and methods on the perceived degree of agility in a project for the different software engineering disciplines. They found only little connection between the use of certain practices and the degree of agility in a project. In fact, the same practices are used in plan-based and agile contexts. Therefore, they conclude that the degree of agility has to depend on other aspects.[3]

The fact that the same practices are used in an agile or plan-based context shows that the mindset is way more important than the used practices when asking about the perceived degree of agility. The used methods and practices are often combined and adapted to fit the respective context of a company. Therefore, the same practices can be used in a plan-driven or agile context. As described above, the base for that adaption

is the mindset. Therefore, the mindset decides about the degree of agility and not the used practices. However, Kuhrmann et al[3] do not investigate in which way the practices and methods are adapted. Klünder et al[35] conducted a survey study in which they investigate for what purpose different methods and practices are used. They identify a huge gap between the intended use of methods (e.g., Scrum is meant to be used for project management and daily stand-ups are meant to be used for synchronization [and, hence, also for project management]) and the use in practice (e.g., Scrum and daily stand-ups are most often reported to be used for implementation and coding).[35] Therefore, it is not surprising that the mere use of Scrum does not guarantee being agile. How should an agile method as Scrum guarantee being agile, if it is used in a completely different way as initially proposed? However, even if it is used as intended, it is unlikely that this guarantees being agile.[1,3] Tell et al[36] also conclude that it is more important how different practices are used and arranged rather than if they are used. Our results show that the finding of the right mindset is an individual process. No two companies are the same, nor two teams. This means for the work of agile coaches that they have to carefully observe the company or team that they are working with. Based on their observation, they can find the best way of introducing a new mindset. It is of particular importance that they continuously involve the other employees in the process and get their feedback. An agile coach also needs to find a vision that everyone can follow to align the employees and create a common goal. Only in this way the implementation of a new mindset will be successful. To spread the new mindset among all employees is further important to ensure that methods and practices are chosen and adapted correctly and do not loose their agile purpose.

The mere implementation of agile practices is rather simple. It is more difficult to change the minds of employees and the management. However, given the results of the study presented in this paper, this is the important aspect for a lasting effect and a successful agile transformation. With a successful implementation of a new mindset, an agile coach can leave a company and the company can adapt and choose the right agile practices on their own. Consequently, further investigations on the degree of the agility of a team should focus on the mindset and the people involved in the process rather than trying to answer the question on process level.

Typically, companies strive for improvement.[7] This improvement can focus on different aspects: shorter release cycles, more flexibility, or more satisfied developers. In most cases, companies try to reach this improvement on process level. However, there are several attempts to improve software projects by focusing on the persons involved in the process. Besides the technical aspects, social aspects are frequently in the focus of research. Adequate communication[37] and equal participation and fair interactions in meetings[38] are just two aspects that are at least as important as technical skills. There are several similarities between this appropriate interaction with other team members and an agile mindset. Although, to the best of our knowledge, this has not yet been proven by research, we assume that an agile mindset facilitates adequate interactions and vice versa. Therefore, it would be interesting to combine research on agile mindsets with research on personality traits (cf. Calefato et al.[39]) and social aspects of software development (cf. Graziotin et al.[40]). Besides practical insights from agile coaches, insights from research might help to create an agile mindset.

None of the aspects related to an agile mindset that have been mentioned in our interview study is new. We assume that both researchers and practitioners are aware of the relevance of an agile mindset and the aspects required to achieve an agile mindset. The results of our study are kind of as expected. But, having this in mind, it is even more interesting that teams are more often doing agile than being agile.[1] Despite concrete ideas of how the process of creating an agile mindset can be supported, the mindset changing process seems to be way more difficult: As the creation of an agile mindset is an individual process, the success strongly depends on the persons in the team. Therefore, we investigate how an agile coach can support a team creating an agile mindset.

5.3 | Limitations and threats to validity

There are some limitations and aspects threatening the validity and the generalizability of the study's results. As proposed by Wohlin et al,[31] we distinguish between threats to *construct*, *internal*, *external*, and *conclusion validity*.

