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Remote communication in Scrum teams – a COVID-19 preventive measure or work time optimisation?

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Abstract

The article presents the impact of remote work, resulting from the COVID-19 pandemic, on the functioning of Scrum teams. Attempts have been made to analyse the positive and negative aspects of remote work. The article also looks at the impact of remote work on the level of communication and efficiency of Scrum teams. For this purpose, the author conducted research on a sample of 40 organisations that declared to use Scrum methodology, using 187 questionnaires as the research material. The study was carried out at the turn of April and May 2021 and was carried out using the CAWI technique. The obtained results were analysed using the Principal Component Analysis and Cluster Analysis methods, and enable defining a picture of an organisation's readiness to work remotely. In addition, they also allowed for an assessment of how the infrastructure used for remote work communication translates into the organisation of Sprint meetings. This paper presents conclusions aimed at counteracting the observed irregularities detected during the tests. At the end, the author proposes solutions that could improve communication within Scrum teams, with remote work in mind.

Keywords: Scrum Team, remote communication, agile, communication channel, COVID-19

Introduction

The development of technology has significantly influenced the way IT projects are managed. Scrum methodology is currently the most frequently used approach for agile organisations. Over the years, Scrum has gained both followers and opponents. As the COVID-19 pandemic unfolds, many organisations have been forced to re-organise their current work model and move their businesses from offices to employees' homes. Not everyone was prepared for this, and not every company was able to cope. Agile methodology, including Scrum, turned out to be the solution to many problems. In volatile, changing conditions, it allows for quick adaptation thanks to an iterative approach to problem solving. The project team itself, which is self-sufficient and self-organising, also plays a key role. More and more organisations worldwide are opting for agile thinking (Denning, 2019; Ragas, 2019). Unfortunately, many of them have not had any training in software development in an agile environment. The decision to introduce changes often results from the prevailing trend in the implementation of projects in Agile processes, and the teams that create them work in a real environment. There is a lack of validation of the adopted approach and adaptation to the actual shape of the organisation (Aghina et al., 2018, 2019). The basic problem concerns the change in the method of communication, and clear rules that were previously related to the complexity of the project (Griffiths, 2015; Phillips, 2019).

In literature on the subject, you will find research by various authors regarding communication in Scrum methodology:
- from the perspective of the role of communication in agile processes (Sarker & Sarker, 2009; Wang et al., 2012);
- in terms of communication as a key factor in the success of an IT project (Ji & Sedano, 2011; Lenarduzzi et al., 2015; Mishra et al., 2012; Mishra & Mishra, 2009);

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- in terms of the lack of communication in IT teams as the main cause of the failure of projects (Parnas, 2006);
- from the point of view of various forms of communication in IT teams and influencing product development (Beck, 2000; Kim, 2007; Korkala et al., 2006; Kraut & Streeter, 1995);
- in terms of team complexity and the impact of the number of people on inter-team communication (Duffield & Whitty, 2016; Melo et al., 2011);
- in terms of remote communication of agile teams, characterised by dispersed organizations (Kajko-Mattsson, 2008; Nevo & Chengalur-Smith, 2011).

In such literature, there are also studies indicating how the lack of communication in a team influences the success of agile projects. According to Hummel et al. (2013), even the lack of communication in a team does not affect agile software development. Rola et al. (2016) studied communication with regards to Scrum team functioning. The main goal of the research was to acquire knowledge that would allow the team to function effectively. Betteke Van Ruler (2015) focused his research on how Scrum teams in the public sector communicate.

In literature on this topic, there is a research gap regarding remote communication as a compulsory form of functioning and producing IT projects. There are no studies on the impact of long-term remote work related to COVID-19 on its effectiveness. On this basis, the author tackles the following research questions:

- How does remote communication affect the work of project teams using Scrum?
- What are the positive and negative aspects of working remotely for Scrum teams?
- Can remote work due to the COVID-19 situation have a positive effect on the work quality of teams using Scrum methodology?

The aim of the article is an attempt to answer such research questions. For this purpose, the following research hypotheses were formulated:

- **H1:** Remote communication has a positive effect on the efficiency of work in a Scrum team.
- **H2:** A positive aspect of working remotely is a significant saving of time and money due to the lack of the need to reach the company's premises.
- **H3:** A negative aspect of working remotely is the possibility to perform other tasks during working hours.
- **H4:** The effectiveness of remote work depends mainly on the tools for remote communication.

Providing the pillars necessary for the proper functioning of Scrum methodology in an organisation requires efficient communication between its participants. It is communication within the team that has become an interesting research area worth further analysis.

Scrum methodology and communication in Scrum Teams

Scrum is a framework of rules, roles and principles aimed at helping individuals, teams and the organisation itself to solve complex problems. The first mentions of Scrum can be found as early as 1986. Takeuchi and Nonaka were the first to show the purposefulness of creating small, interdisciplinary teams. This thought was continued by Schwaber and Sutherland, who have been developing and improving Scrum to this day (Scaled Agile, 2017; Schwaber & Sutherland, 2020). The Scrum approach does not impose communication techniques, but only gives guidelines on what actions should be taken by the team in their daily work Kaczor, 2016; Project Management Institute, 2017). The more dynamic development of an organisation, the greater the probability that this success is thanks to the implementation of Scrum methodology (Trzcieliński, 2011).

