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Team Performance in Agile Software Development Projects: The Effects of Requirements Changes, Time Pressure, Team Diversity, and Conflict

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ABSTRACT

Information system development has traditionally been accompanied by changing requirements throughout projects. While recent research clarifies how time pressure affects team performance, the interplay between time pressure, requirements changes, and various other important factors such as team diversity is unclear. In this paper, we evaluate a novel and unified model based on extant research explaining the interactions of requirements changes, time pressure, temporal leadership, team diversity, and conflict as well as their effect on team performance. Further, we differentiate between the overall team performance and the team's ability to respond both efficiently and extensively to requirements changes. The proposed model helps in composing and steering teams to increase their resilience towards requirements changes and time pressure. A first evaluation is based on a quantitative field study in multiple agile software development projects of student teams.

Keywords

Team Performance, Agile Software Development, Requirements Changes, Time Pressure, Diversity, Conflict

INTRODUCTION

Agile methods for information system development (ISD) are increasingly popular in industry (Conboy 2009; Dybå and Dingsøyr 2008; Fitzgerald et al. 2006; Lee and Xia 2010; Williams 2012) and see wide-spread adoption (VersionOne 2017). Agile ISD methods, however, are no guarantee that a team will be successful (Fraser and Mancl 2008), and our understanding of what affects team performance and of the mechanisms of action in *agile ISD* (henceforth: AISD) *teams* is lacking (Lee and Xia 2010; Persson et al. 2012; Sarker et al. 2009).

Team-level research in AISD, however, is scarce (Lee and Xia 2010), although AISD is mostly conducted in teams and is quintessentially a team effort (Siau et al. 2010). Moreover, results are inconsistent. Some studies suggest that AISD methods work best for highly cohesive and similar (i.e., non-diverse) teams (Cao et al. 2009; Fruhling and de Vreede 2006), and that cohesiveness could be the main reason for successful ISD. Others find that diversity amplifies creativity and communication, and therefore contributes to the success of AISD methods (Bear and Woolley 2011; Lee and Xia 2010; Phillips et al. 2006). However, some studies identified an overhead in communication due to diversity in teams, which hinders performance (Ely and Thomas 2001; Leonard et al. 2004; MacMillan et al. 2004). Similar to diversity, time pressure has been found to both hinder and facilitate team performance, depending on the temporal leadership, which helps to mitigate negative effects of time pressure (Maruping et al. 2015).

Research on teams and team performance therefore has identified a need to move beyond the simple diversity-affects-performance model (Van Der Vegt and Bunderson 2005, p. 542), with calls for more empirical research on how different factors affects team performance (henceforth: performance) in AISD (Lee and Xia 2010), and on team-level effects in AISD (Conboy 2009; Mangalaraj et al. 2009; McAvoy and Butler 2009; McAvoy et al. 2013).

In this study, we aim to (1) identify the effects of diversity in AISD teams, (2) and to consolidate previous findings on team performance (especially regarding time pressure and temporal leadership) into a unified and richer understanding of team performance in AISD. Explaining team performance in a unified, consolidated, and parsimonious model will ultimately help to understand AISD better, and to reduce the number of failed AISD projects. Therefore, we enrich our understanding of team performance in AISD by including and adapting findings of team- and organizational-behavior research as well as established findings from the information systems (IS) research community.

We tested our model with a sample from eight student teams comprising 33 students and engaged in AISD projects, using partial-least square (PLS) structural equation modeling. We found that team performance is affected by requirements changes, temporal leadership, and team diversity. Time pressure has been found to increase affective conflict, which in turn decreased team performance. Further we found that response efficiency precedes and improves response extensiveness, which in turn showed to be beneficial for team performance.

Our results corroborate our unified model and indicate that in an enriched and extended model of team performance interdependencies and effects can manifest differently from more contained models as found in extant research. We therefore expand previous research on team performance and AISD by taking the bigger picture of AISD into account.

The remainder of this paper is structured as follows. First, we lay out related work and establish the theoretical background. Second, we argue for our hypotheses and lay out our research model. Third, we present our research design and explain the details of data analyses. These results are then discussed. Finally, we discuss the findings and limitations of this study, give an outlook to future research and give a conclusion of this paper.

RELATED WORK

Information Systems Development & Agile Approaches

IS are often developed in the form of projects (Hirschheim et al. 1995, p. 33), with many involved stakeholders and project team members (Chae and Poole 2005). The nature of ISD is in many aspects intangible (Cule et al. 2000). As a result, many problems of ISD projects are not so much technological as sociological in nature (DeMarco and Lister 1987, p. 4). Coordination and communication between various stakeholders are necessary for successful implementation (Corvera Charaf et al. 2013; Gallivan and Keil 2003; Ko et al. 2005), and creating a shared understanding between involved stakeholders is deemed to be a major driver for ISD success (Bittner and Leimeister 2014; Gallivan and Keil 2003; Rosenkranz et al. 2013; Rosenkranz et al. 2014; Tan 1994).

In practice, methods for developing IS range from sequential approaches (Royce 1970) to more cyclic, iterative approaches (Boehm 1988). The contemporary state-of-the-art AISD methods (Cao et al. 2009; Vidgen and Wang 2009), which are increasingly adopted in industry (VersionOne 2017), trade strict control for more flexibility and autonomy within the team, the overall development process is not planned upfront, and progress is made in small iterative phases, while encouraging change and constant feedback (Cockburn and Highsmith 2001; Highsmith and Cockburn 2001). Planning becomes a permanent task, and team leadership is established via collaboration (Dybå and Dingsøyr 2008; Dybå and Dingsøyr 2009).

While the team thus is highlighted as crucial to AISD in practice, extant research in the field of AISD methods has investigated mainly specific, individual, or organizational phenomena, such as the use and effects of specific agile practices (Balijepally et al. 2009; Holmqvist and Pessi 2006; Maruping et al. 2009b), and effects regarding whole projects or organizations, such as the adoption of AISD methods (Cao et al. 2009; Heeager 2012; Hong et al. 2011; Kotlarsky 2007; Mangalaraj et al. 2009).

As research thus covers the individual and organization-wide level of effects on AISD, team-level effects are covered less so. Likewise, team research in organizational behavior has included technology as an influencing factor of team work (e.g., Kozlowski and Ilgen 2006), but specific features of ISD have not been observed. Research found that cohesive teams are the optimal base for applying agile practices (Cao et al. 2009; Fruhling and de Vreede 2006), while other studies suggest that *diversity* – the differences among team members regarding visible (i.e., surface-level; e.g., ethnicity, age) and invisible (i.e., deep-level; e.g., experience, education) characteristics (Bear and Woolley 2011; Lee and Xia 2010; Phillips et al. 2006) – amplifies creativity and problem-solving ability (Bear and Woolley 2011; Lee and Xia 2010; Phillips et al. 2006) and therefore might provide benefits for ISD. These inconsistencies are especially important for AISD, as AISD teams rely heavily on efficiency (to respond quickly to requirements changes; Conboy 2009) and problem solving ability (to complete complex, non-routine tasks; Lee and Xia 2010).

