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RESEARCH ARTICLE

Digital transformation of high-performing teams

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Abstract

The paper studies the impact of the covid-19 pandemic and shift to remote work on team productivity. The purpose of the article is to analyze changes in agile team performance in a virtual format of work and to analyze risks and opportunities for management solutions to maintain or improve their work productivity. The study provides a literature review and empirical analysis of high-performing teams in the Russian companies. In the empirical part, the authors first conduct interviews with heads of HR-departments to collect general information on high-performing teams and risks, appeared after transition to remote work, and then study opinions of high-performing teams' members to assess their own attitude to changes in work productivity in 2019-2021. In the result section the authors show changes in the management views and recognition of the hybrid and virtual team capabilities and demonstrate that recent agile team concepts are based more on partially-remote work and focus on individual rather than collaborative work and face-to-face work periods for innovative activities and team-building of agile project members as the way to maintain their high productivity.

Keywords

high-performing teams; project management; digital transformation; HR management; agile teams

JEL codes: J24, M12, M54

1. Introduction

Determinants of team performance have been the research subject for many decades. While the co-located team work has remained the ruling paradigm, the digital transformation of the business world has led to an increase of virtual and hybrid teams all over the world. In

parallel to that development, for the last twenty years, agile management methodologies have spread from the software development industry to many other industries around the globe. Until the onset of the Covid-19 pandemic, agile teams mostly worked in a co-located format and were regarded as a prime example of high-performing teams.

The Covid-19 pandemic has forced transition of all kinds of teams all over the world from a co-located into a virtual format. Later, when the acute phase of the pandemic was over, many teams switched to a hybrid format, and continue to work in a virtual or hybrid format today. Companies have differently treated the question of whether and when teams need to return to the pre-crisis co-located format. Some companies have embraced the new formats, changed their company policies, and used their new positioning to attract employees that prefer working from home, while saving costs on office space. Other companies urged their employees to return to the office, but faced resistance of the employees that were reluctant to go along with that demand. They commonly reacted with delaying their return-to-office plans, in order not to lose good employees in a tight labor market.

One might say that the Covid-19 pandemic worked as a sort of accelerator of digital transformation of teams into hybrid and virtual formats. Companies suddenly and acutely have been faced with the question how team performance is affected by the digital transformation into different work formats, in order to take informed decisions on how to structure work in the future. This question is particularly relevant for agile teams as a prime example for high-performing co-located teams. Therefore, the research question of the study is how the work of high-performing agile teams is affected by the digital transformation into hybrid and virtual formats.

Section 2 is devoted to a review of the literature. In section 3, the literature is discussed and conclusions with respect to the research question are drawn. Section 4 presents and discusses results of the empirical analysis performed in Russia. Section 5 lists the overall conclusions.

2. Literature Review

Team performance is a complex topic. Some recently developed modern management practices, for example agile methodologies, have not been subject to rigorous scientific analysis so far. Since the onset of the Covid-19 pandemic, academics and practitioners have been fast to publish monographs to discuss the consequences of remote work on employee and team performance. These contributions are important as they allow capturing the latest trends in management experience and management thinking that partially may not be accessible to rigorous scientific proof. The publication of academic research papers has also gained momentum, but with a certain time lag, as research projects need to be conceptualized and carried out, and results need to be discussed in the research community, before they are published. The literature review therefore includes monographs of academics and practitioners alike as well as academic research papers.

The literature is chosen with respect to the main components of the research question, that is, the literature ought to allow a better understanding of the terms high-performing, agile, hybrid, and virtual teams, and remote work. Furthermore, the goal of the literature review is to obtain the information necessary to answer the research question based on the current state of research. The literature is divided into the following research areas: 1) Team performance, 2) Agile teams, 3) Hybrid and virtual teams, and 4) Remote work (particularly, against the background of the Covid-19 pandemic).

2.1 Team Performance

Yeatts and Hyten (1998) give a detailed account of classical, human relations, systems, and contingency perspectives on team performance (Yeatts and Hyten 1998: 1) that were developed mostly in the second half of the twentieth century. The authors argue that the self-managed work team (SWMT) approach provides the highest performance in systems and contingency approaches, which developed out of the earlier classical and human relations approaches. While other team configurations might be higher performing under particular circumstances, we will use self-managed work teams as a foundation for the remainder of the paper because they can be seen as predecessors of agile teams, which are the object of our research question.

Yeatts and Hyten define an SMWT as a group of 5-15 employees working on technical tasks regarding a product or service for an internal or external customer (Yeatts and Hyten 1998: xiii). It is characterized by rotation of tasks, self-management, high interdependence, team accountability, and it is brought together not only for a short-term purpose (Yeatts and Hyten 1998: xiii, 16). Laiken (1994) provides an equivalent definition stressing the team's functioning in "a truly interdependent manner", the team leader's role as facilitator, and the sharing of the leadership role with the team members (Laiken 1994: 4, 6, 73). She emphasizes that any team has to go repeatedly through the group development sequence as established by Tuckman (1965) to reach the high-performing phase, and lists attributes of a mature high-performing team (Laiken 1994: 1, 75).

Yeatts and Hyten define high performance as high customer satisfaction under the condition of a team's economic viability. High customer satisfaction is determined in terms of productivity, quality, timeliness and costs of the team's output. Economic viability means that the team's output can be sold profitably (Yeatts and Hyten 1998: 50ff).