Both classic and agile project teams are distinguished on the basis of the company's organisational structure. Agile methods are currently used more and more often, thanks to more detailed analyses and the possibility of confronting them with more traditional projects (Gill, 2015; VersionOne, 2017). After the completion of a project, a given team is often dissolved and a new team is formed with its participants (Stabryła, 2006). Such rotation is deliberate and, as a result, enhances the project culture in an organisation. Each project team requires effective communication (Liebert, 2017). Communication within a team is crucial for successfully manufacturing a product that meets customer requirements. Advanced interpersonal skills and empathy of Scrum Team members enables knowledge sharing, helps avoid potential conflicts and builds positive working patterns within the team (Kozarkiewicz & Paterek, 2019; Ozierańska et al., 2016).

In literature on this topic, you can find many references to the impact of communication on issues related to employee development in an agile project team (Brosseau et al., 2019; Wysocki, 2018). Large organisations, creating interdisciplinary and multicultural teams, must pay special attention to communication. Consistently understanding the Scrum assumptions enhance the quality of work in complex projects, carried out by people from different parts of the world, often working in different time zones (Dingsøyr et al., 2019). It is a big mistake to implement Scrum without providing training and preparing the organisation for an agile transformation. Such a change is a complex process and in order to minimise the risk it should be carried out on a pilot team (Paterek, 2017).

Effective communication requires correct coding of information and then decoding it. In the communication process, the sender's task is to transmit information to the recipient over a communication channel, with simultaneous interference (Figure 1). Correctly processed information by the recipient leads to sending the response as feedback to the sender (Pawlak, 2008).

According to Kaczmarek (2005), the greatest influence on communication efficiency is made by disruptions, which include:

- unclear messages and incorrectly understanding them;
- language issues, both in the linguistic and generational sense (eg using abbreviations, emoticons);
- too many emotions – stress, euphoria, anger, panic;
- contradicting verbal and non-verbal messages (attempting to concentrate on the message while performing other activities);
- communication interference, resulting in receiving fragmented information;
- interpersonal differences – introvert, extrovert, phlegmatic, choleric;
- too much information, making it difficult to process.

Research on effective communication in Scrum teams was conducted by Katzenbach and Smith (2015). They defined five principles that characterise an effective team. Linz (2016) conducted research focused on Scrum artifacts, with emphasis on transparency. On the basis of the conducted research, measures aimed at improving the effectiveness of communication in Scrum methodology can be proposed, as presented in Table 1.

The roles specified in the Scrum Guide (Schwaber & Sutherland, 2020) have a positive impact on the involvement of team members in a manufactured product. Validation and implementation of improvements helps eliminate ineffective areas and optimisation of the time spent on ensuring growth in the project.

Figure 1
Communication model
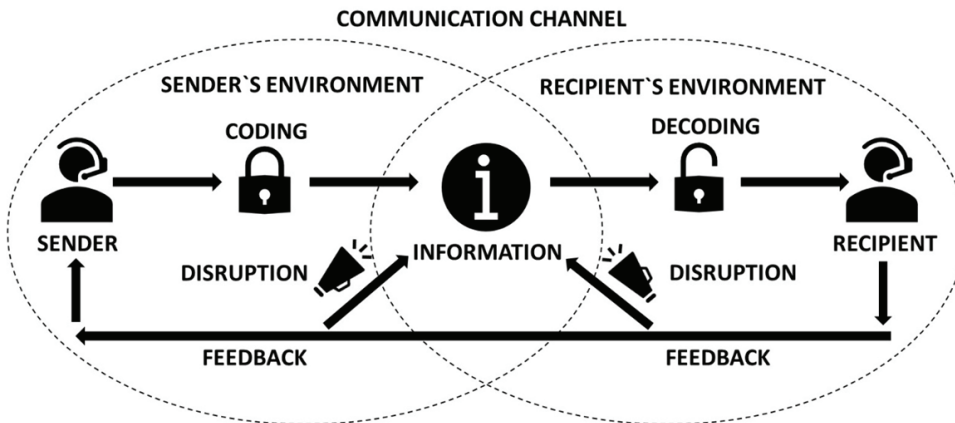
Source: author's own work based on *Communications: discovery, creation and conversation* (p. 41), C. Fill, & S. Turnbull, 2016, Pearson.

Table 1
Scrum communication

Process step	Operations in accordance with Scrum methodology	Responsible
Sender	• Monitoring the order of statements • Keeping track of the scheduled time • Moderating the event	Scrum Team / Scrum Master
Coding	• Ensuring continuous access to information (Sprint Backlog) • Ensuring compliance with customer requirements • Compliance with the Definition of Done	Product Owner
Communication channel	• Daily Scrum implementation • Presentation of work progress on the Scrum board	Scrum Team
Decoding	• Schedule of meetings before each event • Supporting questions during the Daily Scrum process	Scrum Master / / Product Owner
Noise	• Eliminating tasks outside of the Sprint Backlog • Verification of compliance with the Definition of Done	Scrum Master
Feedback	• Observance of all events	Scrum Master
Sender's environment	• Eliminate non-work related activities • Ensuring optimal working conditions	Developers / Scrum Master
Recipient's environment		

Source: author's own work.

