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Conceptualizing the Agile Mindset in Agile Software Development Teams

Research in Progress

Kristin Geffers¹, Ulrich Bretschneider¹, and Karen Eilers²

¹ University of Kassel, Information Systems, Kassel, Germany
kristin.geffers@wi-kassel.de
bretschneider@uni-kassel.de

² Institute for Transformation, Hamburg, Germany
karen.eilers@in-transformation.com

Abstract. Agile Software Development Teams (ASDTs) employ agile methodologies to navigate the dynamic landscape of the software industry, responding effectively to constant change and innovation. The success of ASDTs relies significantly on the individuals' mindset, referred to as the agile mindset (AM). Yet, a clear conceptualization of the AM remains elusive, as existing approaches do not meet scientific standards and fail to produce consistent results. This paper addresses this gap by systematically conceptualizing the AM within the context of ASDTs. Through a systematic review and evaluation of existing definitions and initial conceptualizations, we identify dimensions and consolidate insights, resulting in a comprehensive conceptualization of the AM. Our work represents a crucial step towards understanding the AM's role in ASDTs and lays the foundation for our planned future work: the empirical validation and development of a standardized measurement instrument for the AM.

Keywords: Agile Mindset, Agility, Agile Software Development Teams, Conceptualization

1 Introduction

In today's rapidly evolving technological landscape, the software industry stands out as particularly susceptible to constant change and disruption. With innovation driving the industry forward at an unprecedented pace, companies within this sector face continuous challenges to remain adaptable and competitive (Ozkan et al., 2020; Gannod et al., 2018). To address these challenges head-on, software development teams adopt agile methodologies and work according to the values captured in the Agile Manifesto (Fowler and Highsmith, 2001). These teams, known as agile software development teams (ASDTs), employ iterative processes marked by frequent testing, feedback, and adaptation, all aimed at continuously delivering valuable outcomes to their customers (Buvik and Tkalic, 2022). The Agile Manifesto follows a people-focused approach,

emphasizing individuals in the process of building software (Beck et al., 2001). Consequently, the success of agile software projects is critically linked to people factors (Al-dahmash et al., 2017), referring to the human aspects, such as individual behavior, influencing the agile development process and overall project success. Many researchers already explored various people factors in the field of ASDTs, such as agreeableness, morals, and motivation (Acros-Medina and Mauricio, 2020; Zainal et al., 2020; Fatema and Sakib, 2017). Although the significance of the mindset of individuals working in ASDTs, in the following referred to as the agile mindset (AM), has long been emphasized in both research and practice, the scientific knowledge surrounding this phenomenon remains limited. In particular, there is a pressing need for deeper and clearer conceptualizations of the AM (Eilers et al., 2022). Current concepts predominantly rely on a limited number of practice-driven insights and employ inconsistent dimensions in defining the AM (Eilers et al., 2022; Fuchs and Hess, 2018). Moreover, these concepts are excessively broad and fail to address the specific context and requirements of ASDTs. Consequently, attempts to conceptualize the AM have fallen short of meeting scientific standards and delivering coherent results. Our paper works on the identified gap by answering the research question (RQ): *How can the agile mindset among individuals working in agile software development teams be conceptualized?*

Our research aims to conceptualize the AM in the context of ASDTs. By systematically reviewing and evaluating existing AM definitions and initial conceptualizations, we were able to a) identify all known dimensions, b) consolidate redundant insights, and c) eliminate irrelevant aspects. Further, we expand the existing knowledge base by adding additional insights that we derived from relevant theory. This process leads to a comprehensive conceptualization of the AM which effectively addresses the gaps in understanding the construct. These outcomes represent a partial result of our ongoing research endeavors. Moving forward, our objectives include empirically evaluating and validating our findings, as well as developing a standardized measurement instrument for assessing the AM among individuals in ASDTs.

1.1 Agile Software Development Teams

Agile software development (ASD), using methodologies like Scrum and Extreme Programming, aligns with the values outlined in the Agile Manifesto (Alqudah and Rozi-lawati, 2017). These values prioritize individuals, working software, customer collaboration, and responsiveness to change (Highsmith and Fowler, 2001). Unlike traditional methods, agile approaches emphasize experimenting, shared ownership, and continuous stakeholder involvement (Zanail et al., 2020), enabling frequent delivery and real-time adaptation (Tam et al., 2022). ASD allows teams to respond rapidly and flexibly to changes, fostering learning and improvement (Hameed et al., 2016). Additionally, it enhances stakeholder satisfaction, productivity, and business alignment (Henderson-Sellers and Ralyté, 2010). Agile software development teams (ASDTs) operate in line with agile values and principles, consisting of small, cross-functional groups that make collective decisions (Moe et al., 2012; Schwaber and Sutherland, n.d.;). Close collaboration is essential in ASDTs (Dingsøyr et al., 2013), with roles typically including Agile Manager, Scrum Master, Product Owner, and Developer (Zanail et al., 2020).

