The Rising Importance of Soft Skills for IT-Students: Working Online in Agile Globally Distributed Teams During the Pandemic

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Abstract
During the current pandemic, globally distributed software development teams have had to adapt their communication strategies. IT-students will need to learn new soft skills during their university studies. This work presents results from qualitative interviews of IT professionals during the current pandemic. Specific problems in adapting to remote, online work were identified. Although technical hurdles could be rapidly solved by acquiring new hardware and software, problems in online communication proved much more difficult. Soft skills, such as resolving team conflicts and intercultural communication, were judged to have an increased importance during the pandemic. These results will be used to define requirements for a university course to teach students the skills necessary to work in globally distributed, agile software development teams.

Keywords: Soft-Skills, Communication, Intercultural, Agile, Distributed, IT

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Introduction

The COVID-19 pandemic caused rapid changes in all aspects of daily life. Although it would at first appear that technically affine IT professionals should be uniquely qualified to adapt to remote work, programming skills alone are no longer sufficient in order to cooperate successfully in global software projects during a pandemic. Travel restrictions meant that team members were often not allowed to meet in person to get to know one another. Contact restrictions, even within one country, have prohibited team members from working together in person.

These challenges presented by virus mitigation measures prevent software development teams from implementing the major principles of agile software project management. One of the most widely used methods of agile project management is called Scrum. According to the Scrum Guide (Schwaber & Sutherland 2011), agile teams should ideally be composed of a maximum of 10 people, all working together as a close-knit team in one room. This method of working in close quarters was forbidden during lockdown and subsequent pandemic mitigation measures.

The research questions investigated in this work address these changes:

1. How has working in agile, globally distributed teams changed during the pandemic?
2. What new skills do IT students need to master during their studies to work effectively in this new reality?

Related Work

Even before the pandemic, a number of authors have addressed the challenges involved in adapting agile project management principles to distributed teams. Eckstein (2010) explored the practical implications of trying balance two conflicting goals in modern software development: the close collaboration prescribed by agile principles vs. the physical separation of team members who may be geographically distributed across different countries.

Requirements engineering is one of the most important aspects of the software development process, which also requires an intense amount of communication. Misunderstandings of the project requirements has doomed many a software development project to failure. Due to differences in language and culture, elicitation of project requirements can be even more difficult in a distributed environment. Abbasi et al. (2019) discussed the challenges encountered when trying to conduct requirements engineering in a distributed software development environment. Usmani, Hassan, & Mahmood (2017) identified major impediments encountered when conducting requirements engineering in a distributed environment. Schmid (2014) conducted a wide literature survey of the major challenges in global software requirements engineering and also identified some possible solutions to these challenges.

Strategies for managing distributed agile software development teams have been suggested by a number of authors. Sutherland, Viktorov, Blount & Puntikov (2007) presented ideas for adapting agile scrum project management methods to outsourced development teams. Woodward, Surdek and Ganis, (2010) developed an alternative practical method to adapt scrum project management principles to distributed teams.

The effect of the pandemic on software engineering professionals has begun to be investigated.

Ralph et al. (2020) studied how the COVID-19 pandemic has affected the productivity and general sense of well-being among IT professionals in 53 countries around the world. Especially women and parents with small children reported extremely negative effects due to the pandemic. People with disabilities also reported increased problems when compared to the control group. Ralph et al. recommend that employers should make an extra effort to identify ways to provide additional support to individuals suffering from specific disadvantages during the pandemic.

Methods

Semi-structured, qualitative interviews were conducted with experienced IT professionals from small, medium and large companies in Nuremberg, Germany (Table I). From each company, participants were recruited to take part in the interviews. One interview participant from each of the three major Scrum roles was chosen from each company:

1. Scrum Master: Responsible for processes and effectiveness of the team
2. Product Owner: Communication with stakeholders to define project requirements
3. Developer: Responsible for development of the software product

Table I Companies Studied

Companies studied	Small	Medium	Large
Size	less than 10 employees	ca. 200 employees	400 employees at the local branch, other branches world-wide
Customers	National	International	International
Employees	Multicultural	Multicultural	Multicultural
Official Company Language	German	German	English

For each of the three roles (Scrum Master, Product Owner, Developer), an individual list of questions was developed. Each of list contained questions about cooperation, communication and team cohesion, from the perspective viewpoint of each role.

Each interview lasted approximately 30 – 45 minutes and was conducted online via video conferencing software due to contact restrictions. Due to data privacy concerns, none of the interviews were recorded. With the approval of the interview partners, written protocols of each interview were prepared. After each interview, these protocols were sent to the interview partners so they would have a chance to correct any errors which may have inadvertently occurred during notetaking.

Results

Issues identified during the interviews were grouped into six categories:

1. General issues
2. Technical problems and selection of tools
3. Synchronous vs. asynchronous communication
4. Team communication and knowledge management
5. Foreign language problems
6. Personal contact.

Interview partners readily identified general advantages to remote work, such as the time saved by not having to commute to the office every day. Some employees moved home to live with their parents, or even back to their home countries. Working from home seemed to be a double-edged sword for families with small children. On the one hand, it was considered as an advantage when many child-care facilities were closed due to the pandemic. On the other hand, some parents expressed feeling burdened by trying to work and home-school their children at the same time. Especially for those employees who did not have a separate room to use as a dedicated office, it was often difficult to separate work from their private lives. Some employees also reported feeling pressured to answer e-mail late at night, especially those who reported using the dinner table as their home offices.