Research methodology

Research on the impact of remote work on the effectiveness of activities in Scrum Teams was carried out at the turn of April and May 2021. The research was carried out using the CAWI technique. For this purpose, a questionnaire was created consisting of five sections: Organisation, IT Tools, Team and remote team communication, Remote Sprint organisation, Scrum Team participant. The questionnaire consisted of closed questions. The respondents were asked to choose an answer, specifying on a Likert scale whether, from the perspective of the organisation in which they operate, a given statement is true or not. The respondents had the following answers to choose from: 1 – definitely not, 2 – no, 3 – neither yes or no, or I do not know, 4 – yes, 5 – definitely yes. The questionnaire was sent to 193 organisations randomly selected, limited by the time of the company's operation – minimum 5 years. Requests for participation in the survey were sent by e-mail, containing a link to the survey. In the record, as a filtering question, the respondents were asked to state how long the organisation has been operating using Scrum methodology. Only those surveys in which Scrum has been respected for at least 2 years were classified for further analysis. In addition, due to the possibility of receiving more surveys from a given organisation, while maintaining the anonymity of the survey, we were asked to enter the survey ID. The survey identifier was any string of characters given by the respondent, not shorter than 8 characters, enabling the identification of surveys from one organisation. As a result, 187 correctly completed questionnaires from 40 organisations were obtained. The results are presented in Table 2.

The obtained data was subject to inference. In is worth mentioning the shortcomings of the CAWI method, which includes the limited scope of the research sample and a lack of possibility to verify the person completing the survey.

The results obtained from the questionnaires were analysed by Principal Component Analysis (PCA). The PCA method is used to reduce information included in multivariate dimensional date space to that in two-dimensional space without losing information. Using the PCA method it is possible to represent data in the form of a smaller number of uncorrelated variables called principal components (Draper & Smith, 1998). The Cluster Analysis (CA) was used to grouping variables (Rokach & Maimon, 2005). The PCA and CA analyses were done by using Statistics v13.3. Individual sections of the questionnaire with questions are presented in Figures 2 to 6. Additionally, the PCA uses an abbreviation referring to the questionnaire question (e.g. [D3]).

Remote communication in Scrum Teams – the results of empirical research

Based on the data obtained, a conclusion was reached that 87% of those surveyed declare their organisation's readiness to work remotely. Their employer had also provided the necessary resources to provide it (86%). Only 18% of respondents declare their employer's support in organising space for remote work. As many as 79% of respondents indicated the possibility to choose the form of work with their employer (stationary, hybrid, remote), and 68% declared that their employer preferred remote work. The obtained results are presented in Figure 2.

For communication with remote work – since the beginning of the pandemic – the same software has been used (90%), which is intuitive (97%), and thus does not need to be replaced (94%). All Scrum Team participants operate using the same communication software (99%). It is worth noting that not all communication functionalities in remote work are used (recording meetings, working on a shared screen) – 10% of responses. The obtained results are presented in Figure 3.

Functioning in a remote environment is not a problem (97%). Verbal communication was indicated as the main medium of communication (96%), and as many as 21% of those surveyed did not turn on their camera during meetings. Remote meetings are seen as more effective than stationary meetings by 79% of

Table 2

Companies participating in the research

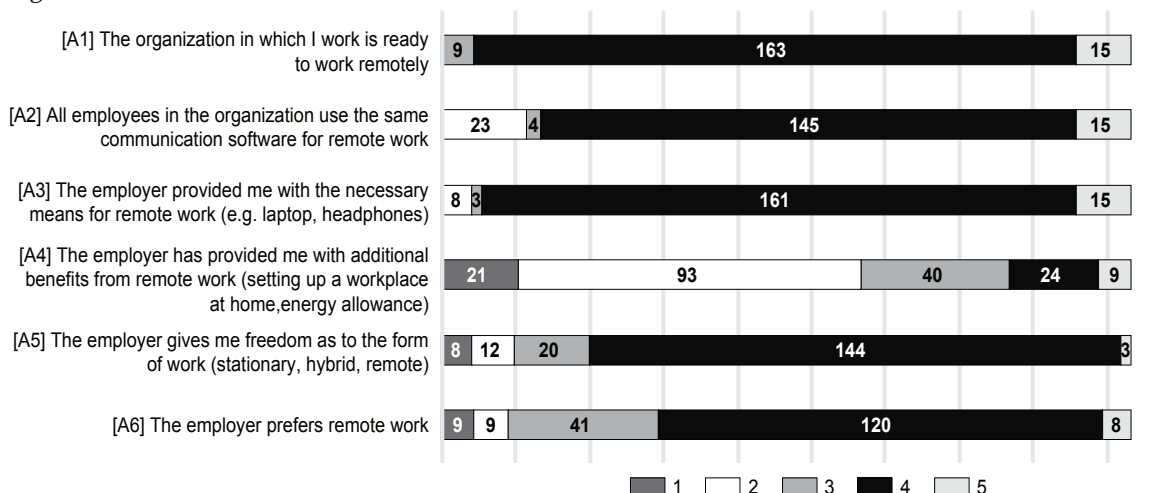| Provinces	Number of companies to which a link was sent with a request to participate in the survey	Number of correctly completed questionnaires
Lower Silesia	5	31
Lodzkie	3	23
Masovian Voivodeship	10	67
Lesser Poland	7	15
Opole Province	3	14
Pomeranian	7	25
Greater Poland	5	12
Total	**40**	**187**