With respect to systems theory, they regard the SWMT approach as providing the best fit of technical and social systems, and with respect to contingency theory, as allowing for optimal quick reactions to employee, technological, and environmental contingencies (Yeatts and Hyten 1998: 2, 17).

According to Yeatts and Hyten (1998), SMWTs have been on the rise as a result of international competition since the 1970s, and research studies show that well-implemented SMWTs are high-performing. In particular, they cite research results that SMWTs are more productive, show more efficient decision-making, are more innovative and creative, cope better with absences of team members, have a higher capability to meet deadlines, match work better to needs and strengths of team members, have more empathy, and need less supervision. The authors point to the challenge to isolate the effects of self-management from other factors in statistical studies, and therefore prefer case studies (Yeatts and Hyten 1998: xivf). Parker et al. (2019) review the history of work design research, and find that autonomous work teams typically show positive attitudinal effects, but less consistently positive performance effects. They argue that more research is needed regarding long-term effects from the high level of control that team members exercise over each other. For future research, they recommend focusing more on the effects of work design (e.g. a self-managed rather than a supervisor-led team) on the dynamic process of organizing, particularly with respect to collective processes like trust, collaboration, and task coordination (Parker et al. 2019: 403-404, 410).

Yeatts and Hyten discuss several models proposed from 1964 to 1994 that explain SMWT performance (Yeatts and Hyten 1998: 24ff), and develop their own theoretical framework, which is shown in Figure 1.They detail the factors shown in Figure 1 as follows:

- Environment
  - Within the organization: Organization philosophy, culture; clear ongoing mission for the team; reward, training, information, and performance measurement systems; management roles and support; supplier / customers / unions support; available appropriate resources
  - Outside the organization: Economy, technology, political-legal issues, demography, education, societal culture
- Team member characteristics: Existing talent (knowledge, skill, ability); personality; values, interests, needs, and prejudices
- Team design characteristics: Goal clarity, challenges and priorities; job design (enrichment, shift work, multiple sites); team size and composition (role and personal diversity, stability); decision-making methods and process for identifying procedures; work norms; roles of team and team leader
- Interpersonal process: Within the team and between the team and others (communication, coordination, cooperation, conflict, cohesion, trust)
- Work process: Effort applied to tasks; talent applied to tasks (knowledge, skill, ability); resources applied to tasks; procedures used for doing the work
- Team performance: Customer satisfaction with productivity, quality, timeliness, costs; economic viability (Yeatts and Hyten 1998: 53)

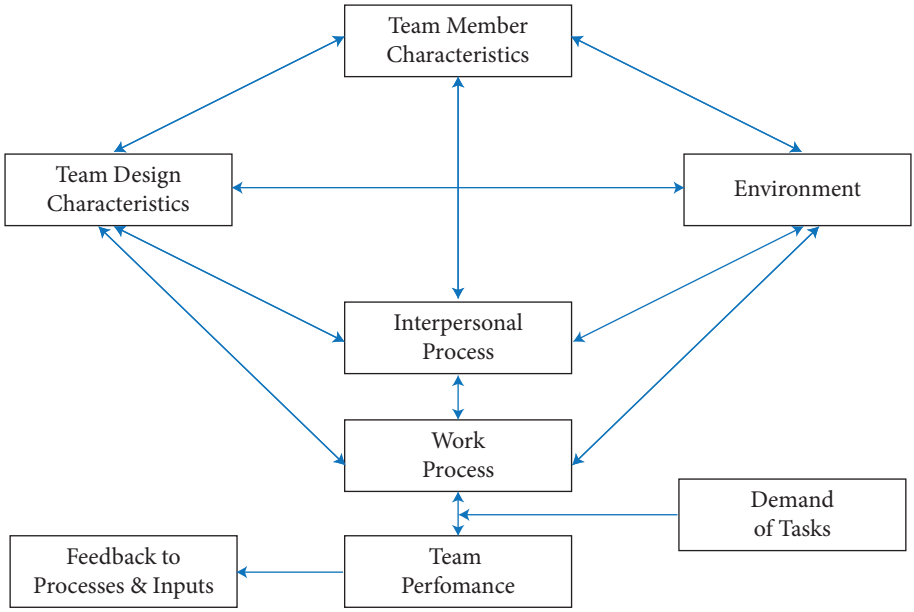

Figure 1. Factors Affecting Self-Managed Work Team Performance. *Source*: Adapted from (Yeatts and Hyten 1998: 53)

SMWT performance depends on many factors that interact in a complex way. Yeatts and Hyten identify SMWT success factors on the basis of the literature and ten case studies of high- and low-performing SMWTs (Yeatts and Hyten 1998: xv).

The team's work cycle synchronicity and the physical location of team members are seen as part of job design within team design characteristics ("shift work", and "multiple sites" in

Figure 1). The authors view SMWTs across works shifts and across multiple sites similarly (Yeatts and Hyten 1998: 254).

Coordination, cohesion and trust within a team can be reduced if teams in different shifts are perceived to work on different terms. There is a tendency to stick to shift assignments, even if resources are available to take over work of another shift. Team members in different shifts often share information through notes or a third party. Mitigations are to assign specific shift communicators, or to organize face-to-face meetings of teams during the shift transfer (Yeatts and Hyten 1998: 252f).