Technical problems could often be minimized by allowing employees to use their company hardware and software systems at home. Seeing other colleagues pack up their office computers and supplies initially let to a feeling of comradery. Weak internet connections were a problem at the beginning. For those who lived in large cities, a more expensive tariff with a higher bandwidth could be booked with their internet providers. Those who lived far out in the country, however, did not have any way to increase the speed of their internet connections.

Online communication was conducted via video conferencing systems for synchronous communication. One major problem identified was a lack of attention during video calls. Some team members admitted to answering e-mail or otherwise multitasking during meetings. One solution was to ask meeting participants to turn on their video cameras. People felt it would be rude to multitask if they felt others could see them. Another solution was to send material and meeting agendas beforehand, so that everyone could read through documents and save time. By strictly adhering to prearranged agendas, the length of meetings could be limited. Sharing user screens when discussing diagrams or demonstrating code greatly increased understanding.

Asynchronous communication was conducted via text chats or e-mail. A major problem with text communication was that non-verbal cues are missing. Especially when writing in a second language to people from another culture, the wrong tone can be easily conveyed. Unintended conflicts due to misunderstood text communication were quite common.

Difficulties in knowledge management were reported by all participants. Information could not be evenly communicated between team members. This lack of transparence decreased acceptance of some decisions. Knowledge diffusion from experienced team members to new employees also suffered. “Innovation Fridays” were instituted by one of the companies. One

experienced team member would present a new method or technology to the rest of the group.

All of the companies which participated reported having team members from different countries or cultures. Each of the interview participants reported conversing regularly in English with team members, customers or other stakeholders. Only one company had team members who learned English as their first, native language. All of the other team members learned English as a second language. Language barriers, including different levels of English proficiency among non-native speakers of English, were increased by online communication. In spite of cultural awareness seminars, cultural differences between team members remained a challenge. One team implemented the practices of "active listening" and "mirroring". This means that the listeners should repeat the message heard in their own words to make sure that the meaning was understood correctly.

One of the biggest changes reported was the lack of in-person contact. Informal communication between co-located team members, which used to take place over lunch or coffee, had previously helped build trust between team members and to integrate new employees. Team-building measures, such as online game nights, or "chat-roulettes" with randomly selected team members, were introduced. During the summer months when the infections rates were low enough, group hikes were appreciated as a chance to get to know other team members better.

Conclusions and Future Work

In conclusion, the research questions posed in the introduction can now be answered:

1. How has working in agile, globally distributed teams changed during the pandemic?

Technical challenges in adapting to remote work could be eased by supplying employees with adequate hardware and software at home. One advantage was the time saved by not having to commute to the office every day. Lack of personal contact has made team-building more difficult, especially for new team members. Time zone differences could be bridged by implementing asynchronous work schedules. Language differences increased chances for misunderstandings, especially during requirements engineering. Working from home has made it more difficult to separate work-life from family life. Employees with small children who lack child-care may faced increased burdens.

2. What new skills do IT students need to master during their studies to work effectively in this new reality?

To work effectively remotely, students need to learn to use video conferencing systems and cloud-based, collaboration platforms. Technical skills alone, however, are not sufficient. Soft skills, such as the ability to communicate with team members from other countries, who speak different native languages and come from diverse cultural backgrounds, are increasingly more important.

These results will be used to define requirements for a university course to teach students the skills necessary to work in globally distributed, agile software development teams.

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References

Abbasi, F.A., Burdi, A., Khan, R.S., Naqvi, S.H.F., Abbasi, M.S & Nizamani, A.R. (2019). Requirement Engineering Challenges in Distributed Software Development, *SINDH Univ. Res. J. -Sci. Ser.*, Bd. 51, Nr. 03, S. 465—468.

Beck, K., Beedle, M., Van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M. & Thomas, D. (2001). Manifesto for agile software development.

Eckstein, J., (2010). *Agile software development with distributed teams: staying agile in a global world*. New York: Dorset House Pub.

Ralph, P., Baltes, S., Adisaputri, G., Torkar, R., Kovalenko, V., Kalinowski, M., ... & Alkadhi, R. (2020). Pandemic programming. *Empirical Software Engineering*, *25*(6), 4927-4961.

Schmid, K. (2014) Challenges and Solutions in Global Requirements Engineering – A Literature Survey. In *Software Quality. Model-Based Approaches for Advanced Software and Systems Engineering*, Cham, S. 85–99.

Schwaber, K., & Sutherland, J. (2011). The scrum guide. *Scrum Alliance*, *21*(19), 1.

Sutherland, J., Viktorov, A., Blount, J., & Puntikov, N. (2007). Distributed scrum: Agile project management with outsourced development teams. In *2007 40th annual Hawaii international conference on system sciences (HICSS'07)* (pp. 274a-274a). IEEE.

Usmani, N., Hassan, R. & Mahmood, W. (2017). Impediments to Requirement Engineering in Distributed Team. In *Int. J. Inf. Eng. Electron. Bus.*, Bd. 9, Nr. 6, S. 10–18.

Woodward, E., Surdek, S. & Ganis, M. (2010) *A practical guide to distributed Scrum*. Upper Saddle River, NJ: IBM Press/Pearson.

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