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Consequences of Project Team Member Turnover for Agile Information Systems Development Teams: A Multiple Case Study

Completed Research Paper

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Abstract

Turnover of IT professionals has been at the center of IT workforce research, mainly focusing on individual level drivers and consequences. This paper explores how turnover events affect the dynamics of agile software development (ISD) teams. We conducted 25 semi-structured interviews in seven cases to understand team-level consequences of turnover events. We found that ISD teams who directly or indirectly experienced turnover events are confronted with the following four consequences on the group level: (1) group dynamics shift, leading to (2) interpersonal voids, and (3) voids of expertise which consequently leads to (4) rebalancing resources. Through our work, we contribute to a better understanding of how coping processes that start after collective turnover occurs in agile ISD teams are shaped at the group level.

Keywords: turnover, consequences, ISD team, project management, emotional

Introduction

Turnover of IT professionals has been at the center of IT workforce research since the beginning of the information systems discipline, as it poses many problems for organizations (Wiesche et al. 2019). First, IT consulting and tech firms operate in the sector with the highest turnover rates, at around 13% on average (Lewis and Soroñgon 2022). IT professionals show less attachment to their employers, with only 29% having high intent to stay at their job (Moore 2022). Second, it is difficult to find replacements for IT professionals because of the high demand in IT labor markets (Thibodeau 2012). Third, it creates high costs for IT organizations, related not only to the direct costs of recruiting and training but also to indirect costs associated with the disruption of organizational processes (Thatcher et al. 2002). Because of how turnover among IT professionals impacts organizations, IT workforce research has sought to identify antecedents and consequences of turnover (Joseph et al. 2007; Maier et al. 2015). Antecedents include exhaustion or role stress, and consequences include replacement costs or performance stress (Ahuja et al. 2007; Zylka and Fischbach 2017).

Most IS research has examined turnover at the individual level, but how turnover events affect group level phenomena such as ISD teams remains elusive (Joseph et al. 2007; Zylka and Fischbach 2017). This research gap is surprising because when an IT professional leaves a team, knowledge is lost and work needs to be re-distributed in the team (Burke and Moore 2004; Thatcher et al. 2002). One could further speculate that information gleaned from the departing employee may inform remaining team members' judgments about potential jobs and turnover opportunities (Pee et al. 2014). For example, departing employees may provide insight into the interview process, clarify what attributes employers find desirable, or even attempt to recruit coworkers to leave with them. Thus, it is vital to examine how coworkers share information that shapes turnover among IT professionals (Ahuja et al., 2007). Moving beyond the common individual-level approaches, this research seeks to understand how employee behavior is influenced by group level factors and the unfolding schemes in the ISD teams resulting from high-paced collective turnover. In particular, the emphasis lies on the importance of teams in agile work settings using Scrum, Kanban, DevOps, pair programming, etc. This niche has created new IS research opportunities.

We therefore seek to answer the following research questions: (1) Which effects does turnover cause for the ISD teams? (2) What consequences do ISD teams face after turnover? A suitable way of addressing this research gap is through studying ISD teams in their project context. We therefore conducted interviews in seven ISD teams and used a partial portfolio approach to GTM for analysis (Wiesche et al. 2017). We seek to identify the effects, consequences, and dimensions of turnover for ISD teams via our in-depth case analysis. Therefore, the objectives of this paper are to provide empirical descriptions of the post-turnover-process in agile ISD teams and to gain deep insights regarding the "how" and "why". ISD teams collaborate intensely in agile work environments e.g. self-organizing development teams (Venkatesh et al. 2020; Vidgen and Wang 2009).

To achieve the objectives of the study, we proceed as follows. The following section presents relevant IT turnover literature from the IS community to place our study within the context of the given research landscape. The next section describes our research methodology. Next, the following section discusses the case interpretation and findings. Then we talk about the implications of our research. Finally, we discuss the study's limitations and review its contributions.

Background

There have been numerous studies on the phenomenon of high turnover rates in the IT and software development field. Especially on the individual level, scholars have intensely examined antecedents, sets of factors and consequences of turnover. Previous IS turnover research has focused on the following fields.

Category	Field of IS turnover research	Underlying theory
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antecedent	causes of turnover (e.g. exhaustion, contagion, stress)	Moore (2000) Carayon et al. (2006) Felps et al. (2009) Porter and Rigby (2021)
	reasons for turnover (e.g. job-related, organizational)	Igbaria and Greenhaus (1992) Joseph et al. (2007)
consequences	costs of IT turnover	Abdel-Hamid (1989) Naidoo (2016)
	effect of IT turnover on the labor market	Ang and Slaughter (2004)
	mitigation strategies (e.g. social, structural)	Ahuja et al. (2007) MacCrory et al. (2016)
	retention strategies	Moore and Burke (2002) (Pflügler et al. 2018a)
Approach	individual decision paths of IT professionals	Niederman et al. (2007) Abdel-Hamid (1989)
Table 1. Overview of Major IT Turnover Research Streams		

We found various factors on the individual level that point to potential consequences of IT team member turnover on the group level: Social factors such as social or cultural biases form an internal and external view and can set the overall expectation of how groups and teams perceive their action and the action of a teammate. In escalating situations, social factors act as a “link (from) the decision maker to the troubled project” (Lee et al. 2019). Collective turnover, the connected turnover of multiple employees during the same period (Naidoo 2016), in a group/team “promote(s) project escalation” (Naidoo 2016). Structural factors (Ahuja, 2002; Joseph et al., 2007) can limit group opportunities and advancements. Job-related factors include boundary spanning activities (Joseph et al., 2007) which inevitably influence teams. Once team mates leave, workload redistribution and responsibility shifting within the team start. Eckhardt et al. (2016) added “job satisfaction and organizational commitment” to the category of job-related factors, which also has an effect on ISD groups and teams.