The physical dispersion of team members can negatively affect communication inside and outside the team. It can also inhibit the development of team cohesion (Yeatts and Hyten 1998: 82, 100). The authors cite Fisher et al. (1995) describing similar communication problems. These can be remedied by intensive face-to-face interaction upon a team's formation, the development of operating procedures, continuing periodic face-to-face interactions and routine teleconference meetings as the team is in operation, and by establishing an office location as the team's home base. Other studies confirm the value of face-to-face communication (Yeatts and Hyten 1998: 254f)

The team's stability represents another team design characteristic. High team turnover negatively affects "high coordination and communication as well as consensus regarding team norms" ((Yeatts and Hyten 1998: 45). Therefore, high stability is important for team performance ((Yeatts and Hyten 1998: 261). Yet, team stability can also produce "stagnation and groupthink (i.e., desire to agree with others on the team)", which can lead to a "lack of innovation and consideration of multiple alternatives during the decision-making process" (Yeatts and Hyten 1998: 266, referring to Cohen, 1994).

Dyer and Dyer (2020) regard physical space as an important context factor for high-performing teams as co-located teams more frequently interact with each other. This is particularly important for tasks that require reciprocal interdependence (as opposed to modular and sequential interdependence) meaning that work needs to be done in a simultaneous, iterative, and closely coordinated process with frequent communication among team members (examples: basketball team, SWAT team, product development teams) (Dyer and Dyer 2020, chapter 2).

Schwartz et al. add one interesting notion to the discussion in what they call "superteams". In superteams, technology is not regarded as a "tool and enabler", but rather as a "team member and collaborator". Artificial intelligence has the potential to add to the diversity of a team contributing its own style of "'thinking'" (Schwartz et al. 2020).

2.2 Agile Teams

The agile movement started in 2001 with Agilemanifesto.org (2001) and can be seen as a specific implementation of self-managed work teams as treated in Yeatts and Hyten (1998) in the software development industry. It was a reaction to the industry-standard waterfall or predictive approach of project management, in which all project requirements (scope, schedule, cost, resource needs, and risks) are defined before the project implementation phase and in which changes in requirements are subject to a rigid process (PMI 2021: 35). The agile movement proposed an alternative flexible approach, commonly referred to as agile or Scrum approach, that is more adapted to a fast-changing environment.

In fact, there is a trend to view agile and waterfall approaches as being complementary. The Project Management Institute (PMI), which used to be famous for its waterfall meth-

odology, recently reformed its approach and now defines a continuum of development approaches that range from predictive (i.e. waterfall) via hybrid to adaptive (i.e. agile). According to PMI, the right development approach needs to be selected based on the nature of the product, service, or result, and based on project and organizational variables (PMI 2021: 39ff). Similarly, Bittner et al., who propose a methodology to scale Scrum, state that teams need to follow either a waterfall or a Scrum process, but not both at the same time (Bittner et al. 2017: 152).

According to Schwaber and Sutherland (2020), one of the key documents in the agile space, the Scrum Team is responsible for implementing product development (Schwaber and Sutherland 2020: 3). The Scrum Team is characterized by a small team of people (max. 10 people), consisting of a Scrum Master, a Product Owner, and Developers. The Scrum Team is a "cohesive unit of professionals", "cross-functional", "self-managing", "responsible for all product-related activities", and "structured and empowered … to manage their own work". The Scrum Master is accountable for team effectiveness as a servant leader, the Product Owner is accountable for product value maximization (Schwaber and Sutherland 2020: 5, 5f).

For Beck and Andres (2004) "Whole Team" is one of the primary practices in their seminal book on Extreme Programming (XP). The development team ought to be cross-functional, and include people with all the skills necessary for the development project. Team members ought to work exclusively on one development project at a time. Team composition ought to be dynamic in the sense that required resources should be onboarded, and non-required resources should be let go (Beck and Andres 2004, chapter 7). According to Beck and Andres, XP can produce dramatic productivity improvements, but the teams have to decide themselves whether to adopt it. Interestingly, they state that "the price of the improvement is closer collaboration and engagement with the whole team" (Beck and Andres 2004, chapter 8). This statement underlines that the kind of team work needed in agile teams does not come without effort, but needs a significant investment.

Ockerman and Reindl (2020) define an effective Scrum Team as cross-functional, self-organizing, collaborative, and stable that needs teaching, facilitation, and coaching skills, technical excellence and servant leadership (Ockerman and Reindl 2020: 4, 8). Regarding team stability, they state: "Without stability, the team never completely forms, and its sponsoring organization never truly reaps the benefits of a high-performing team" and "Some general advice is to move work to the teams, rather than teams to the work" (Ockerman and Reindl 2020: 5, 45). This seems to be in contradiction with dynamic changes in team composition according to task requirements as outlined by Beck and Andres (2004). Ockerman and Reindl support these dynamic changes, but set the goal to find a "dynamic stability" for the team, which can be reached when the team owns the decision of changes in team composition (Ockerman and Reindl 2020: 45). Overall, the authors underline that a Scrum Team differs from a project team that is created and dissolved with the start and the end of the project. A Scrum Team has a product rather than a project mindset, and strives to follow a continuous product development process, which goes beyond a traditional project view (Ockerman and Reindl 2020: 96ff).