AISD explicitly acknowledges the importance of being able to respond to *requirements changes* and even embrace change and an ever-changing environment (Beck et al. 2001). Each change imposes difficulties for the team. Therefore, AISD teams have to have the capacity to recover quickly from these changes and resulting difficulties. Extant research proposed this ability to consist of *response efficiency* (i.e., responding to and implementing of requirements changes with minimal time, cost, personnel, and resources) and *response extensiveness* (i.e., the proportion of requirements changes that a team responds to and implements) – both have been found to be important predictors of overall performance (Lee and Xia 2010).

As AISD embraces requirements changes and aims at responding efficiently and extensively, changing requirements are leading to additional work. Therefore, AISD teams are exposed to time pressure.

Time Pressure & Temporal Leadership

Time pressure is defined as the perceived scarcity of time to complete a task (Cooper et al. 2001). It is important to differentiate time pressure from performance pressure (the shared accountability for outcomes, high scrutiny of work, and significant consequences of performance outcomes; Gardner et al. 2012), as well as from urgency (a concern for time and a feeling of being continuously hurried; Mohammed and Nadkarni 2011). Extant research (Maruping et al. 2015) found that perceived time pressure (in the following simply named "time pressure") negatively affects team processes. These processes in turn contribute to performance. With increased time pressure and therefore weakened team processes, performance is bound to decrease.

Actions which structure, organize, or manage a team and its tasks are conceptualized as *temporal leadership* (Maruping et al. 2015). This concept has been found to moderate the effect of time pressure, meaning that high temporal leadership offsets negative effects on processes and ultimately performance (Maruping et al. 2015). Temporal leadership therefore plays an important role in AISD, due to its change-embracing nature.

Changing requirements lead to additional work and new tasks. Typically, deadlines cannot be moved – which leads to more work per time. While requirements changes are therefore affecting time pressure and project failure being partly attributed to changing requirements (Zowghi and Nurmuliani 2002), recent research has not yet integrated requirements changes into the interactions of time pressure, temporal leadership, and performance.

Similar to requirements changes, findings in organizational research have not yet been fully integrated in ISD research, although diversity in AISD teams becomes increasingly important, due to outsourcing and globally distributed teams.

Diversity & Conflict

Behavioral research on team work has focused mainly on outcomes of performance before shifting from input-process-output models to cyclic input-mediation-output-input models (Ilgen et al. 2005). A notion of teams as complex, context-sensitive, and evolving systems has emerged (Ilgen et al. 2005; Kozlowski and Bell 2003).

As ISD projects are becoming more distributed and diverse (e.g., Persson et al. 2012; Ramesh et al. 2012; Sarker et al. 2009; Sarker and Sarker 2009), research on AISD has started adapting diversity concepts, and calling for a better understanding of effects of diversity in ISD (Lee and Xia 2010). Extant research applied theories of organizational psychology while being focused on IT use than on ISD (e.g., Gorecki et al. 2008; Nan 2011; Wang and Hahn 2015).

In organizational psychology, *diversity* has emerged as an important predictor of performance and research found contradictions (del Carmen Triana et al. 2014; Hülsheger et al. 2009; Joshi and Roh 2009; Milliken and Martins 1996; Phillips et al. 2006; Post 2012; Van Der Vegt and Bunderson 2005). Some studies find a positive relation between diversity and performance (see Bear and Woolley 2011; Phillips et al. 2006; Van Der Vegt and Bunderson 2005), but outlined a dependency on specific contextual circumstances, such as the competitive threat-level (del Carmen Triana et al. 2014), team identification, and climate (Van Der Vegt and Bunderson 2005). Team identification and climate have been found to play an important role in generating positive effects from diversity (Van Der Vegt and Bunderson 2005). Studies which identified a negative effect describe an overhead of communication and a risk for conflict (Ely and Thomas 2001; Leonard et al. 2004; MacMillan et al. 2004).

Scholars differentiate between deep-level (DLD; i.e. education, experiences) and surface-level diversity (SLD; i.e. ethnicity, age) (Aggarwal and Woolley 2013; Hülsheger et al. 2009; Phillips et al. 2006). These two types act differently: while SLD highlights dissimilarities and encourages sharing of unique information (Phillips et al. 2006), DLD might lead to harmful conflict (Jehn et al. 1999) or facilitate performance by providing different educational backgrounds and skillsets (Joshi and Roh 2009).

Furthermore, diversity can be grouped (Harrison and Klein 2007) into separation (differences in opinions etc.), disparity (differences in socially valued assets), and variety (differences in knowledge etc.). In the scope of this research, we are most interested in variety, as differences in knowledge can help overcome crises.

Diversity entails a risk of increased conflict and a need for increased communication among team members. Research distinguishes between *affective conflict* (i.e., conflict on an emotional or personal level that is not task-related; also named relationship conflict) versus *task conflict* (i.e., disagreements about ideas and strategies regarding the current task) (Jehn et al. 2008). While a medium level task conflict has been found to be beneficial to non-routine tasks, affective conflict has been found to negatively affect performance (Jehn et al. 2008).

In sum, no integrated model exists that explains the relationships between factors such as diversity, temporal leadership, conflict, requirements changes, and time pressure. This becomes especially important if the inconsistent findings of effects of diversity are taken into account. A holistic model integrating the findings of organizational research into extant ISD research helps in explaining interdependencies and interactions of existing models.

RESEARCH MODEL & HYPOTHESES

Based on the literature laid out above, we argue for a novel research model that integrates these streams for AISD (see Figure 1). Table 1 provides detailed definitions for each construct.

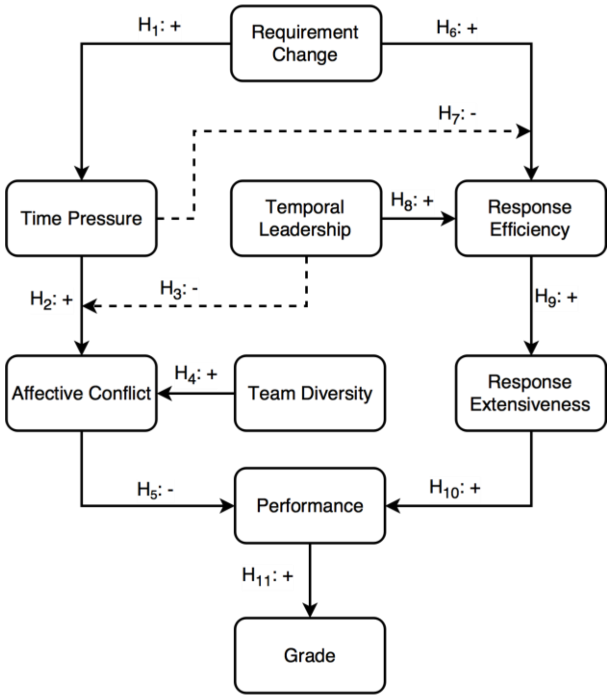


Figure 1. Research Model.