5.3.1 | Conclusion validity

The results of this study are based on five interviews with a total of nine interviewees. Therefore, the results should not be overinterpreted. In addition, some interviewees had a rather low level of experience when looking at the years (less or equal two in most cases). However, given the amount of anecdotes they presented in the interviews and the fact that we reached a saturation effect after the fourth interview (i.e., no new insights from the last interview), we are confident that our results also reflect the opinions of other agile coaches that did not participate in our study. Unfortunately, we cannot provide detailed information on the participants, their companies, and the teams they supported during the agile transformation. This risks the conclusion validity as it remains unclear how reliable the participants' answers are and what kind of teams their answers refer to. Therefore, further studies should be conducted to either extend or strengthen the results, for example, with discussions in a focus group or using a Delphi study and to draw more detailed conclusions for specific types of teams.

5.3.2 | Internal validity

Given the nature of qualitative and exploratory studies, there are several aspects threatening the internal validity. First of all, a researcher was present during the data collection in the interviews and adjusted the questions on-the-fly. This may have introduced a researcher bias because it is possible to ask questions in a way leading to the desired answer. We observed this problem when using the wording "agile mindset." Using this wording triggered the interviewees to think in the direction of social and cultural aspects. Therefore, in the later interviews, we avoided using the word "mindset" to retrieve—if possible—also technical aspects that support success with agile work environments. However, sooner or later, all interviewees talked about the necessity to live an agile mindset without us leading to this topic.

We are confident that other aspects of the researcher bias only play a minor role in our study as each step was performed by the second author of this paper and objectively reviewed by the first and the third author. In addition, we sent all the interview transcripts and the synthesized results to the interviewees to ask for feedback and to avoid misinterpretations during the analysis phase.

5.3.3 | Construct validity

As the interviews mainly consisted of open questions that were adjusted during the process, it is somewhat difficult to compare statements in the interviews as we always need to take into account the context in which a specific statement arose. To reduce the risk of statements put into a wrong context, we used three coding steps. This led to condensed statements and revealed abstract relationships and similarities between the statements.

In addition, all results are based on subjective experiences. The interviews mainly consisted of coaches' self-reports which introduces a bias. It is not unlikely that we received answers from the coaches that are correct for an "ideal" agile coach but are not applicable in practice.

Besides, we only collected data using interviews and analyzed them using a three-step coding methodology. This leads to a *mono-operation bias*. Consequently, other studies are required to triangulate and strengthen our results.

5.3.4 | External validity

As interviewees, we used experienced agile coaches that already supported companies during their agile transformation. As the coaches were able to report from experiences with different teams in different companies, we are confident that our results can also be applied to other companies. However, given the fact that the humans involved in the transformation process strongly influence which practices work and which do not, it is likely that not all insights gained in our study are suitable and helpful for an arbitrary team in an arbitrary company. Consequently, our results can be used as a starting point to support a team when creating an agile mindset, but they should not be taken as the ultimate truth.

6 | CONCLUSION

As there is a difference between being agile and doing agile, in this paper, we analyzed how "being agile" by means of having an agile mindset can be supported by agile coaches. To analyze this question, we performed an interview study with nine agile coaches from Germany and Spain which we analyzed using open, axial, and selective coding.

According to our results, there are prerequisites on the team level that support or facilitate the creation of an agile mindset, such as a general open-mindedness and the willingness to adjust the way of thinking and working. Some imprints in contrast hinder or complicate the mindset building process. In addition, the coach can actively support the team in the process of mindset building by, for example, living the agile values and by creating situations in which the team can try agile practices.

An appropriate collaboration between the coach and the management is also required during the process. This includes sharing a realistic vision and the coach correcting misunderstandings of what agile means as well as a correct motivation for agile working.

Nevertheless, these aspects still cannot guarantee that a team completely adopts the agile mindset and succeeds with an agile work environment. There are too many factors on psychological and personal levels meaning that this set of aspects should be seen as a starting point rather than a concrete road to success.

Future work is required to concretize our results by, for example, analyzing which factors are the most important, or to extend the results with more ideas—for example, focusing on value creation.

DATA AVAILABILITY STATEMENT

Data are available on request due to privacy/ethical restrictions.

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