Regarding co-location, among the twelve principles behind the Agile Manifesto are the following: "Business people and developers must work together daily throughout the project" and "The most efficient and effective method of conveying information to and within a development team is face-to-face conversation" (Agilemanifesto.org, 2001, principles).

Interestingly, Schwaber and Sutherland (2020) do not mention the term co-location. Yet, with respect to "Scrum Events", they advise: "Optimally, all events are held at the same time and place to reduce complexity" (Schwaber and Sutherland 2020: 7).

Beck and Andres (2004) view "Sit Together" as one of the primary practices of XP. The entire team ought to sit together in one open space. Regarding distributed work, they clarify "'Sit Together' predicts that the more face time you have, the more humane and productive the project. If you have a multisite project and everything is going well, keep doing what you're doing. If you have problems, think about ways to sit together more, even if it means traveling." Another primary practice of XP is "Pair Programming", which means that all production programs are supposed to be written by two people sitting at one machine with a frequent rotation (Beck and Andres 2004, chapter 7).

Ockerman and Reindl (2020) state that "it is not impossible to make distributed teams work, but it is certainly much harder". There are risks of reduced cohesion, and effectiveness. Communication can be made difficult by cultural differences. The authors advise to help the team self-organize, to invest in preferably quarterly, and at least yearly on-site collaboration sessions, and in communication and collaboration tools (Ockerman and Reindl 2020: 144).

Ockerman and Reindl also view outsourcing of production support critically: "Sourcing strategies that treat people like exchangeable labor inputs are deeply damaging to creating the kind of accountable, transparent, self-organizing teams that are essential to success." (Ockerman and Reindl 2020: 141).

2.3 Hybrid and Virtual Teams

Aldag and Kuzuhara (2015) identify the following forces for virtualization: globalization, workforce instability, development of Internet-based group collaborative technologies, growing computer literacy, new office forms, time and resource constraints on travel, enhanced robotic capability, deemphasis on hierarchy, increasing rate of change (Aldag and Kuzuhara 2015: 273, 291). They state that these forces are "symbiotic, mutually reinforcing, and mutually dependent", and that they lead to teams being "increasingly virtual, global, technology dependent and self-managing" (Aldag and Kuzuhara 2015: 291).

Nemiro et al. (2008) identify the following purposes for virtual teams: bring together best skills and expertise regardless of physical location; ensure twenty-four-hour coverage across time zones; reduce office overhead through work from home; and to apply an as-needed approach to human resources to increase efficiency. The authors organize their study around six challenges: distance, time, and technology as defining characteristics of virtual teams, and culture, trust, and leadership that need to be developed and sustained by the virtual team. Distance makes the identification of the employee with the team and with the company more difficult, and may result in feelings of isolation. Time differences make real-time collaboration more difficult, and may result in work outside office hours affecting work/life-balance. The use of ever-advancing communication technologies needs to be trained by all team members with the danger of technological incompatibilities across physical locations. Cultural challenges come into existence especially in global virtual teams. Trust can be easier developed in a co-located than in a virtual setting as virtual communication is more task and less socially-oriented, and less rich than face-to-face communication. Leaders need to be facilitators, but now not in a co-located, but in a more challenging virtual setting. High-performance virtual teams are obtained by overcoming these challenges (Nemiro et al. 2008).

Dyer and Dyer (2020) define virtual teams to differ from traditional teams as they are more diverse, as team members work in different time zones, as there is a greater reliance on communication technology, and as there are greater demands on the team leader. They emphasize the value of virtual team workspaces (particularly, by comparison with e-mail communication), audio-, and videoconferences and match them to virtual team tasks. Team members ought to be selected based on their capability and willingness to use these communication technologies, and to work alone without face-to-face contact. Teams explicitly need to work on recognizing and handling cross-cultural and other context barriers, regularly assess team performance, and enter into (if possible face-to-face) team-building activities. Team leaders need cross-cultural and cross-functional experience to anticipate and manage conflicts, and must plan extra time to prepare team meetings, and to communicate frequently individually with each team member. The authors estimate that leadership requires 50% more time resources for a virtual team than for a co-located team (Dyer and Dyer, 2020, chapter 9).

Sobel Lojeski and Reilly (2020) state that today's virtual teams "are simply not really teams" (Sobel Lojeski and Reilly 2020: 191). They prefer to talk about "virtual ensembles", that are "temporary group formations" similar to "jazz ensembles", that get together to innovate, to work out problems, and to produce a final deliverable (Sobel Lojeski and Reilly 2020: 191ff). That is why the authors focus more on virtual work than on virtual teams. They define virtual distance as a psychological distance being composed of physical (location-based), operational (day-to-day), and affinity (relationship-based) distance (Sobel Lojeski and Reilly 2020: 69). From a collection of 1,400 studies from many industries and countries over the previous fifteen years, they derive a vertical distance index that weights operational distance twice as much as physical distance, and affinity distance twice as much as operational and four times as much as physical distance (Sobel Lojeski and Reilly 2020: 46f). In fact, while affinity and operational distance have statistical significance regarding key performance indicators, physical distance does not (Sobel Lojeski and Reilly 2020: 99f). Affinity distance comprises four relationship dynamics: cultural, relationship, social, and interdependence distance (Sobel Lojeski and Reilly, 2020: 87).