Source: author's own work.

Figure 2

Organisation

[A1] The organization in which I work is ready to work remotely	9 / 163 / 15
[A2] All employees in the organization use the same communication software for remote work	23 / 4 / 145 / 15
[A3] The employer provided me with the necessary means for remote work (e.g. laptop, headphones)	8 / 3 / 161 / 15
[A4] The employer has provided me with additional benefits from remote work (setting up a workplace at home, energy allowance)	21 / 93 / 40 / 24 / 9
[A5] The employer gives me freedom as to the form of work (stationary, hybrid, remote)	8 / 12 / 20 / 144 / 3
[A6] The employer prefers remote work	9 / 9 / 41 / 120 / 8

Legend: ■ 1 □ 2 ▨ 3 ■ 4 □ 5

Source: author's own work.

Figure 3

IT tools

[B1] I have been using the same communication software since the beginning of the pandemic	9 / 10 / 113 / 55
[B2] I consider the communication software used every day to be intuitive	1 / 4 / 124 / 58
[B3] I don't feel the need to change my current communication software	2 / 10 / 120 / 55
[B4] All Scrum Team participants have the same communication software	2 / 181 / 4
[B5] Each Scrum Team participant has the same communication software license (s)	2 / 2 / 179 / 4
[B6] During meetings, functions such as recording meetings or working on a shared screen are used	5 / 12 / 18 / 150 / 2

Legend: ■ 1 □ 2 ▨ 3 ■ 4 □ 5
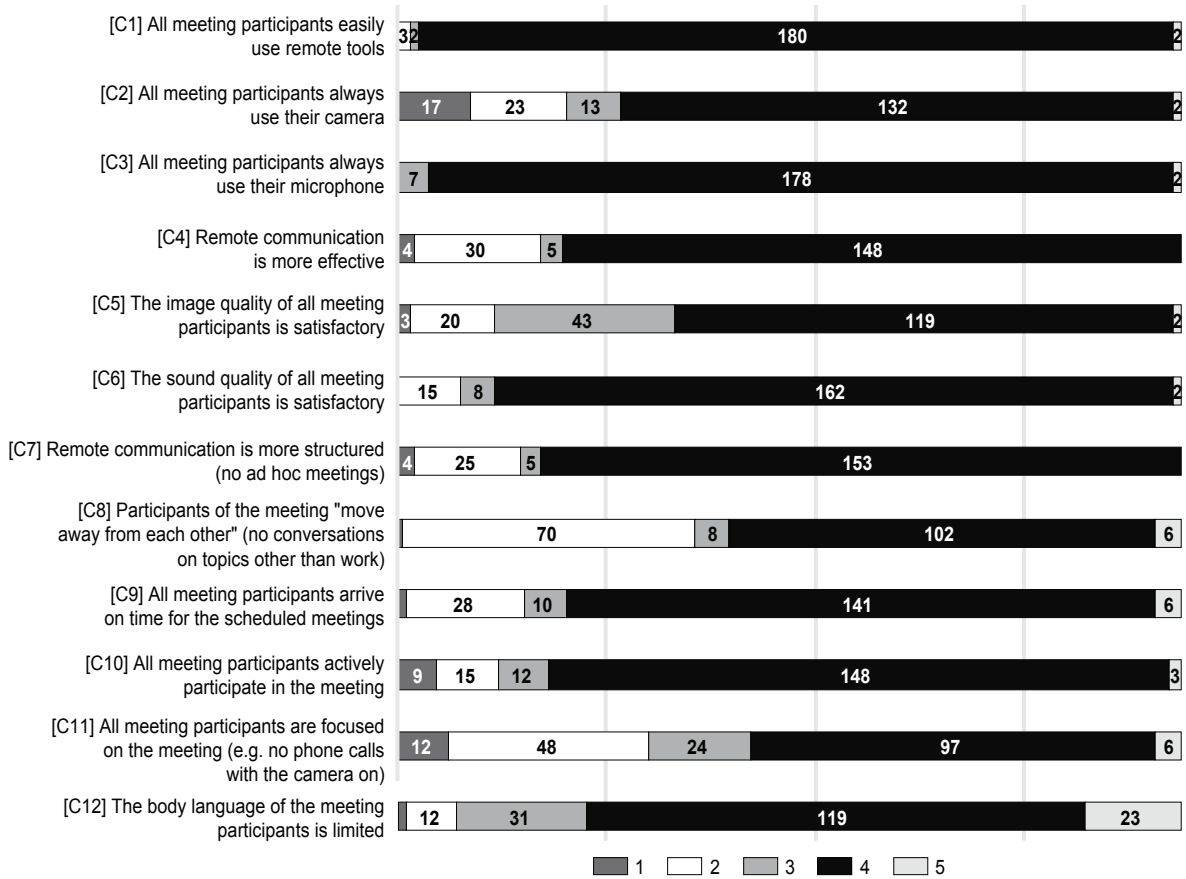
Source: author's own work.