Construct	Definition
Requirements Changes (Maruping et al. 2009a)	Reflects changes to the intended functionality of the to-be-developed IS during the process.
Time Pressure (Cooper et al. 2001; Kelly and McGrath 1985; Maruping et al. 2015)	A (perceived) scarcity of time available to complete a task, relative to the demands of the task at hand.
Temporal Leadership (Maruping et al. 2015; Mohammed and Nadkarni 2011)	Leader behaviors that help in structuring, coordinating, and managing the pacing of task accomplishment within the team.
Response Efficiency (Lee and Xia 2010)	Minimal time, cost, personnel, and resources that the team requires to respond to and implement a specific requirement change.
Response Extensiveness (Lee and Xia 2010)	Proportion of changing user requirements that a software team responds to and implements.
Team Diversity (Aggarwal and Woolley 2013; Hülsheger et al. 2009; Lee and Xia 2010; Phillips et al. 2006)	The extent to which team members are different in terms of their functional backgrounds, skills, expertise, and (work) experience.
Affective Conflict (Jehn et al. 2008; Maruping et al. 2015)	Conflict on an emotional or personal level that is not task-related. Also named relationship conflict.
Team Performance (Lee and Xia 2010; Maruping et al. 2015; Wallace et al. 2004)	The extent to which a team's project deliverable is produced on time, within budget, within functionality requirements, and is of high quality.

Construct	Definition
Grading	The grade achieved by each participant. The grades are based on the industry partner's and the teaching assistant's evaluation of each participant.

Table 1. Construct Definitions.

Due to the change-embracing nature of AISD (Beck et al. 2001), we focus on *requirements changes* first. Requirements changes are conceptualized as a change in the customer's understanding of their own needs over the course of the project (Maruping et al. 2009a). Likewise, *time pressure* is defined as the perceived scarcity of available time to finish a task (Maruping et al. 2015). As requirements changes have been found to increase time pressure due to increased work amounts (Maruping et al. 2015), we propose:

H_1: Increased requirements changes increase time pressure.

With increased time pressure, confusion might arise over who is responsible for which task, due to limited resources (Maruping et al. 2015). Furthermore, this results in limited time to resolve existing conflicts or inhibits to blights upcoming conflicts. This further increases frustration and in turn conflict (Maruping et al. 2015) – more specifically, *affective conflict*, that is, conflict on an emotional or personal level, which is not directly task-related (Jehn et al. 2008). Following this argument, we state:

H_2: More time pressure leads to more affective conflict.

In line with the argumentation of Maruping et al. (2015), we propose a moderation of temporal leadership on the effect of time pressure on affective conflict. Temporal leadership is defined as "leader behaviors that aid in structuring, coordinating, and managing the pacing of task accomplishment within the team" (Mohammed and Nadkarni 2011, p. 492); temporal leadership plays an important role to utilize time pressure as a motivator. As we focus on affective conflict (i.e., the negative effects of time pressure due to increased confusion about who should complete what tasks (Maruping et al. 2015)), we propose that strong temporal leadership leads to less time-pressure-related conflicts. Therefore, we propose:

H_3: Higher levels of temporal leadership decrease the effect of time pressure on affective conflict.

Diversity has been found to have both positive (Bear and Woolley 2011; Lee and Xia 2010; Phillips et al. 2006) and negative effects (Cao et al. 2009; Fruhling and de Vreede 2006) on *performance* – the fulfillment of requirements, functionality, and quality. This depends on the level of diversity and the type of resulting conflict (Jehn et al. 1999; Joshi and Roh 2009; Phillips et al. 2006). As we focus on diversity in skillsets and experiences (Joshi and Roh 2009) to tackle shocks resulting from requirements changes, we are especially interested in deep-level diversity, which has been found to increase the need for communication and entailing a risk of misunderstanding and conflicts (Jehn et al. 1999). Therefore, we propose:

H_4: Higher levels of diversity lead to more affective conflict.

As extant research found, affective conflict is hindering performance (e.g., by requiring additional time to resolve conflicts; Jehn et al. 2008) which is why we state:

H_5: Increased affective conflict decreases performance.

Coming back to the top of our model, we further expect requirements changes to increase response efficiency. The more requirements changes are brought forward by a customer, the more potential a team has to respond efficiently. Therefore, we posit:

H_6: Higher levels of requirements changes lead to more response efficiency.

Extant research found that with increasing time pressure, developers engage in less productive, inefficient tasks, constraining their ability to efficiently complete their task (Durham et al. 2000; Perlow 1999). If time pressure rises, the ability to turn requirements changes into response efficiency (see H_5) is being limited. If H_1 is supported, this assembles a control-loop: increased requirements changes increase the potential of response efficiency which in turn is limited if the increased requirements changes raise the time pressure. We expect this to ultimately prevent teams from responding efficiently for high time pressure.

H_7: More time pressure decreases the enabling effect of requirements changes on response efficiency.

Regarding *temporal leadership* (i.e., "leader behaviors that aid in structuring, coordinating, and managing the pacing of task accomplishment within the team" (Mohammed and Nadkarni 2011, p. 492)), we expect temporal leadership to increase response efficiency. Contrary to extant literature (Maruping et al. 2015), we do not posit time pressure to have a direct effect on response efficiency (and therefore temporal leadership not having a moderating effect on response efficiency). Instead of replacing it, we modify and transform the previous model. H_3 resembles the moderating and mitigating effect of temporal leadership on the negative effects of time pressure. We further argue that temporal leadership increases response efficiency due to the structuring, coordinating, and managing (i.e., optimizing) actions associated with strong temporal leadership. Therefore, we propose:

H_8: Higher levels of temporal leadership lead to increased response efficiency.

With the ability to respond efficiently to requirements changes, we expect teams to be able to also respond more extensively. While extant research found a negative effect of response extensiveness on response efficiency (Lee and Xia 2010), an inverted relationship so far has neither been supported nor dismissed. We argue that with high response efficiency, resulting from strong temporal leadership, a team is able to response more extensive than otherwise. We acknowledge that an overly extensive response can have adverse effects on response efficiency (i.e. due to an overwhelming effect (Lee and Xia 2010)), but we argue that this situation would not have happened if a strong temporal leadership was in place (e.g., due to a better structuring and organization of tasks). Therefore, we state:

H_9: Increased response efficiency increases response extensiveness.

As a team is able to respond extensively to requirements changes, performance is bound to increase as well, as this results in more software functionality being implemented as initially needed by the client (Lee and Xia 2010):

H_{10}: Increased response extensiveness increases performance.

As our sample consists of students of a graded course, we expect an increased performance to lead to better grades:

H_{11}: Increased performance leads to better grading.

RESEARCH DESIGN

Survey Design & Data Collection

As our research model is based on extant literature and all constructs were already used by previous literature, we were able to reuse parts of existing measurement instruments.

In accordance with the quantitative nature of our study we used a questionnaire to gather data. Over the course of an undergraduate class in which students had to develop software for practitioners following AISD principles (Scrum), we provided two different surveys at two different times. First and at the very beginning of an iteration, we asked for general demographics and static information and control variables, such as the experience developing software. Second and just after finishing the iteration, we asked the participants for all outcome-related constructs. Third, we measured the grading of the outcome by the teaching assistants and the industry partner at the end of the project. With this approach, we hope to get an as unbiased result as possible, as we gather static information (e.g., diversity) without distortion from current, quite possibly stressed, emotions, while still gather time-pressure-sensitive data during the most stressful part of AISD (i.e., sprint completion).

All participants were granted anonymity and did not receive any rewards for participation. The grades were added to our dataset by an otherwise not involved researcher without access to any identifying properties aside from the student-identification number.