Sobel Lojeski and Reilly emphasize that nowadays everyone is virtual and affected by virtual distance to the extent smart digital devices are used (Sobel Lojeski and Reilly 2020: xiii). Therefore, the discussion around performance effects of remote work is wrong-footed, as virtual distance does not necessarily depend on physical remoteness (Sobel Lojeski and Reilly 2020: 11). From their own data, the authors show that remote workers (>75% remote) perform better than co-located employees (<20% remote), except for employee engagement (see table 1). There are no significant differences regarding trust, satisfaction, role and goal clarity, and on-time, on-budget project delivery and customer satisfaction between remote and co-located employees (Sobel Lojeski and Reilly 2020: 12f). Full remote workers usually obtain effective support to organize their work, other than employees with an intermediate share of remote work (21-74%) that consequently perform worse (Sobel Lojeski and Reilly 2020: 14, 16) (see table 1).

Sobel Lojeski and Reilly propose a virtual distance mapping process that includes the identification of key players, the assignment of virtual distance scores, and the location of critical relationship paths, along which virtual distance can be reduced to achieve better organizational outcomes by way of a virtual distance action plan (Sobel Lojeski and Reilly 2020: 126, 150, 174ff).

Table 1. Performance rank as function of percentage of time worked remotely

% of time worked remotely	Citizenship / Helping behavior	Learning	Employee engagement	Innovation
Less than 20% (less remote)	2	2	1	2
21-50%	3	Tie for 3	4	4
51-75%	4	Tie for 3	3	3
More than 75% (more remote)	1	1	2	1

Source: (Sobel Lojeski and Reilly 2020: 13)

Note: 1 = Very best; 4 = Least best

Friedrich (2017) develops a virtual team maturity model with the goal to improve virtual team performance over time to a target level for a task or project (Friedrich 2017: 7, 18). He actually comes from a hybrid setting, in which some team members work in a co-located manner, and others in a virtual manner (Friedrich 2017: 16f). Later he describes a co-located team with some team members working virtually on a rotational basis, which has become more prominent post-Covid-19 (Friedrich 2017: 20). The virtual team maturity model consists of eleven processes for virtual team performance, each described in terms of inputs, methods, and outputs, and four maturity levels based on key performance indicators (KPIs) (Friedrich 2017: 173ff, 218f, 219f). The model was tested with multinational virtual teams of two global companies, a pharmaceutical, and a consultancy company (Friedrich 2017: 268f). While the pilot at the pharmaceutical company was canceled during the experiment due to a lack of commitment, the second pilot, with some team members located in Germany and others in India, showed positive results of the maturity model application (Friedrich 2017: 269-270, 296).

Afflerbach (2020) investigates cooperation problems in hybrid virtual teams in shared services organizations. He seeks to overcome challenges of distance, reliance on communication technologies, and temporary team composition through identification, trust, and peer monitoring (Afflerbach 2020: vii). The setup is similar to Friedrich (2017) as shared services organizations are characterized by service centers (usually located in a low cost country) and local business partners (usually located close to end customers) such that team members at the respective locations are co-located, while across locations they form a hybrid virtual team (Afflerbach 2020: 21). Location-dependent subgroup formations (ingroup/outgroup) negatively affect team performance and form a challenge that is particular to hybrid virtual teams (Afflerbach 2020: 29ff). Overall, Afflerbach carries out a series of interviews of hybrid virtual teams at a global mobility company from the "Old Economy", and a global IT-company from the "New Economy", both characterized by hybrid virtual teams consisting of business partners in German-speaking countries, and central shared services hubs in Eastern Europe (Afflerbach 2020: 93ff). He identifies thirteen contextual challenges and twenty-two practices to overcome cooperation problems (Afflerbach 2020: 116, 142). One of the challenges is that "location determines subgroup-belonging" (Afflerbach 2020: 116). The negative dynamics of subgroup formation can be counteracted by constructing a superordinate identity that binds together subgroup identities, and by determining common goals (which is one of the identified practices) Afflerbach 2020: 195). One interesting result is that Afflerbach shows that hybrid virtual teams can foster cooperation even without high-end communication technologies. They help facilitate cooperation, but need to be accompanied by activities of identity constructing, trust building, and virtual peer monitoring (Afflerbach 2020: 141, 186f).

Silveira (2021) from a practitioner's point of view makes a clear difference between remote and distributed teams. In remote teams, not all team members are remote, but some still work at a central office space, while in distributed teams all team members are remote. In a remote team, off-site team members have problems to get engaged, and to participate in team work the same way as on-site team members. Therefore, "remote only works well when everyone is remote." (Silveira 2021: 26f) Distributed team members ought to work in roughly the same time zone, such that synchronous communication (via audio- or videoconference) within the team and with customers remains easily possible (Silveira 2021: 29). They ought to meet in person at least once a year (Silveira 2021: 17). Interestingly, Silveira views a need for focus time in distributed teams, that is, periods of undisturbed self-directed work, at a level of at least 55-60% (Silveira 2021: 96). As software developer, he is a proponent of agile methodologies and does not see fundamental problems of applying agile principles in distributed teams (Silveira 2021: 66).