respondents. Both the sound (88%) and image (64%) quality of the meeting participants is satisfactory. Remote communication is more structured (82%). The advantages of remote communication also include the punctuality of participants (79%) and active participation in meetings (81%). Unfortunately, during these meetings, not all participants are fully concentrated. As many as 32% of respondents experienced conversations on the phone during a meeting. The obtained results are presented in Figure 4.

According to the respondents, organising a remote Sprint meeting is more effective than in stationary (80% of responses). As many as 71% of people did not notice any difficulties in tracking the progress of the team's work remotely, and in 96% it is monitored using a Scrum table. Worth noting are a relatively large number of indications (35%) regarding non-compliance with all the ceremonies provided for in Scrum methodology. Such a state of affairs may often be conditioned

by different working hours in remote form and the desire to limit meetings. The reason may also be the lack of compliance with the time frames of meetings and the tendency to run over time (20%). The obtained results are presented in Figure 5.

Research has shown that 77% of respondents declare that remote work inhibits communication. 38% of people admitted to performing tasks other than those provided for in the meeting plan. This is undoubtedly due to the limited body language (87%). The topics that were not the main focus of the meeting were not discussed (92%). It is worth mentioning that for as many as 29% of respondents remote work influenced their self-esteem. The reasons for this are the lack of conditions for comfortable remote work. Remote work during the pandemic is often also requires looking after children and sharing office space with other residents, which was declared by 63% of respondents. The obtained results are presented in Figure 6.

Figure 4

Team and remote team communication

Item	1	2	3	4	5
[C1] All meeting participants easily use remote tools	32			180	2
[C2] All meeting participants always use their camera	17	23	13	132	2
[C3] All meeting participants always use their microphone	7			178	2
[C4] Remote communication is more effective	4	30	5	148	
[C5] The image quality of all meeting participants is satisfactory	3	20	43	119	2
[C6] The sound quality of all meeting participants is satisfactory	15		8	162	2
[C7] Remote communication is more structured (no ad hoc meetings)	4	25	5	153	
[C8] Participants of the meeting "move away from each other" (no conversations on topics other than work)		70	8	102	6
[C9] All meeting participants arrive on time for the scheduled meetings		28	10	141	6
[C10] All meeting participants actively participate in the meeting	9	15	12	148	3
[C11] All meeting participants are focused on the meeting (e.g. no phone calls with the camera on)	12	48	24	97	6
[C12] The body language of the meeting participants is limited	12	31		119	23

Legend: ■ 1 □ 2 ▨ 3 ■ 4 ▢ 5

Source: author's own work.