Some studies point to the need to deeper study the effect of IT turnover on the group level. Naidoo (2016) discussed multi-level collective employee turnover theories by drawing on HR literature. He also summarizes the limitations of previous IS turnover research and provides an outlook to future IT turnover studies, e.g. the need to explain turnover with hidden group processes. The consequences of turnover on the observed teams remain obscure. A group level view is important because it may help identify the influences of IT professionals' high turnover on group dynamics of ISD teams. Especially in highly collaborative and coordinative working environments e.g. in agile teams with a shared mental model work mode (Kude et al. 2019; Yu and Petter 2014), ISD teams are ever challenged in an ambivalent state between stability (regular events with fixed length) and change (requirements, staffing).

Agile methodology for software development emphasizes short cycles of rapid delivery and iteration. Agile teams require team dynamics skills to function as social systems including social and structural factors (Matook et al. 2016). They also require a group skill set e.g. non-technical skills such as soft skills or communication skills (Pflügler et al. 2018b). Synergy can be important because individuals working as a team may experience synergy that enhances their ability to solve problems beyond what they can do individually (Kautz and Zumppe 2008). Social interactions in communities also enable individuals to contribute their individual skills, ideas and creativity towards a common goal (Matook et al. 2016). Agile teams are characterized by a highly collaborative approach to work and a dynamic group of individuals (Kolfshoten et al. 2012) such as “non-experts who perform specialized tasks within the team” (Ellard & Hamel 2001), providing “a useful synergy between all team members” (ibid.). Furthermore, backup behaviors such as “sharing information (...) or helping a teammate to complete a task” (Coman et al. 2014) are crucial in this setting. Therefore, synergy plus backup behaviors of ISD teams are congruent with the

values of agile software development. In a highly collaborative setting e.g. in agile project teams the mentioned skills and values come into effect, ergo it is a vital object of study (Kude et al. 2019).

Agile software development can reduce exhaustion of team members through a better distributed workload, but also through more clear and congruent role perception (Venkatesh et al., 2020). Turnover could thus lead to more exhaustion, since there is an increased workload for the remaining team members and possibly a change in roles. Also, a team may experience exhaustion if its members have unclear expectations about the job functions of team members and if there is no consensus about the purpose of the team. This lack of communication leads to miscommunication and misunderstandings between team members, leading to frustration, loss of motivation, and burnout (Armstrong et al. 2015). In agile teams, when “various expectations about how a feature or product should be implemented are created, different priorities and interpretations can occur” (Andrews and Niederman 1998). Overhead costs of working in a team include communication difficulties and misunderstandings among team members. The productivity and cost optimization of each member depends on the quality of their interactions with other team members; therefore, it is important to clarify how teammates perceive teamwork. This underlines the codependence. Recent research found shared models as well as backup behavior as important dimensions of agile development methods (Kude et al., 2019).

Team members work closely together, as they have continuously need to adopt to changes in their tasks as well as joint tasks with other team members (Wiesche 2021). By working closely together, agile teams practice a shared mental model (Kude et al., 2019). Thus, collective turnover can have an effect on the team. When teammates leave, they may create emotional holes within the team that cannot be easily filled by new members as quickly, as well as removing skills and knowledge, which could otherwise be used by the team (knowledge holes). As a result, there is a need to understand underlying processes in a team and explore how turnover affects agile ISD teams. Studies on the consequences of turnover at a group level, especially in ISD teams are scarce. Eckhardt et al. (2016) observed groups of IT professionals to examine the effect of personality on job-related attitudes of IT professionals. The results of Eckhardt et al. (2016) imply that the individual’s “personality traits affect IT personnel turnover intention”. However, they did not analyze group level effects. Moore and Burke-Smalley (2002) stated that high IT turnover culture reflects the accepted workgroup norms in a high turnover environment. Cohorts consider that turnover is appropriate and/or anticipated. Social contagion describes that co-workers’ turnover influences the team’s turnover intention (Moore and Burke-Smalley 2002).

Method

Since IT turnover studies on group level are scarce, we opted to choose a qualitative research design because this approach is appropriate for sparsely penetrated topics and we used case studies to comprehend social phenomena involving people and the social and cultural contexts (Walsham 1995). We designed the scope of the case study by considering “in depth and (...) real-life context” investigations and data acquisition when selecting the seven various cases and conducting the interviews (Yin 2009).

We adopted an interpretive stance, seeing knowledge as socially constructed via subjective perception of social action; most notably because the dynamics of ISD teams in various agile project settings are elusive. In order to determine the actors involved, what occurred, and when it occurred, we concentrated on events, actions, and processes (Langley 1999). As we seek to assess the effects of turnover on ISD teams, we performed in-depth case studies in order to collect primary empirical material from seven heterogeneous teams from different companies. We followed established guidelines for interpretive case study research (Klein & Myers, 1999; Walsham, 1995).

From the perspective of an outside observer conducting interpretive case studies, the interviews allow the researcher to gain the most insight into participants' perceptions of the events and actions that have occurred or are currently occurring. Hence, we conducted 25 semi-structured interviews with ISD team members ranging in hierarchical levels (e.g. project manager, team lead, developer) and with ISD teams from different industries. The interview guide was sectioned into five pillars (1. project environment, 2. teamwork, 3. agility, 4. turnover cases, 5. relationship in the team) and structured to build a relationship of initial trust. We started by developing a case understanding and then asked open-ended questions about the process and consequences of the turnover events. As appropriate case sites, we sought agile ISD teams of different industries that experienced turnover events.

The primary data, including recordings and transcripts of the interviews, underwent qualitative analysis. By using exploratory analysis (Corbin and Strauss 1990) through open, axial, and selective coding (Wiesche et al. 2017) and reviewing the data iteratively, we discovered how individual perceptions and observations can be utilized to understand team dynamics when employees resign.

Sample & Data Collection

We conducted the 25 interviews over a period of two years from June 2020 to June 2022. We analyzed and interviewed seven heterogeneous teams that experienced turnover events within the last 36 months, prior to our interview period, and where the turnover events impacted team dynamics.

We focused on ISD teams with varying team size and domain. After the first interviews, we noticed that agile ISD teams were more strongly influenced by turnover. Therefore, we decided to focus on agile ISD teams while using the two waterfall teams to contrast our results and enhance our theorizing. After our initial selection, we continued with purposeful sampling based on acquaintance contacts. We identified further suitable interviewees who had different roles, project experience and were (in-) directly affected by turnover events. Participants of the chosen teams were asked to reflect on the larger context of their work environment and the turnover events' impact on the team. We also interviewed two exiting team members.