Measurement Scales

Table 2 lists all constructs used in our research model as well as the measurement items for each construct. To ensure a common understanding of all items, we applied the back translation method (Brislin 1970), as all participants were more proficient in German than in English.

Construct	Item
(RC) Requirements Changes (Maruping et al. 2009a)	Requirements fluctuated quite a bit in early phases of the project
	Requirements fluctuated quite a bit in later phases of the project
	Requirements identified at the beginning of the project were quite different from those toward the end
(TP)	We are often under a lot of pressure to complete our tasks on time

Construct	Item
Time Pressure (Maruping et al. 2015)	We are not afforded much time to complete our tasks
	The amount of time provided to complete our tasks is short
	Task durations are often short
(TL) Temporal Leadership (Maruping et al. 2015)	To what extent does the team leader remind members of important deadlines?
	To what extent does the team leader prioritize tasks and allocate time to each task?
	To what extent does the team leader prepare and build in time for contingencies, problems, and emerging issues?
	To what extent does the team leader pace the team so that work is finished on time?
	To what extent does the team leader urge members to finish sub-tasks on time?
	To what extent does the team leader set milestones to measure progress on the project?
	To what extent is the team leader effective in coordinating the team to meet customer deadlines?
(RE) Response Efficiency (Lee and Xia 2010)	How much additional effort was required by the team to incorporate the following changes? (Effort includes time, cost, personnel, and resources)
	System Scope
	System Input Data
	System Output Data
	Business Rules & Processes
	Data Structure
	User Interface
(RX) Response Extensiveness (Lee and Xia 2010)	How much additional effort was required by the team to incorporate the following changes? (Effort includes time, cost, personnel, and resources)
	System Scope
	System Input Data
	System Output Data
	Business Rules & Processes
	Data Structure
	User Interface
(TD) Team Diversity (Lee and Xia 2010)	The members of the team were from different areas of expertise
	The members of the team had skills that complemented each other
	The members of the team had a variety of different experiences
	The members of the team varied in functional backgrounds
(AC) Affective Conflict (Maruping et al. 2015)	How much have you managed friction among members of your project team?
	How much have you managed personality conflicts between team members during the project?
	How much have you dealt with tension among members of your project team?
	How much have you managed emotional conflict among members of your project team?
(PE) Team Performance (Lee and Xia 2010; Maruping et al. 2015)	The client perceives that the system meets intended functional requirements
	The overall quality of the developed system is high
	The software delivered by the project achieved its functional goals
	The software delivered by the project met end-user requirements
	The capabilities of the software fit end-user needs
	The software met technical requirements
(GR) Grading	The final grade (in points) for this sprint. Based on functionality implemented, bugs fixed, and code quality, as rated by the lecturer and practice partner.

Table 2. Constructs & corresponding items.

DATA ANALYSIS & RESULTS

We gathered data from 33 voluntarily partaking students. Table 3 describes the sample characteristics. The group to which the students were assigned did only correlate with one item – the functional background diversity (#4 of the diversity construct; $r(31) = -.380$, $p < .05$) –, indicating variations in perceived functional backgrounds among groups.

Participants (n = 33)	
Gender	Female (N = 5; 15.2%)
	Male (N = 28; 84.8%)
	Other (N = 0; 0%)
Age	22.41 years average (range: 20-28)

Experience in working agile	No previous experience (N = 21; 63.6%)
	One year (N = 7; 21.2%)
	Two or more years (N = 4; 12.2%)
	No answer (N = 1; 3.0%)
Group Sizes	Four to six students per Group (M = 5.00, SD = .5)

Table 3. Sample Description

In the following we test our model using partial least squares (PLS) structural equation modeling. PLS is better suited for exploratory research and predict key target constructs using latent variables, and for complex structural models than a covariance-based approach (Hair et al. 2011). Our results were calculated with SmartPLS 3.2.6 (Ringle et al. 2015).

Our measurement model contains reflective and formative constructs. As the grading is a single-item and – in this context – less subjective construct compared to other success measures such as self-report performance, we do not check this construct for reliability or validity. We first checked the reflective constructs (i.e., all but response extensiveness and response efficiency) for reliability and validity. First, internal consistency was evaluated using Cronbach's alpha and composite reliability which need to exceed .70 (Nunnally 1978; Werts et al. 1974). The constructs fulfill both criteria (see Table 5). Second, indicators are considered reliable if the associated latent construct explains more than half of the indicator's variance (Henseler et al. 2009); our model passes this criterion (see Table 6). Therefore, we presume indicator reliability.

Third, Table 5 shows that the composite reliabilities of all constructs exceed the required minimum of .80 and that the AVE values of all constructs exceed the threshold of .50. Additionally, all item loadings exceed the threshold of .70. Thus, convergent validity conditions are met (Fornell and Larcker 1981).

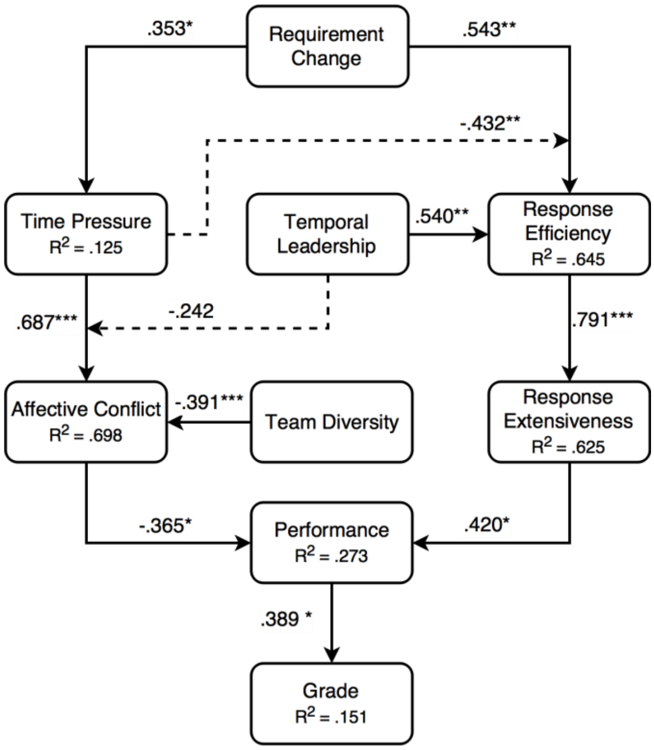
Fourth, the square root of each construct's AVE needs to exceed the correlations with the other constructs to indicate discriminant validity (Fornell and Larcker 1981) which is the case for all of our constructs (see Table 4). Moreover, we examined the factor loadings of each indicator (Fornell-Larcker criterion). Each indicator needs to load higher on the associated construct compared to all other factors (Chin 1998) which is the case for our data (see Table 6). In addition to the Fornell-Larcker criterion, the Heterotrait-monotrait (HTMT) ratio of correlations is suggested as a new criterion to assess discriminant validity (Henseler et al. 2015). The highest HTMT value for our model of .78 is below a conservative threshold of .85 (Henseler et al. 2015). Combining the results, we posit discriminant validity (Voorhees et al. 2015).