Figure 5

Remote Sprint meetings

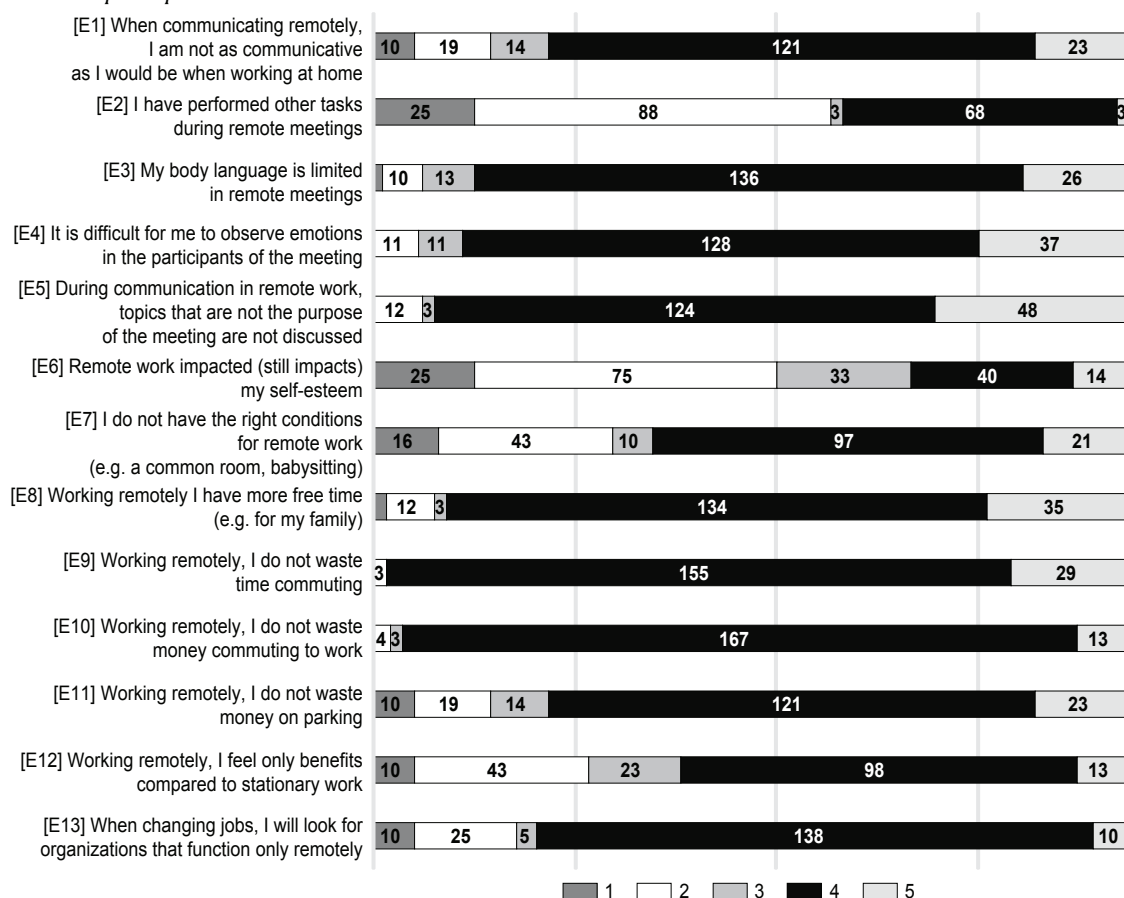| Item	1	2	3	4	5
[D1] Organising a remote Sprint meeting is more effective than stationary	13	23		134	15
[D2] Remotely tracking Sprint progress is difficult	31	102	12	40	2
[D3] A Scrum Bord is used for remote Sprint tracking	4 3			165	15
[D4] All events are respected during remote Sprint meetings	10	55	11	99	12
[D5] During remote Sprint meetings, each Development Team participant knows what to do	4 6			165	10
[D6] Remote meetings last less time than stationary meetings	15	21	4	137	10

Legend: ■ 1 □ 2 ▨ 3 ■ 4 ▢ 5

Source: author's own work.

Remote work also has its advantages. Working remotely, the respondents declared more free time outside of work (90%), for example due to the elimination of time spent on commuting (96%). The costs of commuting to and from work (96%) and parking costs (77%) also decreased, which had a positive effect on household budgets. Remote work is an important decision factor for employees. Although only 60% of the respondents saw only positive aspects of remote work, 80% declared that if they change their job they will look for organisations operating only remotely.

Figure 6

Scrum Team participant

[E1] When communicating remotely, I am not as communicative as I would be when working at home	10	19	14	121	23
[E2] I have performed other tasks during remote meetings	25	88	3	68	3
[E3] My body language is limited in remote meetings	10	13		136	26
[E4] It is difficult for me to observe emotions in the participants of the meeting	11	11		128	37
[E5] During communication in remote work, topics that are not the purpose of the meeting are not discussed	12	3		124	48
[E6] Remote work impacted (still impacts) my self-esteem	25	75	33	40	14
[E7] I do not have the right conditions for remote work (e.g. a common room, babysitting)	16	43	10	97	21
[E8] Working remotely I have more free time (e.g. for my family)	12	3		134	35
[E9] Working remotely, I do not waste time commuting	3			155	29
[E10] Working remotely, I do not waste money commuting to work	4	3		167	13
[E11] Working remotely, I do not waste money on parking	10	19	14	121	23
[E12] Working remotely, I feel only benefits compared to stationary work	10	43	23	98	13
[E13] When changing jobs, I will look for organizations that function only remotely	10	25	5	138	10

■ 1　□ 2　▨ 3　■ 4　□ 5

Source: author's own work.

Application of the PCA method in research

The data obtained from the CAWI study was analysed using PCA analysis. The obtained results are shown in Figure 7. The analysed variables were arranged on the two-dimensional plane PC1 and PC2. The first and second components explain the variability in 95.33%. This indicates the existence of a strongly arranged pattern of data.

In order to group the variables correlated with each other, CA analysis was then performed, the results of which are presented in Figure 8.

Based on the obtained results of the bond distance, the variables were divided into four groups, which are marked with a dashed line in Figure 8. In the case of the PC1 and PC2 plane (Figure 7), these groups are marked with circles – a solid line. In addition, within one circle, an additional five circles were diagnosed, which are depicted with a dashed line. The factors from these five circles are grouped in terms of their specific features. The first group consists of the following variables: A4, D2, E2. The second group is the variable E6. The third group are the variables C8, C11, D4, E7 and E12. The fourth group consists of the following variables: A1, A2, A3, A5, A6, B1-B6, C1-C7, C9, C10, C12, D1, D3, D5, D6, E1, E3, E4, E5, E8, E9-

E11, E13. These variables are arranged on the PC1 and PC2 plane and the direction of change is marked with a dashed arrow in accordance with the criterion:
- negative (❶) and positive (❷) aspects of working remotely;
- the least important (❸) and the most important (❹) features of working remotely.