2.4 Remote Work

In the wake of the Covid-19 pandemic that started in March 2020 many books and articles on remote work have been published.

Neeley (2021) directly addresses the question of how an agile team can operate remotely. First, she confirms that agile methodologies are commonly premised on co-location, but she also points out that agile processes had already been successfully introduced in globally distributed teams before Covid-19 (Neeley 2021: 88f). She brings the example of Unilever that has successfully implemented three hundred globally distributed agile teams since 2017 (Neeley 2021: 92). Another example is AppFolio that found when it moved to remote during the Covid-19 pandemic that only 10-20% of time is used for truly collaborative or creative tasks, while the remainder is used for individual, focused work, and concludes that the benefits in higher efficiency of focused work may outweigh the costs of less efficiency in collaborative activities (Neeley 2021: 99). Neeley identifies five best practices for remote agile teams (Neeley 2021: 101ff):

- "Prepare Alone, End in Sync": Virtual meeting platforms are insufficient for real-time brainstorming. That is why brainstorming needs to be done asynchronously via e-mail, messaging, or social media before real-time virtual meetings.
- "Brainstorm in Shared Documents": Online collaboration tools like Google Docs are better than co-located whiteboards as any team member can add thoughts at any time, and all thoughts are saved for reference.
- "Streamline the Huddle": Virtual daily stand-up meetings need to be improved by a dedicated speaking order, and dedicated speaking times. Reducing the number of meeting participants accelerates decision-making. Virtual meetings are more efficient due to simple dial-in, online whiteboards, and screen sharing.
- "Set Digital Norms": Phone calls can replace quick one-on-one chats.
- "Solicit Anonymous Feedback": Anonymous questions and anonymous polls enhance traditional in-person retrospectives.

Neeley concludes that agile principles can actually be served better by remote than by co-located teams (Neeley 2021: 101).

Neeley sees problems in a future hybrid setting with co-located, and remote team members. Subgroup formation easily emerges according to geographic locations of team members. More centralized co-located team members tend to ignore the needs and contribu-

tions of other remote team members. Minority subgroups show lower identification with the overall team, and are associated with lower expert knowledge. Teams with single remote workers ("geographic isolates") lead to feelings of exclusion (Neeley 2021: 135ff). If team leaders become aware of subgroups, they ought to stress one group-level identity, and emphasize the higher common purpose to be achieved for the company (Neeley 2021: 142).

Dyer and Shepherd (2021) define remote work as "situation in which someone works independently and, on a regular basis, in an environment where there are no coworkers. … The person is part of the company and collaborates with their team, but not in an office on a regular basis" (Dyer and Shepherd 2021: 14). They claim that the virtual model makes a company truly agile, and responsive to new business opportunities (Dyer and Shepherd 2021: 69). It allows global team building of a "Performance Driven Workforce", and has less restrictions regarding offices, and physical infrastructure (Dyer and Shepherd 2021: 24, 69). It helps eliminate bad habits, addresses the biggest distractions in offices, and increases productivity by avoiding commuting times, and by allowing employees full flexibility when to work (Dyer and Shepherd 2021: 76, 96, 110). But they also state that "a remote model requires a level of discipline that is almost military" (Dyer and Shepherd 2021: 76).

Dyer and Shepherd compare on-site work culture with water polo, and remote work culture with competitive swimming: "Remote work is similar to on-site work, but it's also different, in the same way that water polo is similar to but different from competitive swimming. … In water polo, teamwork is essential. Players need to know the team strategies and their responsibilities within the strategies. They need to know where their teammates are at all times, and understand what any teammate is likely to do next. They need to be of one mind. In contrast, competitive swimming is a more individualized sport. The swim team practises together, helping and encouraging one another, but when the 50-metre freestyle race starts, it all comes down to individual performance. Your remote team should become like competitive swimmers. There should be collaboration, but an effective remote team depends on solid individual performance" (Dyer and Shepherd 2021: 20f).

Dyer and Shepherd view Scrum as a useful tool for remote work (Dyer and Shepherd 2021: 32). Regarding structural obstacles of remote work, they see the co-location concern as justified only in specific situations such as in dual coding in software development. Apart from that they believe that collaboration tools and processes like Scrum help teams be highly performing remotely. They are more skeptical regarding the hybrid remote work model because of high infrastructure expenses to enable on-site work, remote work, and the interaction between them. They react harshly to the concern that remote work provides less social interaction between employees by stating that the expectation needs to be set that the workplace is not the place to find friendships (Dyer and Shepherd 2021: 58ff).

Belling (2021) as a practitioner in the software development industry emphasizes the advantages of remote work: mitigates risks of people and systems concentrated in physical locations, allows hiring of the best employees irrespective of where they live or want to work and live, increases workforce diversity, allows saving of real estate costs, and business travel (Belling 2021: 11, 13ff, 25). He supports the distributed work's five levels of autonomy proposed by Mullenweg (2020) (Belling, 2021: 85), in which, also from a software development point of view, distributed, and asynchronous work leads to a level of autonomy of employees that cannot be reached in co-located companies (Mullenweg, 2020). Yet, even with distributed teams, he is in favor of periodic in-person events to build connections (Belling, 2021: 70). He also supports hybrid models in general as they serve employees' needs regarding flexibility and social contacts (Belling, 2021: 72).