	RC	TP	TL	TD	AC	PE	GR
RC	**.86**						
TP	.35	**.88**					
TL	-.07	.14	**.83**				
TD	-.16	-.14	-.14	**.76**			
AC	.33	.73	.11	-.47	**.93**		
PE	.01	-.06	-.02	.35	-.32	**.85**	
GR	.03	-.07	.25	-.03	-.04	.39	**1.00**

	Cα	**CR**	**AVE**
RC	.82	.90	.74
TP	.90	.93	.77
TL	.93	.94	.70
TD	.76	.84	.58
AC	.95	.97	.87
PE	.92	.94	.71
GR	1.00	1.00	1.00

Left: Table 4. Construct correlations & the square root of average variance extracted (AVE, bold).
Right: Table 5. Cronbach's alpha (Cα), composite reliability (CR) & average variance extracted (AVE).

	RC	TP	TL	TD	AC	PE	GR
RC1	**.94**	.34	-.03	-.04	.33	.10	-.02
RC2	**.83**	.34	-.13	-.20	.33	-.12	-.02
RC3	**.81**	.22	-.03	-.22	.18	.02	.16
TP1	.38	**.86**	.10	-.02	.66	-.17	-.10
TP2	.36	**.90**	.22	-.14	.64	-.14	-.02
TP3	.23	**.82**	-.06	-.15	.61	.11	-.01
TP4	.25	**.92**	.22	-.18	.63	.03	-.10
TL1	-.05	.01	**.87**	-.19	.00	-.03	.27
TL2	-.21	.24	**.82**	-.14	.16	.04	.20
TL3	-.08	.03	**.90**	.01	-.05	-.03	.23
TL4	.03	.10	**.87**	-.13	.12	-.06	.18
TL5	-.24	-.01	**.71**	-.28	-.01	-.13	.02
TL6	.01	.11	**.92**	-.09	.11	.02	.34
TL7	-.07	.34	**.79**	-.07	.31	.05	.14
TD1	-.29	-.19	.08	**.82**	-.44	.13	-.07
TD2	-.20	.04	-.19	**.74**	-.29	.38	-.11
TD3	.05	-.03	-.15	**.81**	-.35	.26	-.11
TD4	-.02	-.20	-.24	**.72**	-.31	.35	.23
AC1	.47	.61	.06	-.40	**.90**	-.24	.01
AC2	.24	.69	.10	-.46	**.95**	-.32	-.08
AC3	.27	.69	.19	-.46	**.94**	-.34	-.02
AC4	.29	.72	.07	-.42	**.95**	-.28	-.08
PE1	.15	.15	.14	.34	-.16	**.76**	.32
PE2	.06	.09	.09	.14	-.16	**.86**	.26
PE3	-.03	-.15	-.11	.41	-.29	**.88**	.25
PE4	.04	-.15	.02	.35	-.37	**.82**	.39
PE5	-.11	-.15	-.16	.32	-.39	**.85**	.36
PE6	-.11	-.16	-.11	.21	-.28	**.90**	.38
GR1	.03	-.07	.02	-.03	-.04	.39	**1.00**



Left: Table 6. Factor loadings (bold) & cross-loadings
Right: Figure 2. Path weights & significances.
*: $p < .050$, **: $p < .010$, ***: $p < .001$

In the following, we check the formative indicators (i.e., response efficiency and response extensiveness). We followed Petter et al. (2007) for assessing the validity and reliability of the formative constructs. The traditional evaluation criteria such as factor loadings and AVE are not applicable for evaluating formative measurement models. Because these measures assume high internal consistency (high intercorrelating indicators), they are inappropriate for formative indicators, where no theoretical assumption is made about inter-item correlation (Petter et al. 2007; Straub et al. 2004). We assessed construct validity by using principal components analysis to examine the item weights for the measurement model (Petter et al. 2007). Table 7 depicts the inter-item and item-to-construct correlations for the formative indicators. If the majority of inter-item correlations and item-to-construct correlations for a given latent construct are significant, the measures achieve convergent validity. As can be seen, all items correlate with one another within the same construct higher than with items of the other construct with only a few exceptions which indicates discriminant validity. While only one item (RE3) shows a significant outer weight (see Table 9), and one might drop the other items, all items share more variance with their respective construct than any other item which is why we keep the items (Cenfetelli and Bassellier 2009). Furthermore, small absolute and insignificant weights should not inevitably be misinterpreted as a poor measurement model (Chin 1998; Hair et al. 2011). Following this analysis, we assume convergent validity.

In line with Lee and Xia (2010), RX3 showed an above-threshold (Diamantopoulos and Siguaw 2006) value for the variance inflator factor (VIF, see Table 8). As Lee and Xia (2010) argue, removing RX3 would not benefit the measurement and the item was retained. Therefore, we ensure that no multicollinearity issue exists and that reliability is given.

	RX1	RX2	RX3	RX4	RX5	RX6	RX	RE1	RE2	RE3	RE4	RE5	RE6	RE
RX1	1.00													
RX2	.58*	1.00												
RX3	.66*	.70*	1.00											
RX4	.72*	.76*	.72*	1.00										
RX5	.50*	.60*	.51*	.43*	1.00									
RX6	.51*	.56*	.67*	.52*	.58*	1.00								
RX	.80*	.86*	.87*	.84*	.74*	.79*	1.00							

RE1	.40*	.24	.43*	.275	.45*	.52*	.47*	1.00						
RE2	.29	.49*	.51*	.44*	.13	.27	.44*	.39*	1.00					
RE3	.59*	.50*	.50*	.61*	.27	.45*	.59*	.40*	.60*	1.00				
RE4	.66*	.53*	.45*	.63*	.23	.32	.57*	.29	.70*	.60*	1.00			
RE5	.25	.36*	.40*	.39*	.41*	.41*	.45*	.54*	.46*	.62*	.26	1.00		
RE6	.33	.43*	.31	.35*	.21	.26	.38*	.34	.62*	.39*	.55*	.43*	1.00	
RE	.55*	.56*	.58*	.59*	.37*	.49*	.64*	.65*	.84*	.81*	.74*	.75*	.73*	1.00

Table 7. Inter-Item and Item-to-Construct Correlation Matrix for Formative Items.
$* p < .05$; EX: Response Extensiveness, EF: Response Efficiency

Having established our model as valid and reliable, we can now turn to our hypotheses. As can be seen in Figure 2, all hypothesized paths but one are significant. Hypotheses H_3 and H_9 cannot be accepted. As diversity does not increase affective conflict in our sample but actually decreases it, we cannot accept H_3. Regarding the moderating effect of temporal leadership on the effect of time pressure on affective conflict, we cannot accept the hypothesis, as it is not significant ($p = .080$).

Table 7 displays R^2 values, the achieved power as well as the effect sizes and respective f^2 values. As can be seen, most constructs provide medium or even large effects and high power in spite of the small sample size of 33.