Conclusions

Remote work has become a popular option. Before the COVID-19 pandemic and changed regulations, no one thought about the benefits and limitations of working remotely. Almost overnight, many companies were faced with the necessity to close their offices and announce a lock down. Despite the next waves of the pandemic, many institutions are trying to return to normal operating and are re-opening their offices, while the sanitary restrictions in force require the introduction of preventive measures. One such preventive measure is shifting to remote work.
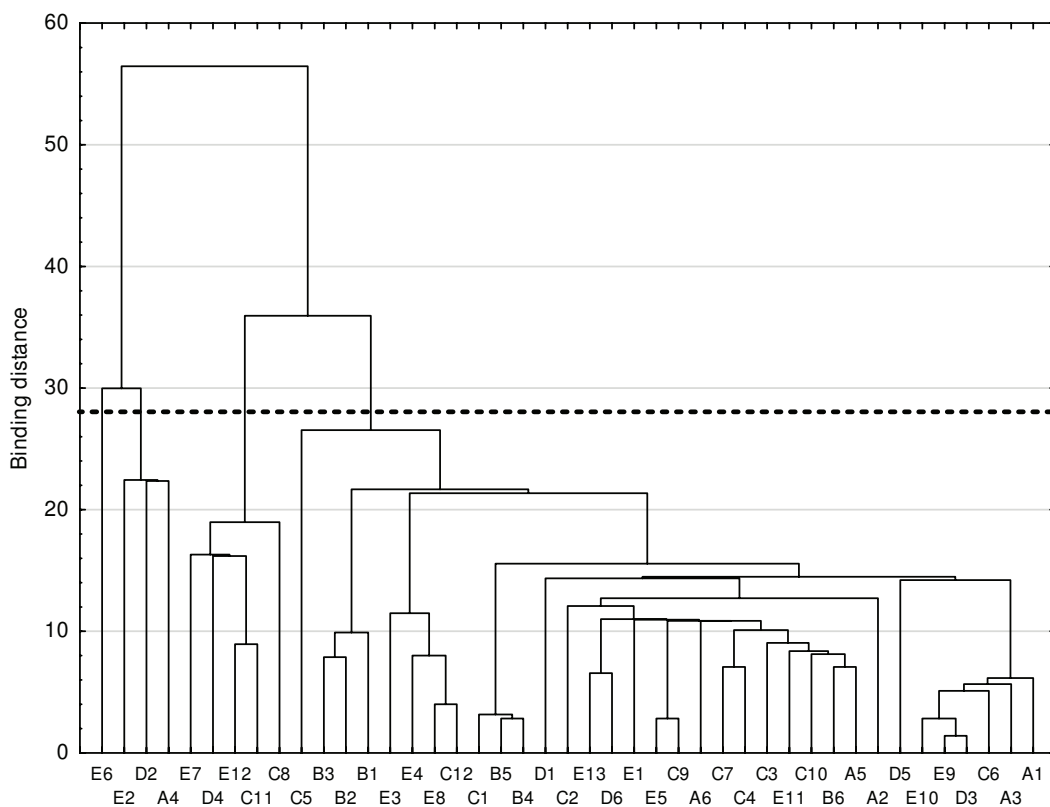
Various workshops and meetings are held to optimise and make remote work more attractive. This is aimed at getting used to the situation where remote work is a necessity, and not the employee's choice.

Figure 7
Principal Component Analysis
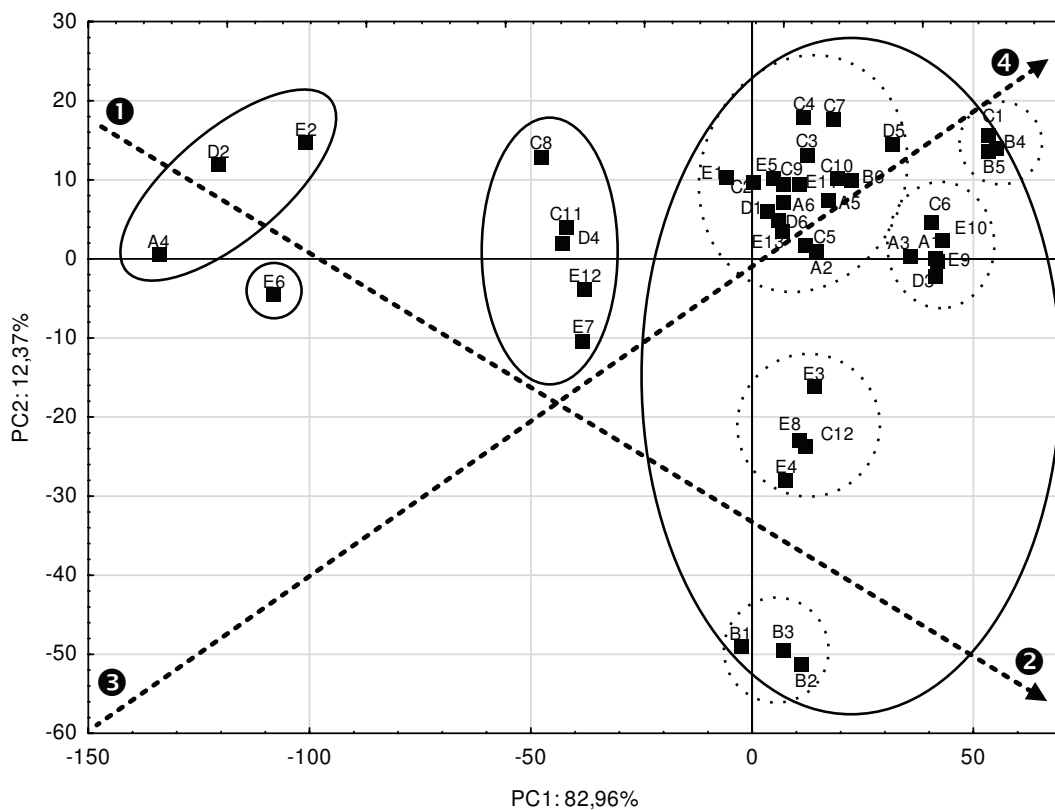
Source: author's own work.