Case		Method	Project focus	Team members	Turnover events
1	Team Auto	agile (Scrum)	IT services	7	7
2	Team Aviation	agile (Scrum)	IT consultancy	6	6
3	Team Furniture	agile (Scrum)	Online shop	5	4
4	Team Insurance	waterfall	IT consultancy	5	4
5	Team Public IT	agile (Scrum)	Document mgmt.	6	2
6	Team Smart Device	waterfall	IT innovation	14	4
7	Team Software Development	agile (Scrum)	Music platform	20	10

Table 2. Overview of Cases and Data collected

Case #1: Team Auto is a team of software developers focusing on IT service operations in the automotive industry. The team contained four highly qualified team members and three regular team members. One of the highly qualified team members was responsible for the project and team management. The working atmosphere was described as normal, but employees were complaining about the imbalance in the workload. Other complaints included a lack of training opportunities and a lack of appreciation in the form of unfulfilled promises about future salary negotiations. First, some regular employees voluntarily quit their jobs. But after highly qualified team members also resigned, the project manager decided to leave the company. He was headhunted by an old business contact, which caused him to poach another colleague, closely connected to him. As a result, this colleague was the last highly qualified team member that resigned.

Case #2: Team Aviation is an IT consulting team consisting of six team members who worked on strategic IT management tasks in the aviation industry. In the team, one team member filled a leadership position, all other five team members worked on their own tasks. When the team leader resigned, a direct successor was chosen from the team. However, there was too high workload for the successor, so that he quickly resigned as well. One of the regular team members did not feel comfortable in her role as a consultant and took the turnover of two project leaders as a wake-up call and left the company to work for another employer. In addition, an employee at the operational level resigned during the same period. Finally, this situation was followed by the resignation of the other two employees at the operational level.

Case #3: Team Furniture is a software development team for a furniture retail company. The tasks of the team revolve around developing and maintaining an online shop. This team consisted of five employees. Three of them had project management positions, and two employees were working on operational tasks. The three project managers collaborated very closely. There was also an apprentice who was taken on after her apprenticeship and a project manager who recently joined the team. After the head of the department resigned, a change in the organizational structure was necessary so that his department, including the

development team, had to be integrated into an existing department, and one team member was offered a team leader position. Due to a lack of recognition and dissatisfaction, the first team member resigned after the organizational change. Shortly after this, the apprentice surprisingly decided to leave. Her probationary period enabled her to leave at short notice. Finally, two central team members resigned the same day. The former head of department, through social contact with his old employees, recruited all three employees who had worked together at project management level.

Case #4: Team Insurance works in an IT consultancy project for a large company. The team consists of three freelancers and two project managers. There was a close relationship between one project manager and the freelancers in the team. In addition to the two team members identified as highly qualified, the other team members can be classified as regularly qualified. The company's managing director played a major role in the turnover process. After he had resigned, dissatisfaction with the corporate strategy and a lack of transparency in the vision of the company was noticed among the employees. The managing director, who founded his own company, first recruited one of team's freelance team members as they have been working closely in the past. He further tried to take a well-known colleague with him and convinced a group of freelancers to change into an employment relationship. As a consequence, two project managers resigned, and the freelancers also tried to withdraw their contracts. The situation resulted in further fluctuations in the regularly qualified team members.

Case #5: Team Public IT operates as an internal IT service provider for city administration. Their tasks include implementing, deploying, and maintaining the IT systems and applications for a city administration. Among other projects, they are engaged in the rollout and customization of a document management system with a core team of six IT professionals. The employment characteristics of the public sector are high job security and change aversion. The project leads mentioned the factors that keep them at their current job and employer. They appreciate job security, and they have intrinsic motivation for their tasks. Two web developers left the team because the employer lacked opportunities for ongoing development and the public sector neither offers competitive compensation nor attractive career models for IT specialists.

Case #6: Team Smart Device is a large team consisting of 14 team members working in an IT department. They work on IT innovation projects for business processes, especially new technologies such as smartwatches and smart glasses. The team was led by a project manager and several operational sub-teams who were working largely separately. After restructuring and due to bad leadership and uneven distribution of work, dissatisfaction developed among the employees. A knowledge expert quit because he wanted to work in a smaller company and left no documentation. This left the rest of the team with additional work and the challenge of understanding the departing team member's solutions. In addition, one of the team members was not sufficiently qualified for the position. The difficult task distribution was intensified when another team member left to work on her own start-up company. Finally, one team member decided to do a trip around the world and left the team, causing another team member to take a sabbatical.

Case #7: Team Software Development is a classical application development company that also offers consulting services. The team covers full-stack development for a client in the music industry. This team consisted of twenty employees but the core team also works together with a few developers from the client-side and from external partners. Two of the interviewees had project management positions (project lead and team lead) and three of the interviewees were software engineers. The leads collaborated in planning and reporting tasks. Thus, the fluctuation in their team, which occurred approximately every 6 months, attracted their attention. The project lead mentioned conversations with the individuals who exited the firm. She observed that the more senior (role-wise) the leaving individual the less insights they share or reveal regarding their turnover intentions. Other factors, which contribute to more disclosure, are relations. The project lead as well as the team lead confirmed common sense: the closer the relationship within a team, the more the team members shared. Joint activities e.g. nail studio appointments during lunch time was one of many informal opportunities of team members to spend time together and share turnover news.

Data Analysis

In order to comprehend the dynamics of ISD teams after turnover events, we engaged in a four-step analytical process following the logic of a partial portfolio approach to Grounded Theory Methodology (Wiesche et al. 2017). First, we read and became familiar with the transcripts, after which we assigned codes to each pertinent comment made by the interviewees. To better grasp and capture the context of events and

actions, we kept the descriptive first-order concepts grounded for our analysis. This strategy adheres to the Klein and Myers (1999) contextualization principle, which highlights the significance of knowing the social and historical context of the setting in qualitative research. Formal events like daily standups, reviews and retrospectives as well as informal events such as private chatting (e.g. after work call/day, the team decided to interact/speak in private, during lunch time) were identified and documented in case memos.