Construct	R^2	Power	f^2	Effect size
RC -> RE	--	.999	.703	Large
RC -> TP		.677	.142	Small
TP	.280	.762	.178	Small
TL	--	.999	.721	Large
RE	.645	1.00	1.669	Large
RX	.625	.859	.237	Medium
TD	--	.988	.489	Large
AC	.698	.756	.175	Small
GR	.151	--	--	--
TL * TP	--	.589	.112	Small
TP * RC	--	.979	.433	Medium

Construct	Item	Weight	VIF
Response Extensiveness	RX1	.012	3.33
	RX2	-.347	3.04
	RX3	.363	3.75
	RX4	.597	2.47
	RX5	.202	1.98
	RX6	.334	2.13
Response Efficiency	RE1	-.417	2.69
	RE2	.348	2.58
	RE3	.716*	2.65
	RE4	.302	1.48
	RE5	.243	2.31
	RE6	.044	1.87

Left: Table 8. Interaction effects
R^2 values, Power, f^2 values, and effect sizes (Cohen 1988; Cohen 1992)
Right: Table 9. Outer Weight and Variance Inflator Factor (VIF) Statistics for Formative Indicators
$* p < .05$

DISCUSSION & CONCLUSION

We were able to support most of our hypotheses. Large effect sizes, high power, and high explained variance indicate that our small sample size of 33 participants is sufficient to draw meaningful conclusions. The model suggests that AISD is affected by requirements changes in regard to time pressure, affective conflict, and ultimately performance. Furthermore, the results suggest that diversity can reduce affective conflict and therefore mitigate some negative effects of time pressure, and that response efficiency, response extensiveness, as well as performance are linked to temporal leadership.

In contrast to our expectation, diversity decreased affective conflict in our sample. We assume this to be due to a medium level of diversity present in our sample. Age (SD = 2.18), experience (SD = .66), and educational background (SD = .55) were more homogeneous than in many AISD teams, as all participants were undergraduate students from the same university. This homogeneity might have reduced the likelihood of affective conflicts by providing a common ground and a feeling of belonging to the in-group (Brewer 1979). Another explanation would be that the in-group was perceived as more complex and diverse than other groups (Park and Rothbart 1982) and therefore, due to the self-reported characteristic, distort the measurement.

Another unexpected result was that no moderation of temporal leadership could be identified for the effect of time pressure on affective conflict. Another limitation and explanation for this might be that this sample was set in an educational context. While the class is designed to prepare students for real-life projects in cooperation with real-life practitioners, we cannot rule out a distortion. This might also have reduced the effect of affective conflict due to a sense of community among students (Cheng 2004; Cicognani et al. 2008).

Therefore, we call for replications in real-world scenarios with larger sample sizes. Replications would not only increase the reliability, but also increase the transferability to other contexts. Due to the small sample size and the participants being students, generalizability is not given. Future research could also investigate, whether or not the self-report items on diversity significantly deviate from the actual diversity to clear the mixed results regarding diversity. Furthermore, we measured different projects but only over one iteration. Including multiple iterations might result in further insights regarding the effect of time pressure.

Regarding theoretical contributions of this paper, we found supporting evidence for the importance of time pressure and temporal leadership for performance as outlined by previous research. Further, we integrated diversity and requirements changes to provide a more holistic view and are able to reduce the ambiguity of effects regarding diversity, requirements changes, and performance.

In regard to practical contributions, we laid the groundwork for a deeper understanding of the effects at play in AISD teams which are operating under constant requirements changes. The proposed model helps practitioners compose and steer teams to increase a team's resilience towards requirements changes and time pressure.

In this paper, we presented the results of a quantitative study. We added explanation to the effects and interactions between performance, requirements changes, time pressure, affective conflict, diversity and temporal leadership. We provided reasoning for the hypothesized relations and argued for deviations and discussed the contributions to both research and practice and derived future research opportunities from the limitations of this study.

REFERENCES

Aggarwal, I., and Woolley, A. W. 2013. "Do You See What I See? The Effect of Members' Cognitive Styles on Team Processes and Errors in Task Execution," *Organizational Behavior and Human Decision Processes* (122:1), pp. 92-99.

Balijepally, V., Mahapatra, R., Nerur, S., and Price, K. H. 2009. "Are Two Heads Better Than One for Software Development? The Productivity Paradox of Pair Programming," *MIS Quarterly* (33:1), pp. 91-119.

Bear, J. B., and Woolley, A. W. 2011. "The Role of Gender in Team Collaboration and Performance," *Interdisciplinary Science Reviews* (36:2), pp. 146-153.

Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., Jeffries, R., Kern, J., Marick, B., Martin, R. C., Mellor, S., Schwaber, K., Sutherland, J., and Thomas, D. 2001. "Manifesto for Agile Software Development." *Manifesto for Agile Software Development* Retrieved February 24, 2016, from http://www.agilemanifesto.org/

Bittner, E. A. C., and Leimeister, J. M. 2014. "Creating Shared Understanding in Heterogeneous Work Groups: Why It Matters and How to Achieve It," *Journal of Management Information Systems* (31:1), pp. 111-144.

Boehm, B. W. 1988. "A Spiral Model of Software Development and Enhancement," *IEEE Computer* (21:4), pp. 61-72.

Brewer, M. B. 1979. "In-Group Bias in the Minimal Intergroup Situation: A Cognitive-Motivational Analysis," *Psychological bulletin* (86:2), p. 307.

Brislin, R. W. 1970. "Back-Translation for Cross-Cultural Research," *Journal of Cross-Cultural Psychology* (1:3), pp. 185-216.

Cao, L., Mohan, K., Xu, P., and Ramesh, B. 2009. "A Framework for Adapting Agile Development Methodologies," *European Journal of Information Systems* (18:4), pp. 332-343.

Cenfetelli, R. T., and Bassellier, G. 2009. "Interpretation of Formative Measurement in Information Systems Research," *MIS quarterly*), pp. 689-707.

Chae, B., and Poole, M. S. 2005. "The Surface of Emergence in Systems Development: Agency, Institutions, and Large-Scale Information Systems," *European Journal of Information Systems* (14:1), pp. 19-36.

Cheng, D. X. 2004. "Students' Sense of Campus Community: What It Means, and What to Do About It," *NASPA journal* (41:2), pp. 216-234.

Chin, W. W. 1998. "The Partial Least Squares Approach to Structural Equation Modeling," *Modern methods for business research* (295:2), pp. 295-336.

Cicognani, E., Pirini, C., Keyes, C., Joshanloo, M., Rostami, R., and Nosratabadi, M. 2008. "Social Participation, Sense of Community and Social Well Being: A Study on American, Italian and Iranian University Students," *Social Indicators Research* (89:1), pp. 97-112.

Cockburn, A., and Highsmith, J. 2001. "Agile Software Development: The People Factor," *IEEE Computer* (34:11), pp. 131-133.

Cohen, J. 1988. "The Effect Size," *Statistical power analysis for the behavioral sciences*), pp. 77-83.

Cohen, J. 1992. "A Power Primer," *Psychological bulletin* (112:1), p. 155.

Conboy, K. 2009. "Agility from First Principles: Reconstructing the Concept of Agility in Information Systems Development," *Information Systems Research* (20:3), pp. 329-355.

Cooper, C. L., Dewe, P. J., and O'Driscoll, M. P. 2001. *Organizational Stress: A Review and Critique of Theory, Research, and Applications*. Sage.

Corvera Charaf, M., Rosenkranz, C., and Holten, R. 2013. "The Emergence of Shared Understanding: Applying Functional Pragmatics to Study the Requirements Development Process," *Information Systems Journal* (23:2), pp. 115-135.