Figure 8
Cluster Analysis

Source: author's own work.

The conducted research has shown that remote communication has a positive effect on the efficiency of work in a Scrum team and is more effective than in stationary form (the result of grouping the variable [D1]), thus the H1 hypothesis has proven to be true.

Although remote work shows tangible benefits, there are areas for further improvement. Work and remote communication in Scrum teams requires constant control and reaction of the Scrum Master to situations deviating from the accepted norm. The Development Team is a self-organising group of people, and the Scrum Master should be invisible in their activities. However, this approach is wrong when assuming only remote work. A quick reaction by the Scrum Master to a signalled message about a problem help avoid escalating further problems.

A positive aspect of remote work is the significant saving of time and money due to the lack of the necessity to reach the company's offices (distribution of the variables [E9] and [E10] on the PC1 and PC2 levels). Thus, the hypothesis H2 has proven to be true.

A negative aspect of remote work is the ability to perform other tasks during working hours (occurrence of the variable [E2]), often without the knowledge and consent of the employer. Thus, the H3 hypothesis has proven to be true. Very often employees, feeling unsure about their job security, took on additional work. This work was aimed at ensuring the stability of employment in the event of redundancies. As a result, employees often had to work more efficiently to manage both jobs. It is also worth noting that remote work influences employees' self-esteem (variable [E6]). This assessment is often a result of isolation and lack of contact with the external environment, organisation, and loss of established bonds with colleagues.

It is therefore important to introduce practices that allow employees to feel more relaxed and are similar to working in an office. It is worth enriching formal meetings with short conversations about everyday life. "On-line coffee" is more and more often used in organisations as a relaxed form of spending time with team members and nurturing mutual relationships. Positive relationships, often developed during stationary work, cease and become very formal over time. It is also worth providing team members with the same hardware infrastructure for remote communication to avoid disproportions and categorising meeting participants as better and worse.

Very often, the mere fact of communicating from home causes the participants to feel uncomfortable and use the camera less and less often. They then use a bad connection or pro-ecological approach to reduce their carbon footprint as an excuse. In addition to remote communication software, it is worth implementing a chat in the organisation in which team members will be able to communicate on an ongoing basis. Emoticons, used for expressing emotions in remote form, should function in everyday communication.

An important aspect of the functioning of a Scrum Team in a remote environment is to ensure a balance between group and individual work. The most common mistake is to unconsciously isolate team members who are trying to be self-sufficient. As a result, they lose control over the task being carried out and make mistakes. Mistakes that often cost time and money. The basic environment for Scrum methodology is mutual communication, support and exchange of experiences. The exchange of experiences requires meetings, because without them learning is impossible. Before planning a Sprint meeting, it is worth doing research on the preferences of team members and how their work can bring better results. Meetings participants should not be forced to meet, because the effect of such meetings will be counterproductive. There is nothing worse than the awkward silence and general embarrassment of meeting participants that have nothing to say.

The conducted research has shown that remote communication in Scrum teams is more effective than in stationary form, which largely depends on remote communication tools. The H4 hypothesis has therefore proven to be true. On the basis of the research (Figure 7), the variables [B1], [B2], [B3] and [C1], [B4], [B5] are clusters concentrated both in terms of positive aspects of remote work, as well as in terms of the most important features constituting remote work. From the perspective of the success of communication in remote work, it is necessary to have and know the software used by the entire development team, and this software should be homogeneous and with the same rights for all participants.

The benefits of this approach are immense, and organisations are increasingly supporting such initiatives. A larger number of people operating remotely is an opportunity for cost optimisation in the organisation and reduce the size of office space. Remote work – as a standard form of work in modern organisations – can also be problematic for employers. Remote communication and agile operations provide great opportunities on the labour market, getting rid of geographical barriers. The information exchange takes place in the same way whether working locally or internationally. The effect of this is the continuous increase in expectations and salaries of people from the IT industry.

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