Belling discusses concerns that remote work negatively affects innovation. He acknowledges that intensive teamwork on new ideas and on ways to deliver a project, any collaboration that requires tactile experience like prototyping technology hardware, unplanned or spontaneous passive collaboration, casual and unplanned conversations, and the building of mentoring relationships, that co-located teams naturally engage in, cannot be simply transferred to a remote environment. The remote environment lacks spontaneity, which impacts creativity and innovation (Belling 2021: 104-105, 110-111). On the other hand, he takes an optimistic stance stating that other companies have proven that remote innovation is possible (Belling, 2021: 104). He proposes creating hybrid meeting rooms "where people both on-site and remote are able to collaborate effectively in active and passive ways" (Belling 2021: 111). He concludes that "successful and innovative companies will be those who can find and develop talent and culture while providing the best of the flexibility and options that remote scenarios offer" (Belling 2021: 104).

HBR (2021) gives practical advice regarding twenty-eight remote work topics. One section is dedicated to solving problems on a remote team with chapters: "How to Collaborate Effectively If Your Team Is Remote: You need a range of behaviors and skills", "Managing a Team Across 5 Time Zones: Everyone should share the scheduling burden", "How to Raise Sensitive Issues with Your Remote Team: Make people feel safe", and "Ideas for Helping Remote Colleagues Bond: From book clubs to video games" (HBR 2021, section 6). Sber University (2022) represents a comparable resource targeting the Russian market.

Rykina and Filatova (2021) analyze the features of hybrid work from the point of view of HR management, give knowledgeable practical advice, collect a number of case studies of companies in Russia having implemented hybrid work, and provide a check-list for determining the necessity for a transition into a hybrid work format. From their case studies, they conclude that a return to an office work format is not possible due to a loss of competitiveness on the labor market, a loss of attractiveness of the company's brand as employer, and a loss of cost competitiveness. On the other hand, they see significant short-term, and long-term risks in a virtual work format (Rykina and Filatova 2021: 107).

Wheatley et al. (2021) collect eighteen research papers on remote work and worker well-being in the post-Covid-19 era. There are four research papers with interesting insights for this study's research question:

1. Baumann and Sander (2021) underline the positive effects of work-from-home on autonomy (similar to Belling 2021), one of the basic psychological needs that drive intrinsic motivation and, work performance. The effect on the other two needs, competence and relatedness, is less clear. The performance increase in a work-from-home experiment at a Chinese call-center company (Bloom et al. 2015) leads them to a positive assessment of work-from-home on productivity. Teams are not subject of the research;
2. Errichiello and Pianese (2021) confirm in a case study at a multinational IT company that remote workers benefit from organizational support. This is in line with the factor model of team performance. They fear that post-Covid-19 companies might undervalue the hybrid format, and favor a virtual format disregarding employee preferences and negative performance effects from a lack of face-to-face contact. The case study comprised one virtual team;
3. Ayache et al. (2021) underline that videoconferences are not able to replace face-to-face communication, with the consequence of negative effects on social interaction and team performance. This might change with the introduction of virtual and augmented reality;

4. Seshadri and Elangovan (2021) confirm in a survey of Indian IT professionals the location-dependent subgroup formation in hybrid virtual teams as discussed by Afflerbach (2020) and Neeley (2021), and they offer equivalent remedies.

Soga et al. (2022) perform a literature review of 113 research papers on the downsides of flexible working practices (FWP) covering the period 2011 – mid-2021. Remote work represents one of the flexible working practices in scope of the study. The others are spatiotemporal, on-demand, and self-directed work (Soga et al. 2022: 655). Pitfalls are divided into individual-level, group/organization-level, and digital technology-related pitfalls (Soga et al. 2022: 649). Downsides regarding teamwork are mostly part of the group/organization-level pitfalls and include hampering visibility and social interaction affecting trust, issues around communication and connectivity, erosion of cohesion, and negative effects on work commitment (Soga et al. 2022). Pitfalls regarding digital technology relate to the need of technological systems for reviewing and monitoring virtual teams, for sharing information, and fostering teams, and to technological knowledge gaps that hamper collaborative efforts (Soga et al. 2022: 649, 653). Pitfalls are structured into six dimensions and twelve categories (a-l) (Soga et al. 2022: 656):

1. Health:
   a. Impact on well-being
2. Socio-cultural:
   b. Family-related
   c. Gender-related
   d. Impact on social profile
3. Technical:
   e. Technology use
4. Economic:
   f. Business-related
   g. Financial concerns
5. Political:
   h. Power groups
   i. Leadership style
6. Spatial:
   j. Struggle in defining boundary
   k. Travel
   l. Workplace.

The authors foresee a rise in FWP due to benefits from digital technologies and associated cost savings, but they also see that the "amplification of FWP benefits overlooks its pitfalls", that "the growing adoption of FWP masks the more long-term negative effects on individuals and groups, and that FWP "creates systemic vulnerabilities" (Soga et al. 2022: 648, 658, 659).

Papers not covered by the literature review of Soga et. al, include Razumova and Artamonova (2017), who identify the features of flexible working practices in Russia, and discuss their risks and perspectives.