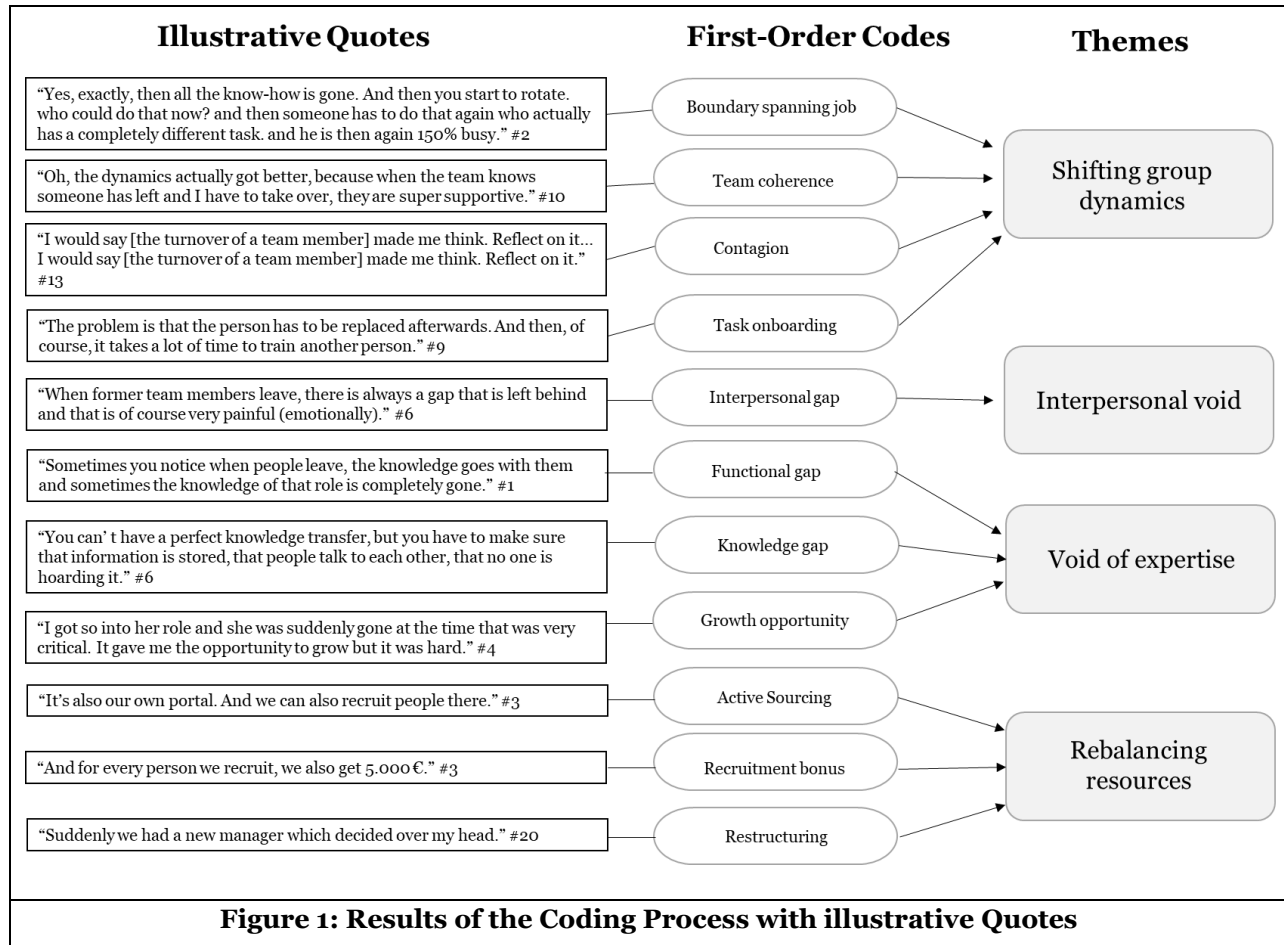


Figure 1: Results of the Coding Process with illustrative Quotes

Second, we used axial coding to structure the analysis around periods of continuity and discontinuity along the ISD project lifecycle to theorize the nature of change and its triggers. We identified changes in team organization through an iterative process of analyzing the data and the sequence of events. We for example found different turnover consequences for the immediate co-workers relevant to project specific tasks as well as consequences relevant to the social fabric of the team. We then examined the interactions and sequences of changes e.g. how the team handles changes. We investigated the triggers and intentions behind changes from leaving as well as staying ISD team members.

Selective coding was performed as the last coding procedure prior to forming the core categories (consequences) of our model. This helped us understand how turnover event can impact team dynamic positively or negatively e.g. by influencing how new employees fit within an existing team. In addition, we were able to identify patterns in the team members' reaction relating to the numerous turnover events.

We contrasted these empirical findings with the literature on ISD teams and IT turnover to identify salient themes in how turnover and the actors involved in the agile setting changed between phases, following the recommendations of Gioia et al. (2013). This process produced a timeline of events and the identification of four themes (see Figure 1).

Results

Based on our case analysis, we identified four themes that depict the consequences that especially foster a deep understanding of the group dynamics of ISD teams who stand in a state of high fluctuation and feel compelled to fill the resulting voids on various dimensions (see Figure 2). We identified both consequences that were rather related to emotions and consequences that were rather related to tasks and roles. Emotional consequences affect team member in their perception of others in their team, well-being, and in the general team culture. Project management consequences relate to expertise, resource distribution, and tasks in general.

In our analysis, we found that turnover events had different effects on the ISD teams, which we grouped into four higher level consequences. In all seven cases, there were consistent mechanisms that were caused by the turnover of one or more of the ISD team members. While the turnover process differed in speed and intensity across the teams, all teams experienced several turnover cases in a limited time frame. One participant, who has worked as a developer for a client in the eCommerce sector and developed the front end of their newly launched web store, said especially the last project, that he was staffed on, had issues with a demanding high-stress environment. He described the resulting chain of turnover events in his own team as follows:

“Of course, the number is also relatively high, especially from the last project. It was probably the case that one person left every two or three weeks. It was really stressful and many of them couldn't cope with it or left due to burnout or simply left.”