Cule, P., Schmidt, R., Lyytinen, K., and Keil, M. 2000. "Strategies for Heading Off Is Project Failure," *Information Systems Management* (17:2), pp. 65-73.

del Carmen Triana, M., Miller, T. L., and Trzebiatowski, T. M. 2014. "The Double-Edged Nature of Board Gender Diversity: Diversity, Firm Performance, and the Power of Women Directors as Predictors of Strategic Change," *Organization Science* (25:2), pp. 609-632.

DeMarco, T., and Lister, T. 1987. *Peopleware: Productive Projects and Teams*. Dorset House Publishing Co., Inc. New York, NY, USA.

Diamantopoulos, A., and Siguaw, J. A. 2006. "Formative Versus Reflective Indicators in Organizational Measure Development: A Comparison and Empirical Illustration," *British Journal of Management* (17:4), pp. 263-282.

Durham, C. C., Locke, E. A., Poon, J. M., and McLeod, P. L. 2000. "Effects of Group Goals and Time Pressure on Group Efficacy, Information-Seeking Strategy, and Performance," *Human Performance* (13:2), pp. 115-138.

Dybå, T., and Dingsøyr, T. 2008. "Empirical Studies of Agile Software Development: A Systematic Review," *Information and software technology* (50:9), pp. 833-859.

Dybå, T., and Dingsøyr, T. 2009. "What Do We Know About Agile Software Development?," *IEEE Software* (26:5), pp. 6-9.

Ely, R. J., and Thomas, D. A. 2001. "Cultural Diversity at Work: The Effects of Diversity Perspectives on Work Group Processes and Outcomes," *Administrative Science Quarterly* (46:2), pp. 229-273.

Fitzgerald, B., Hartnett, G., and Conboy, K. 2006. "Customising Agile Methods to Software Practices at Intel Shannon," *European Journal of Information Systems* (15:2).

Fornell, C., and Larcker, D. F. 1981. "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research* (18:1), pp. 39–50.

Fraser, S., and Mancl, D. 2008. "No Silver Bullet: Software Engineering Reloaded," *IEEE Software* (25:1).

Fruhling, A., and de Vreede, G.-J. 2006. "Field Experiences with Extreme Programming: Developing an Emergency Response System," *Journal of Management Information Systems* (22:4), pp. 39-69.

Gallivan, M. J., and Keil, M. 2003. "The User-Developer Communication Process: A Critical Case Study," *Information Systems Journal* (13:1), pp. 37-68.

Gardner, H. K., Gino, F., and Staats, B. R. 2012. "Dynamically Integrating Knowledge in Teams: Transforming Resources into Performance," *Academy of Management Journal* (55:4), pp. 998-1022.

Gorecki, J., Berthon, P., DesAutels, P., Donnellan, B., and Teigland, R. 2008. "The Multinational's Nemesis: The Rise of Ict-Enabled Distributed Collective Intelligence?," in: *ICIS 2008 Proceedings*. pp. 1-6.

Hair, J. F., Ringle, C. M., and Sarstedt, M. 2011. "Pls-Sem: Indeed a Silver Bullet," *Journal of Marketing Theory and Practice* (19:2), pp. 139-152.

Harrison, D. A., and Klein, K. J. 2007. "What's the Difference? Diversity Constructs as Separation, Variety, or Disparity in Organizations," *Academy of management review* (32:4), pp. 1199-1228.

Heeager, L. T. 2012. "Introducing Agile Practices in a Documentation-Driven Software Development Practice: A Case Study," *Journal of Information Technology Case and Application Research* (14:1), pp. 3-24.

Henseler, J., Ringle, C. M., and Sarstedt, M. 2015. "Testing Measurement Invariance of Composites Using Partial Least Squares," *Forthcoming in: International Marketing Review*).

Henseler, J., Ringle, C. M., and Sinkovics, R. R. 2009. "The Use of Partial Least Squares Path modeling in International marketing," *Advances in International Marketing* (20:IV), pp. 277–319.

Highsmith, J., and Cockburn, A. 2001. "Agile Software Development: The Business of Innovation," *IEEE Computer* (34:9), pp. 120-122.

Hirschheim, R., Klein, H., and Lyytinen, K. 1995. *Information Systems Development and Data Modeling. Conceptual and Philosophical Foundations*. Cambridge, England: Cambridge University Press.

Holmqvist, M., and Pessi, K. 2006. "Agility through Scenario Development and Continuous Implementation: A Global Aftermarket Logistics Case," *European Journal of Information Systems* (15:2).

Hong, W., Thong, J. Y. L., Chasalow, L. C., and Dhillon, G. 2011. "User Acceptance of Agile Information Systems: A Model and Empirical Test," *Journal of Management Information Systems* (28:1), pp. 235-273.

Hülsheger, U. R., Anderson, N., and Salgado, J. F. 2009. "Team-Level Predictors of Innovation at Work: A Comprehensive Meta-Analysis Spanning Three Decades of Research," *Journal of Applied Psychology* (94:5), pp. 1128-1145.

Ilgen, D. R., Hollenbeck, J. R., Johnson, M., and Jundt, D. 2005. "Teams in Organizations: From Input-Process-Output Models to Imoi Models," *Annual Review of Psychology* (56), pp. 517-543.

Jehn, K. A., Greer, L., Levine, S., and Szulanski, G. 2008. "The Effects of Conflict Types, Dimensions, and Emergent States on Group Outcomes," *Group Decision & Negotiation* (17:6), pp. 465-495.

Jehn, K. A., Northcraft, G. B., and Neale, M. A. 1999. "Why Differences Make a Difference: A Field Study of Diversity, Conflict and Performance in Workgroups," *Administrative Science Quarterly* (44:4), pp. 741-763.

Joshi, A., and Roh, H. 2009. "The Role of Context in Work Team Diversity Research: A Meta-Analytic Review," *Academy of Management Journal* (52:3), pp. 599-627.

Kelly, J. R., and McGrath, J. E. 1985. "Effects of Time Limits and Task Types on Task Performance and Interaction of Four-Person Groups," *Journal of Personality and Social Psychology* (49:2), p. 395.

Ko, D.-G., Kirsch, L. J., and King, W. R. 2005. "Antecedents of Knowledge Transfer from Consultants to Clients in Enterprise System Implementations," *MIS Quarterly* (29:1), pp. 59-85.

Kotlarsky, J. 2007. "Re-Engineering at Lecroy Corporation: The Move to Component-Based Systems," *Journal of Information Technology* (22:4), pp. 465-478.

Kozlowski, S. W., and Bell, B. S. 2003. *Work Groups and Teams in Organizations*. London: Wiley.

Kozlowski, S. W., and Ilgen, D. R. 2006. "Enhancing the Effectiveness of Work Groups and Teams," *Psychological Ccience in the Public Interest* (7:3), pp. 77-124.

Lee, G., and Xia, W. 2010. "Toward Agile: An Integrated Analysis of Quantitative and Qualitative Field Data on Software Development Agility," *MIS Quarterly* (34:1), pp. 87-115.

Leonard, J. S., Levine, D. I., and Joshi, A. 2004. "Do Birds of a Feather Shop Together? The Effects on Performance of Employees' Similarity with One Another and with Customers," *Journal of Organizational Behavior* (25:6), pp. 731-754.