Research on ASDTs covers various aspects like organizational, technical, technological, procedural, project, customer, team, and performance dimensions (Arcos-Medina and Mauricio, 2020; Aldahmash et al., 2017; Chiyangwa and Mnkandla, 2017; Darwish and Rizk, 2015). However, ASD maintains a people-centric approach, with team members driving the development process, adapting to changing requirements, and ensuring the software's success (Alqudah and Rozilawati, 2017; Tam et al., 2020). This human-centered focus has led to growing research on people factors. The outlined factors found in the literature can be categorized into several dimensions:

- 1) Scholars have investigated *personal traits* such as agreeableness, conscientiousness, team orientation, emotionality, extraversion, and honesty-humility in the context of ASDTs (Zainal et al., 2020; Fatema and Sakib, 2017).
- 2) *Individual characteristics* of the ASDT members significantly impact their performance. Autonomy, learnability, openness to experience, and self-organization are crucial for navigating agile project complexities (Acros-Medina and Mauricio, 2020; Zainal et al., 2020; Stankovic et al., 2013; Chow and Cao, 2008; Subramanyam and Prasad, 2013).
- 3) The psychological well-being of members also plays a vital role in the success of ASDTs. Individual *perceptions* of participative safety, psychological safety, and mutual trust contribute to creating an environment where individuals feel supported and secure in expressing their ideas and concerns (Acros-Medina and Mauricio, 2020; Buvik and Tkalich, 2022; Fatema and Sakib, 2017).
- 4) Further *psychological factors* such as motivation, moral, and value congruence were investigated in ASDTs (Acros-Medina and Mauricio, 2020; Fatema and Sakib, 2017; Chiyangwa and Mnkandla, 2017; Kelle et al., 2015; Stankovic et al., 2013; Fernández-Sanz and Misra, 2011).

1.2 The Agile Mindset

Understanding the AM entails delving into the concept of “mindset” which originates from cognitive psychology. Mindset can be viewed as the inherent sense-making assumptions of an individual, serving as a general framework of epistemology (French, 2016). Scholars often describe mindset as a predisposition to perceive the world in a certain way, acting as a lens through which individuals interpret experiences. This implies that mindset shapes an individual's worldview and dictates how individuals view and interact with the world, portraying it as a fundamental aspect of their beliefs and identity (French, 2016). This view corresponds to the psychological concept of attitude which reflects an individual's predisposition towards a value and their reactions to various objects or behaviors, termed the attitude object (Perloff, 2016). Unlike mindsets, attitudes are more specific, focusing on particular objects or behaviors and indicating an individual's degree of favor or disfavor towards them (Dweck, 2016). Thus, attitudes can be positive or negative evaluations of the attitude object (Perloff, 2016). Applied to the context of the AM, it can be regarded as an attitude with a thematic focus on agility as its object, with agility understood as the company's ability to rapidly and effectively respond to external changes (Youssef et al., 2021). Similar to attitudes, the AM can be a positive or negative evaluation of agility by an individual (Eagly and

Chaiken, 1993). Attitudes are generally resistant to change but can evolve through environmental experiences and learning processes (Petrocelli et al., 2007).

2 Research Design

Clear, concise conceptualization is crucial for accurately defining constructs (Churchill, 1979). To conceptualize the AM, we followed a three-step process recommended by MacKenzie et al. (2011): 1) review existing literature, 2) specify the construct, and 3) define it. We started by examining past research on the AM. This review aimed to identify previous definitions as well as initial conceptualizations and assess their strengths and weaknesses. In December 2023, we conducted a systematic literature search using Google Scholar and Business Source Premier for works published until 2023 under the search criteria “Agile Mindset”, “Mindset”, “Attitude”, and “Agile Attitude”. This yielded 21 relevant studies from journals and conferences. Forward and backward citation searches from these studies identified 9 additional sources. Following that, we reviewed these 30 articles, carefully assessing their abstracts for relevance. Of these, 23 articles used the keywords in contexts different from our focus, prompting their exclusion. Ultimately, we selected 7 relevant studies (Table 1) for our analysis.

Our next step in conceptualizing the AM is to formally specify it by building on the strengths of prior definitions and conceptualizations from our literature analysis. This process entails leveraging the insights in a stepwise manner according to the criteria that we used for the literature analysis, namely general type of property, entity to which the property applies, dimensions, and stability. The specification of the AM construct including its dimensions enabled us in a final step to provide a clear, concise conceptual definition of the AM. In the future, we aim to validate our findings through empirical testing and to develop a standardized measurement tool for evaluating the AM among members in ASDTs.