Shifting Group Dynamics

The first effect that we found during our analysis is the boundary spanning job. Across all cases, interviewees indicated that at some point after the turnover events happened, the remaining team members had to stretch their original sphere of work to an extent that they were able to absorb the extra amount of work that was left behind from the ones who left. Difficulties arose when the task did not match their expertise.

“It wasn't exactly clear for which task I was allocated and then I took on a certain task because I had to. But actually, it wasn't the one I wanted or the one that was agreed upon.”

“In my case, for example, that was sometimes the case when one of my colleagues left and I then had to more or less follow in his footsteps. That means I had more to do. And then I had to take on tasks that weren't really made for me, because I simply hadn't been on this path for two years and didn't have all the know-how that this person had. And you can't transfer that at all like that. There are so many little screws that you just don't know about.”

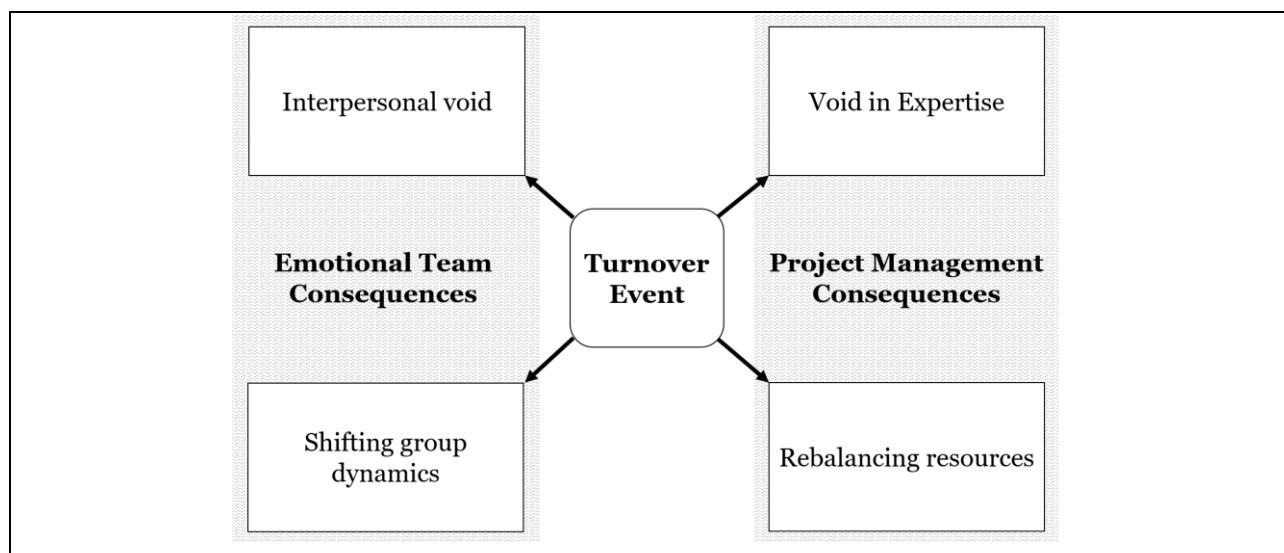


Figure 2. Consequences for agile ISD teams after a turnover event

In our analysis we also found that turnover events had a contagion-like effect as a consequence for the ISD team. In all seven cases, there were consistent mechanisms that were caused by the turnover of one or more of the ISD team members. While the turnover process differed in speed and intensity across the teams, all teams experienced several turnover incidents in a limited time frame that were directly related. One team member described the flow of events as follows:

“And then ... the whole team broke apart. Because two weeks after I quit, the next one left. [...] And then still two weeks later, [team member C] and [team member D] resigned on the same day. [...] And just a month later, [team member E] also resigned. That was the last one of us, then only the team leader and another one remained. But she hadn't been in the team for long and had actually done something else. And then within two months everyone was gone.”

The consequences of turnover in software development teams unfold both on the individual as well as on the group level. On the individual level, turnover by software development team members cause a thinking process amongst the rest of team members. Team members assess their individual situation based on objective and subjective factors. Objective factors include additional or different tasks caused by a knowledge expert leaving. Subjective factors include perception of the work environment such as appreciation and perspectives, but also interpersonal relationships within the team. Several interviewees reported on being either shocked by close colleagues leaving or that they were so close, that they “saw the turnover coming ahead of time”. In general, these reasons triggered a thinking process within other team members.

Another illustration of the consequently shifting group dynamics is team coherence. This effect occurs if the boundary spanning activities do not overstrain the team’s capabilities and capacities. Drawing from our data, reallocation of tasks fosters team coherence in a positive way as long as the team is not overworked.

“Oh, the dynamics actually got better, because really. Yeah, when the team knows that someone has left and I have to take over that position, they're just super supported. So for me at least that was the case because I got along pretty well with the team anyway. And of course they are then trying. So in that case it was really like that, that someone tried to take work off my hands and support me. And I support the team in the same way. It is not only from above already done, in every direction. And I thought that was actually quite cool, because then you are even more welded together with the rest of the team.”

Speaking of taking over new tasks, it is inevitable to provide training and a learning period for those who take over new tasks from their departing colleagues. Boundary spanning activities bring along task uncertainties, which need to be addressed with onboarding tasks to ensure a smooth transition.

“The problem is that the person has to be replaced afterwards. And then, of course, it takes a lot of time to train another person.”

The example of case #7 shows that the team which practiced Scrum and pair programming put a lot of emphasis on close collaboration and retrospectives had a higher track of turning critical project phases around by cultivating an appreciative and constructive feedback exchange culture.

“[Pair programming] means there are always two of us (...) working together all day. It is very relaxed, pleasant tone, no blaming, but rather how do we manage it together?”

We found that close collaboration and lateral management settings fostered interpersonal closeness.