MacMillan, J., Entin, E. E., and Serfaty, D. 2004. "Communication Overhead: The Hidden Cost of Team Cognition," in *Team Cognition: Understanding the Factors That Drive Process and Performance,* E.S.S.M. Fiore (ed.). Washington, DC, US: American Psychological Association, pp. 61-82.

Mangalaraj, G., Mahapatra, R., and Nerur, S. 2009. "Acceptance of Software Process Innovations - the Case of Extreme Programming," *European Journal of Information Systems* (18:4), pp. 344-354.

Maruping, L. M., Venkatesh, V., and Agarwal, R. 2009a. "A Control Theory Perspective on Agile Methodology Use and Changing User Requirements," *Information Systems Research* (20:3), pp. 377-400.

Maruping, L. M., Venkatesh, V., Thatcher, S. M., and Patel, P. C. 2015. "Folding under Pressure or Rising to the Occasion? Perceived Time Pressure and the Moderating Role of Team Temporal Leadership," *Academy of Management Journal* (58:5), pp. 1313-1333.

Maruping, L. M., Zhang, X., and Venkatesh, V. 2009b. "Role of Collective Ownership and Coding Standards in Coordinating Expertise in Software Project Teams," *European Journal of Information Systems* (18:4), pp. 355-371.

McAvoy, J., and Butler, T. 2009. "A Failure to Learn by Software Developers: Inhibiting the Adoption of an Agile Software Development Methodology," *Journal of Information Technology Case and Application Research* (11:1), pp. 23-46.

McAvoy, J., Nagle, T., and Sammon, D. 2013. "Using Mindfulness to Examine Isd Agility," *Information Systems Journal* (23:2), pp. 155-173.

Milliken, F. J., and Martins, L. L. 1996. "Searching for Common Threads: Understanding the Multiple Effects of Diversity in Organizational Groups," *Academy of Management Review* (21:2), pp. 402-433.

Mohammed, S., and Nadkarni, S. 2011. "Temporal Diversity and Team Performance: The Moderating Role of Team Temporal Leadership," *Academy of Management Journal* (54:3), pp. 489-508.

Nan, N. 2011. "Capturing Bottom-up Information Technology Use Processes: A Complext Adaptive Systems Model," *MIS Quarterly* (35:2), pp. 505-540.

Nunnally, J. C. 1978. *Psychometric Theory*, (2nd ed.). New York: McGraw-Hill.

Park, B., and Rothbart, M. 1982. "Perception of out-Group Homogeneity and Levels of Social Categorization: Memory for the Subordinate Attributes of in-Group and out-Group Members," *Journal of Personality and Social Psychology* (42:6), p. 1051.

Perlow, L. A. 1999. "The Time Famine: Toward a Sociology of Work Time," *Administrative science quarterly* (44:1), pp. 57-81.

Persson, J. S., Mathiassen, L., and Aaen, I. 2012. "Agile Distributed Software Development: Enacting Control through Media and Context," *Information Systems Journal* (22:6), pp. 411-434.

Petter, S., Straub, D., and Rai, A. 2007. "Specifying Formative Constructs in Information Systems Research," *MIS quarterly*), pp. 623-656.

Phillips, K. W., Northcraft, G. B., and Neale, M. A. 2006. "Surface-Level Diversity and Decision-Making in Groups: When Does Deep-Level Similarity Help?," *Group processes & intergroup relations* (9:4), pp. 467-482.

Post, C. 2012. "Deep-Level Team Composition and Innovation: The Mediating Roles of Psychological Safety and Cooperative Learning," *Group & Organization Management* (37:5), pp. 555-588.

Ramesh, B., Mohan, K., and Lan, C. 2012. "Ambidexterity in Agile Distributed Development: An Empirical Investigation," *Information Systems Research* (23:2), pp. 323-340.

Ringle, C. M., Wende, S., and Becker, J.-M. 2015. "Smartpls 3." Retrieved 2017/05/22, from http://www.smartpls.com/

Rosenkranz, C., Charaf, M. C., and Holten, R. 2013. "Language Quality in Requirements Development: Tracing Communication in the Process of Information Systems Development," *Journal of Information Technology* (28:3), pp. 198-223.

Rosenkranz, C., Vranesic, H., and Holten, R. 2014. "Boundary Interactions and Motors of Change in Requirements Elicitation: A Dynamic Perspective on Knowledge Sharing," *Journal of the Association for Information Systems* (15:6), pp. 306-345.

Royce, W. W. 1970. "Managing the Development of Large Software Systems: Concepts and Techniques," *Proceedings of WesCon*.

Sarker, S., Munson, C. L., Sarker, S., and Chakraborty, S. 2009. "Assessing the Relative Contribution of the Facets of Agility to Distributed Systems Development Success: An Analytic Hierarchy Process Approach," *European Journal of Information Systems* (18:4), pp. 285-299.

Sarker, S., and Sarker, S. 2009. "Exploring Agility in Distributed Information Systems Development Teams: An Interpretive Study in an Offshoring Context," *Information Systems Research* (20:3), pp. 440-462.

Siau, K., Long, Y., and Ling, M. 2010. "Toward a Unified Model of Information Systems Development Success," *Journal of Database Management* (21:1), pp. 80-101.

Straub, D., Boudreau, M.-C., and Gefen, D. 2004. "Validation Guidelines for Is Positivist Research," *The Communications of the Association for Information Systems* (13:1), p. 63.

Tan, M. 1994. "Establishing Mutual Understanding in Systems Design: An Empirical Study," *Journal of Management Information Systems* (10:4), pp. 159-182.

Van Der Vegt, G. S., and Bunderson, J. S. 2005. "Learning and Performance in Multidisciplinary Teams: The Importance of Collective Team Identification," *Academy of Management Journal* (48:3), pp. 532-547.

VersionOne. 2017. "11th State of Agile Report." from https://explore.versionone.com/state-of-agile/versionone-11th-annual-state-of-agile-report-2

Vidgen, R., and Wang, X. 2009. "Coevolving Systems and the Organization of Agile Software Development," *Information Systems Research* (20:3), pp. 355-376.

Voorhees, C. M., Brady, M. K., Calantone, R., and Ramirez, E. 2015. "Discriminant Validity Testing in Marketing: An Analysis, Causes for Concern, and Proposed Remedies," *Journal of the Academy of Marketing Science* (44), pp. 119-134.

Wallace, L., Keil, M., and Rai, A. 2004. "How Software Project Risk Affects Project Performance: An Investigation of the Dimensions of Risk and an Exploratory Model," *Decision Sciences* (35:2), pp. 289-321.

Wang, Z., and Hahn, J. 2015. "Crowd Experience and Performance: An Empirical Analysis of Crowdsourced New Product Development," in: *ICIS 2015 Proceedings*. pp. 1-20.

Werts, C. E., Linn, R. L., and Jöreskog, K. G. 1974. "Intraclass Reliability Estimates: Testing Structural Assumptions," *Educational and Psychological Measurement* (34:1), pp. 25–33.

Williams, L. 2012. "What Agile Teams Think of Agile Principles," *Communications of the ACM* (55:4), pp. 71-76.

Zowghi, D., and Nurmuliani, N. 2002. "A Study of the Impact of Requirements Volatility on Software Project Performance," *Software Engineering Conference, 2002. Ninth Asia-Pacific*: IEEE, pp. 3-11.