3 Preliminary Findings: Conceptualization of the Agile Mindset

Review and analysis of the literature: As described in the previous section, we identified seven relevant studies (Table 1). All examined studies perceive the AM as an attitude towards a company’s or team’s agility efforts, or at least its closely related concept of mindset. Moreover, all studies consistently identify the individual employee as the entity to which this property applies. In contrast, scholars lack clarity on which dimensions of agility should form the attitude object. There is no consensus on the specific dimensions or their quantity and some crucial dimensions remain undiscovered. Additionally, we found significant overlaps between dimensions within the initial conceptualization. All these discrepancies in the dimensionality lead to the fact that until today there are inconsistent, varying and unspecific definitions of the AM. Furthermore, only one paper by Eilers et al. (2022) addresses the stability of the AM. The authors suggest that like psychological attitudes, the AM tends to be somewhat resistant to change but can evolve through experiences and resulting learning processes. This

previously overlooked aspect should be a crucial component of a comprehensive conceptualization of the AM.

Table 1. Overview of Literature

Extant literature	Methodologies
Senapathi and Srinivasan (2013)	Literature review
Van Manen and van Vliet (2014)	Case study
Gannod et al. (2018)	Interviews
Miler and Gaida (2019)	Interviews and quantitative survey
Mordi and Schoop (2020)	Literature review and interviews
Ozkan et al. (2020)	Literature review and expert interviews
Eilers et al. (2022)	Quantitative survey

Specification of the construct: (1) *General type of property:* All identified studies (Table 1) commonly interpret the AM as a psychological attitude or at least as a mindset that is closely related to the concept of attitude towards a company's or team's agility efforts. Derived from our research aim, we will take the team perspective, more precisely that of the ASDT for our conceptualization.

(2) *Entity's property:* All identified studies consistently apply the AM to individual employees. In our research, we refine this perspective to specifically focus on individuals within ASDTs.

(3) *Dimensions:* Our literature analysis revealed significant discrepancies in the identified works regarding the dimensionality of the AM. To ensure precision in defining the focal construct, we identify and clarify each relevant dimension and their interrelationships, following MacKenzie et al.'s recommendations (2011). This involves meticulously analyzing each study and dimension to assess their relevance and distinctiveness. We examine the unique characteristics of each dimension and consider key questions: How distinct are these characteristics from each other, beyond their common theme? Would excluding any dimension significantly limit the construct's scope, particularly in the context of ASDTs? Dimensions that did not meet these criteria were excluded. In the final step, the remaining dimensions (Table 2) were grouped by categorizing those with similar thematic focuses into distinct and unique groups.

(4) *Stability:* Only the studies by Eilers et al. (2022) and Senapathi and Srinivasan (2013) address the stability of the AM. Following their findings, we agree that the AM, defined as a psychological attitude, tends to exhibit stability over time but can evolve through experiences and learning processes influenced by the environment.

Definition of the construct: Based on the specifications provided, we define the AM as the attitude of an individual working in an ASDT towards an ASDT's agility efforts. This, in turn, is expressed through the following dimensions: Positive attitude of an individual working in an ASDT 1) towards the search for and the learning of new things and insights to respond to change (learning spirit); 2) towards sharing knowledge, giving feedback, and collaborating with colleagues for problem-solving (collaborative exchange); 3) towards the reflecting upon their working process, organizing themselves, making own decisions, and taking responsibility for their work (empowered self-guidance); and 4) with a direct touch point with customers towards a proactive record of

customer needs and a proactive transfer into appropriate actions in response of these needs (proactive interaction with customers). The AM tends to be more or less change-resistant in an individual employee, however, can be changed over time through experiences in contact with the environment and the resulting learning processes.

Table 2. Categorization of Dimensions

Dimensions from extant literature (Table 1)	Newly-emerged dimensions
Opportunities for learning; continuous improvement; continuous learning; open mind; willingness to learn; seeking new insights for change response	Learning spirit: Positive attitude of an individual working in an ASDT towards the search for and the learning of new things and insights to respond to change
Collaboration; transparently share and discuss methods and work results	Collaborative exchange: Positive attitude of an individual working in an ASDT towards sharing knowledge, giving feedback, and collaborating with others for problem-solving
Proactivity; responsibility; proactive mind; decide for themselves how to proceed	Empowered self-guidance: Positive attitude of an individual working in an ASDT towards self-reflection, organizing themselves, decision-making, and taking ownership
Customer orientation in a co-creation process	Customer co-creation: Positive attitude of an individual working in an ASDT towards customer-centricity within a customer co-creation process

4 Contributions and Outlook

Our study addresses the current gap in the scientific literature concerning the inconsistent understanding of the AM by providing a clear and concise conceptualization along with its dimensions. Thus, we reduce misunderstandings and interpretation errors regarding the AM and foster consistent communication across research and practice about this phenomenon. Furthermore, we lay the groundwork for further theoretical exploration of the AM's impacts and relationships, its theoretical differentiation from other constructs, and the development of precise measurement and validation of the AM construct. Moreover, a reliable conceptualization of the AM addresses the inconsistent and misleading applications observed in practice by providing practitioners, managers leading ASDTs, and human resources departments with a basis to comprehend AM's role and relevance in ASDTs and to identify strategies and measures to promote attitudes, competencies, skills, and values required to foster an AM among employees. Looking ahead, we aim to empirically evaluate and validate our findings and develop a standardized tool to measure AM among individuals in ASDTs.

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