Interpersonal Void

Working in a team exposes people to interpersonal connections and the resulting interpersonal relationships, which are either purely on a professional level or even on a platonic level, form strong bonds, which lead to grief/melancholy when a team member leaves the team. This grief/melancholy can be differently pronounced. Especially in the physical setting, the team can perceive the absence of former team members.

"In our team, because of the Corona pandemic, we don't work on site as much or directly next to each other, so that if a person is no longer there, she/he is not immediately missed. If I'm in the office and then all of a sudden a desk is empty or you can no longer talk to them during coffee break, that's when the sadness kicks in."

We refer to this phenomenon as an interpersonal void effect, which was described as painful on the emotional level by the participants who experienced this scenario of loss. We found that formerly close team members maintained the exchange to cope with the loss. In two cases members returned.

"You see or hear from each other again from time to time, about how the others are doing or that other colleagues also communicate. By the way, he came back again."

Void in Expertise

In addition to the interpersonal void, which is mainly driven by emotional reasons, we also found that team members' work was also affected by turnover events. The functional void emerges when team members who had central/important roles within the team leave. The vacancy of key roles and missing expertise has the potential to make or break a project.

"It may even be that in the worst case scenario a system is replaced, because you can always make something new when no one knows how to operate the old system anymore."

As a consequent effect, the knowledge gap occurs when there is little or no documentation of legacy work.

"Sometimes you notice when people leave, the knowledge goes with them, and sometimes the knowledge is completely gone."

The participants specified legit solutions to combat the occurrence of knowledge gaps after turnover.

"You can't have a perfect transfer of knowledge, but you have to make sure that information is stored properly, that people talk to each other, and that no one is hoarding information."

All the listed gaps are challenging effects of turnover for the ISD team. However, they also offer growth opportunities when vacancies get filled with motivated and qualified personnel. Team members who get promoted to this new position feel gratitude and the need to prove themselves to the leads for this decision. One participant took over the role of a colleague who moved to Switzerland. Without this vacancy, the participant would not have had the chance to prove herself as a dev team lead in the early stage of her career.

"So I got into her role and she was suddenly gone at a time, which was very critical. It gave me the opportunity to prove myself. I had to work really hard but it was worth it to me. It gave me incredible confidence in the field and yes, all of that only happened because the position was simply free and I was able to ask for it."

Rebalancing Resources

We found that turnover had another effect on ISD teams as there is a change in task distribution in the team, as the work of the leaving team member needs to be absorbed by the team. This can be resolved by either hiring a replacement (effect: active sourcing, incentive: recruitment bonus), by rebalancing the roles and/or the workload of the team or by re-structuring the team's former organization (e.g. adding new management level). We found that the seven teams we analyzed differed in how they replaced turnover. Some teams did not find replacements at all or did not get management support for hiring replacements. Other teams found replacements that had different expertise or did not perform as good as the team member that left, at least in the beginning. One interviewee described the difficulties in getting to know software code that somebody else crafted:

"Well, we had a core SAP developer who left, and when he quit, he went to [competitor]. At the time, he had the code and nobody knew about the code. This is when they approached me. I had to take over. And I had two days to talk to him and then he was gone."

The recruitment bonus is one of many incentives to involve the remaining team members in the active sourcing process. This monetary incentive increases extrinsic motivation for this purpose. Another

approach to rebalance the resources after collective turnover is restructuring which is not a popular measure among the employees who work in the ISD teams.

"Suddenly I had a new manager which was decided over my head. That took me by surprise."

Not involving the ISD teams in fundamental changes of their workflow led to frustration and resentment. Both states are not beneficial to encouraging the ISD team to keep up their high working morale.

Discussion and Theoretical Contributions

Previous research has shown that IT turnover is an important phenomenon when managing IT professionals while in existing studies antecedents, consequences, decision dynamics, and decision paths were mainly analyzed on the individual-level. Our study examines consequences of turnover on a new level, the group level. We therefore extend IS turnover research by explaining how individual turnover events affect functional and interpersonal project team dynamics of ISD projects. Our analysis identifies four consequences (shifting group dynamics, interpersonal void, void of expertise, rebalancing resources) which are summarized in Figure 2. Below, we discuss the theoretical implications of our analysis.

Group Level Analysis of ISD Team Member Turnover

Extant IS turnover research found that job-related factors, perceived organizational factors, and individual factors are the typical main causes for turnover and uncertainty and cost of replacement are central consequences (Joseph et al., 2007; Zylka & Fischbach, 2017). A vast number of IS turnover studies portray findings on the individual level. Moore and Burke (2002) remark the abundance of traditional turnover research, which focused on individual-level variables and led to a narrow view on IT turnover. Joseph et al. (2007) confirm this remark and suggest sensitivity to the multi-level context of IT turnover. Niederman et al. (2007) focus on individual decision-making following various paths before IT professionals eventually quit. Since IT professionals are embedded in a team in the work context, we show empirically how the unfolding process of turnover includes wide-ranging consequences affecting the entire team structure (group level). Naidoo (2016) highlights the necessity of multi-level analysis, which considers e.g. how group units interact and how the demeanor of these groups influences voluntary turnover among IT professionals. Thus, as opposed to prior research (Joseph et al., 2007; Moore & Burke, 2002; Naidoo, 2016; Niederman et al., 2007) our research extends this perspective by illustrating group level consequences of turnover on ISD teams. Our analysis shows the interpersonal/social and functional impact on the ISD team.

On the interpersonal level, we consistently found shifting group dynamics and an aching interpersonal void as consequences for the ISD team after turnover events occurred. Venkatesh et al. (2020) examined agile systems development and role conflict on the individual level. They found that the individual has to possess "organizational skills to effectively manage interpersonal communication and group dynamics." The individual-level implications highlighted by Venkatesh et al. (2020) contrast with our implications because opposed to them, we fully account for the ISD team as a group. Hence, our findings and implications refer to the group as a social system where the actions of each team member depend on each other. The premise of our group level view is that we see the ISD team as "adaptive units whose organization cannot be reduced to individual interactions" (Wilson & Sober, 1994). Following this, turnover events affect the entire team, and these turnover events need proper management to face the consequences for the group. On the functional level, we found the following consequences resulting from turnover events: void of expertise and resource rebalancing. Once the post-turnover-event situation is assessed, the team is determined to fill the functional and knowledge gap with suitable resources. Especially in distributed ISD teams (Sarker and Sarker 2009) this dimension is referred to as resource agility. This is a vital management measure and self-healing mechanism for the group. Therefore, it was crucial to focus on the group level view. IT turnover research including team or group level is (to date) scarce. The consequences and mechanisms to restore the desired team state include resource rebalancing in the form of restructuring. The team and/or their supervisor can either staff new hires to acquire the desired expertise (e.g. manager, team lead, developer) or they reallocate and promote team members in place (Lee et al. 2021). However, the ambiguity and uncertainty of the restructuring process is also prone to causing tensions. Among our cases, we have seen harmonic restructuring transitions e.g. when team members successfully got promoted to team lead to fill the gap but we have also seen suboptimal restructuring measures e.g. when the team got a new manager

without notice. The cause of the tension is a bipolar setting. In the following, we discuss the different natures of tensions.

ISD Team Tensions Caused by Turnover

According to Lu and Ramamurthy (2011) one potential source of tension is the IT-agility contradiction. Their study provides quantitative evidence to answer the question whether IT enables or impedes agility. They found that a higher IT capability provides greater agility. In our study, we ensured that our interviewed teams possessed a high level of agile practice in order to eliminate the IT-agility tension dimension. Our empirical results rather suggest that turnover events cause both project management and communicative tensions in ISD teams that – if not addressed properly - most likely lead to further turnover. Project management tensions result from contrasting management styles (Gregory and Keil 2014). Typical ambidexterity in ISD projects is based on bureaucratic vs collaborative management styles. Such ambidextrous management styles create conflicting demands that need to be addressed to navigate IS projects successfully. Communicative tensions in ISD projects also include contrasting states such as alignment-autonomy, stability-change, expression-suppression, certainty-unpredictability (Naidoo, 2016). We demonstrate novel forms of tensions. Naidoo (2016) illustrated tensions on a relational level. Our results showcase that such communicative tensions are caused by change events e.g. collective turnover if they are perceived as unresolvable by team members. Turnover events in ISD teams can cause interpersonal void that is most likely to result in communicative tensions based on grief and frustration. The change-induced communicative tension is amplified if the interpersonal connection between the team members was strong. With this dimension, we extend Naidoo's (2016) findings by adding that turnover reinforces team tensions. At the same time, turnover events cause a void of expertise that results in project management tensions when workload is distributed in a team that has different expertise than needed. Thereby, turnover is an change-induced ambivalence on the relational stability-change level that needs to be managed.

We consider this a permanent condition for ISD teams because ISD teams per default face contextual (e.g. agile vs formal) and relational (e.g. interact vs disengage) tensions, especially because of the bipolar feature (Baxter and Montgomery 1996; Singh and Tan 2010). Teams that use agile methods are most often embedded in organizations with traditional structures and long-established project management approaches since the implementation of agile methodologies rarely comes with a company-wide big bang rollout strategy. In this setting, teams find themselves in an array of “competing bi-polar choices” (Batra et al. 2010) when agile methodology and traditional approaches, e.g. the waterfall model, clash. Notwithstanding this apparent contradiction, interpersonal and group-related communicative tensions are a natural part of organizational and social life and can “arise due to the inter-organizational, organizational, unit-level structures, cultures that shape the context in which employees work” according to Naidoo (2016). Cousins et al. (2007) suggest cognitive processes to combat the disruptive dualities and produce synergies by pursuing group interest rather than self-interest. These cognitive processes include integrating and differentiating. Smith and Tushman (2005) argue that accepting the simultaneous existence of contradictions can be seen as strategically beneficial when depicting the complexity of hybrid team management. Framing the cognitive paradoxes in this manner can lead to a synergistic combination as a desired team outcome.

Strengthening ISD Team Cohesion Through Turnover

Our results confirm the co-existence of cohesion and conflict in ISD teams. Additionally, we show that turnover events strengthen cohesion by surfacing conflicts of the team for the management to resolve. According to McCarthy et al. (2018) cohesion is crucial for aligning the efforts of a distributed ISD team. At the same time „conflict is essential for capitalizing on diverse knowledge flows“ (McCarthy et al. 2018). As stated by Thatcher and Patel (2011) emerging task conflicts (e.g. disagreements over work-related issues) and relationship conflicts (which are disagreements over interpersonal issues) reduce team cohesion. When subgroups are formed along demographic faultlines, there is less conflict within subgroups but more conflict and distrust between or across subgroups (Thatcher and Patel 2011). As a result, the perceived strong faultlines negatively impact turnover intentions (Iwaasa et al. 2018) within the entire team. Our results suggest that conflicts that escalate in turnover bring the underlying problem to the surface for the team and for the management and thereby increase the likelihood of resolving the problem. Thus, our study

extends research on the consequences of conflict in ISD teams by illustrating that turnover increases the level of conflict above a threshold.

One explanation for the increased level of cohesion despite turnover events is the modified structure of the team. The subgroup theory implies that the group structure of the team influences the cohesion. After each turnover event, the team structure changes according to the given faultlines e.g. age, sex, education or other. With every turnover case, a new redefining round commences and the subgroups refine themselves and become more homogenous as people tend to bond with others who are similar to themselves (Przybilla et al. 2018). Hence, each turnover event initiates a new subgroup formation. Our results confirm this thesis. Turnover events trigger a chain of events in which team cohesion is strengthened due to subgroup formation, subgroup consolidation, increased mutual support or backup behavior and increased teamwork quality. Extant IS literature portrays team cohesion as a base for effective information sharing, higher team satisfaction, and better team performance (Venkatesh & Windeler, 2012; Yang et al., 2015).

Based on our findings, turnover events can shift the faultline structure and corresponding subgroup formation (Shen et al. 2016) in ISD teams. Based on the attributes of the exiting team members, this event could be a positive or negative impact on team cohesion. Due to the nature of agile ISD teams, close collaboration is a given and essential for the project's success. This stresses the importance of cohesion.

The Relationship of Agile Project Management Approaches and ISD Team Turnover

Contrary to the predominant view in IS research that agile methodology use combats factors that reinforce IT turnover intentions such as information hoarding, role ambiguity, role conflict, work exhaustion, micro management and mere formal bonds (Benlian 2022; Ghobadi and Mathiassen 2016; Ramesh et al. 2012), we show that agile methodology use can partially reinforce IT turnover behavior as well. In accordance with Ghobadi and Mathiassen (2016) who identified frequent releases as an advantage of agile ISD teams to „facilitate knowledge sharing across stakeholders“, we acknowledge the beneficial facet of this approach for the ISD team to frequently release product increments and to participate in regular events e.g. reviews and retrospectives from the Scrum framework in order to strengthen the team's shared mental model during the exchange (Kude et al., 2019). The positive aspect of regular, intense exchange applies to all agile methods e.g. DevOps, Kanban, pair programming and eXtreme Programming (XP).

Nonetheless, the frequent releases in agile ISD projects can be considered as small-scale deployments. The team members are constantly required to react rapidly to ever-changing requirements by accelerating the “small release cycles and through continuous integration of the customer” (Hummel et al. 2013). Scheduling deployments or go-lives every four weeks or even every other week, increases continuous stress. We found, that a remarkably large proportion of our cases reported that many turnover events occurred in the most stressful periods of the ISD project. The interviewees appointed the (pre) go-live stage as the most stressful period. This continuous stress can set back the advantages of agile methodology use and foster work exhaustion which promotes turnover intention and behavior. The turnover can have a reinforcing impact on the ISD team. For example, turnover can lead to an increased workload for the remaining team members and can require reconfiguration of roles, both can lead to exhaustion, further promoting turnover. Our results suggest that also in agile ISD teams turnover occurs and continuous stress can lead to turnover.

Previous research shows that agile methodology use increases closeness between team members and binds them together. Baham and Hirschheim (2022) clarified as a theoretical core concept that agile methodology use in ISD projects always includes - but is not limited to - working cooperatively, collaboratively and in close communication. Moreover, compliant with the Agile Manifesto, agile development requires more informal interactions (Ramesh et al., 2012) and values informal interactions with all individuals more than e.g. extensive documentation (Beck et al., 2001). For this reason, the interpersonal level is so pronounced in agile projects. Agile methodology use unfolds shared expertise, shared responsibility and shared understanding (Maruping et al. 2009). This shared experience helps enriching the shared mental model (Espinosa et al., 2001). Such a high level of closeness in agile ISD teams can lead up to a fragile social system which is more vulnerable to turnover. We gained a new perspective on closeness and turnover, suggesting that, among the many positive impacts of closeness, the stress associated with agility can amplify negative effects of turnover due to that closeness. Besides on the functional and professional closeness created by

agile methodology use e.g. in pair programming, turnover also has a strong influence on the existing interpersonal relationship.

Agile methodology use brings people together professionally and interpersonally (Baham & Hirschheim, 2022; Ramesh et al., 2012). As turnover has strong consequences in the perception of agile ISD team members, we can summarize that turnover disrupts the closeness of the team and their tight collaboration e.g. in pair programming, collective code ownership, continuous integration (Baham & Hirschheim, 2022). Our data shows that turnover has much worse consequences due to this closeness. In addition to the professional consequences of the turnover event, we also see in our results that personal consequences such as disappointment play a role. This leads to the fact that if one goes, under the terms of the closeness and contagion argument, further persons (due to personal closeness) follow. These aspects suggest a higher need for implementing collaborative exchange systems (e.g. alumni expert network) to participate from this desirable closeness among (former) team members even after completed turnover events. This absorbs the pain of loss of the remaining team members, and increases the chances that leavers will eventually return to their old project team. This action can act as a process that interactive boundary resources can facilitate.

In addition to influencing the antecedents of turnover, agile offers mechanisms and tool sets to deal with the consequences of turnover. Agile methodology use gives process guidance to deal with turnover-induced changes. We as well start with developing an understanding of the changes and new situation (e.g. communicate turnover), then continue to adjust plans (e.g. offset workload) and finally, coordinate the new work (e.g. restructuring). The agility on various levels supports the team's ability to recover quickly from turnover events and to build resilience.

Even in another context e.g. with technical disasters, agile methods can act as an appropriate solution (Baham and Hirschheim 2022). Our data show that agile methodology use helps to deal with the consequences of turnover, despite closeness, stress and other driving factors. While important team members with key roles left agile teams, most interviewees did not characterize this situation as dramatic as one might have thought. The agile mind set helps team members to view this change in personnel as they view changes in other matters of their projects: inevitable, manageable and not static.

Practical implications, Limitations and Future Research

This research has practical implications for managers. Project managers should be aware of the project level consequences of turnover in regard to expertise and balancing of resources. Our results suggest that managers often found different ways to cope with resource shortage, such as hiring additional staff, including team members from other teams, or extending deadlines, coping with missing expertise is a severe issue that should be addressed early, potentially even before an expert leaves the organization. Regarding the emotional dimension, we identified countermeasures to cope with proximity of departing employees, e.g., by maintaining collaborative exchange systems. Project managers need to be aware and sensitized that cases of turnover can surface conflicts, enabling them to resolve conflicts and strengthen cohesion. Project managers should identify early warning signals and actively communicate with team members on these issues.

This research is subject to a number of limitations. First, we could not prove the generalization of our findings to be valid given the small sample size of interviews per case. It would also be interesting to include other kinds of cases, especially in more fluid teams such as in open source development (Maruping et al. 2019), larger ISD ecosystems (Maruping and Matook 2020) or more integrated organizational setups such as DevOps (Wiedemann et al. 2020). Second, we could have employed a longitudinal design to confirm the chronological sequence of events we obtained to reduce the risk of missing competing explanations for the data or omitting critical events or changes. To overcome these shortcomings, we purposefully selected interview participants and deeply immersed in the interviews by asking for specific examples and illustrations. Future research might explore the consequences for agile ISD teams that face a higher number of different events in close succession. Furthermore, it is worth researching the consequences when multiple employees need to be replaced after collective turnover.

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