Yang et al. (2021) analyze e-mails, calendars, instant messages, video and audio calls, and working hours of more than 60,000 U.S. Microsoft employees from December 2019 before the start of the Covid-19 pandemic to June 2020 within the Covid-19 pandemic (Yang et al. 2021: 44). Before the Covid-19 pandemic eighteen percent of the employees worked remotely, as from March/April 2020 virtually all employees had to work remotely (Yang et al.

2021). Results of a causal network analysis are that employees intensified communication within their units, but communicated less with other units. The collaboration network of employees became more static as they added and deleted less connections. Synchronous connections were replaced by asynchronous connections. The means of communication became less rich, that is, there were not only less live meetings, but also less video conferences, and more instant messages, and e-mails. Yang et al. infer that these changes negatively affect transfer and processing of new and complex knowledge, and workers' output quality. They conclude that, in the long term, productivity and innovation could be impacted (Yang et al. 2021: 649f).

Brodnicki (2021) performs a survey of 187 employees of forty companies using Scrum in Poland in April and May 2021 with the goal to assess the readiness of Scrum teams for remote work (Brodnicki 2021: 81). The survey consists of 43 questions to be answered on a scale from 1 (definitely not) to 5 (definitely yes) regarding: Organization, IT tools, team and remote team communication, remote sprint organization, Scrum Team participant (Brodnicki 2021: 84). Survey participants confirm that the organization is ready to work remotely (95%), that remote communication is more effective (79%), and more structured (82%), that all meeting participants actively participate in meetings (81%), and that remote meetings take less time than stationary meetings (79%). On the other hand, they also confirm to some degree that there are no conversations in meetings on topics other than work (58%). They only confirm to some extent that all meeting participants are focused on the meeting (55%). They confirm that the body language of meeting participants is limited (76%). (Brodnicki 2021: 85ff, own %-calculations) Overall, the author sees confirmation for his hypothesis that remote communication has a positive effect on the productivity of Scrum Teams (Brodnicki 2021: 89).

To sum up, the literature review comprises both material from business/management monographs and material from academic research. This is necessary to capture the complex topic of team performance under different management paradigms (traditional and agile) and in different environments (co-located, hybrid, virtual). The material has been categorized under the headers 1) Team performance, 2) Agile teams, 3) Hybrid and virtual teams, and 4) Remote work.

Before moving to the discussion of the literature with respect to the research question in the next section, we would like to touch on the related research stream of peer production, which has developed in parallel to methodologies of agile and virtual teamwork over the last twenty years. Our study focuses on teamwork within companies, whose goal is to produce products and services for customers, in order to make a profit, and where team members have a contractual relationship with the company to be compensated for their work. Peer production in its original form "describes a vast array of self-organized collaborative ventures and distributed work arrangements" and peer producers are "people who create and manage common-pool resources together" primarily in the "digital commons" (O'Neil et al. 2020: 3). Wikipedia and open source software like Linux, Apache, MySQL, Perl/PHP/Python are classical examples of peer production (O'Neil et al. 2020: 3f). O'Neil et al. claim that nowadays "the most technologically advanced forms of peer production have hybridized with the market" (O'Neil et al. 2020: 5). For example, for-profit companies employ open licenses in software development to allow for peer production, while at the same time selling commercial products (O'Neil et al. 2020: 10ff). Another widespread example are social networks, where the peer production of contents is monetized by selling targeted advertisements. Regarding our research question, peer production can be seen 1) as a better

alternative to high-performing within-company teams, 2) as a complement to high-performing within-company teams, which provides work effort, creativity and innovation at low cost, and which needs to be integrated into a team's work, or 3) as a phenomenon, which may be disregarded for the narrower discussion of high-performing within-company teams. In this study, we are not going to discuss peer production any further, but we note for future research that the way peer production deals with self-organized distributed collaboration may have significant effects on the future way of working.

3. Discussion

The research question of this study is how the work of high-performing agile teams is affected by the digital transformation into hybrid and virtual formats. In this section, based on the literature review conducted in the previous section, the authors clarify the meaning of the components of the research question - concepts of "high-performing team" and "Agile team" in order to relate the above studies with each other and substantiate a further author's research on the impact of remote format of work on the team performance.

3.1 High-Performing Teams and High-Performing Agile Teams

Yeatts and Hyten (1998) show how the view of a self-managed high-performing team results from research that spans the second half of the twentieth century. They (as well as Laiken 1994) see a high-performing team as a small group of people, that over time develops a high expertise and self-management capabilities, a high level of communication, cooperation, and conflict management skills, and a team culture that supports creativity and innovation, with a team leader who works as a facilitator. They define high performance as high level of customer satisfaction together with economic viability, and list studies that show that the above-characterized team is indeed high-performing. Parker et al. (2019), on the other hand, see less consistent performance effects of autonomous work teams in the literature, and see the need for more research on performance management with due regard to periods of work in the organization.

Yeats and Hyten (1998) show the complex setup of interacting factors that influence team performance (see Figure 1) and identify success factors for high performance. For them high-performing teams are primarily co-located teams. This can be seen from the fact that they report problems of teams that are distributed across several shifts (i.e. temporally), or across multiple sites (i.e. spatially). For them, more face-to-face contact is the main solution for the presented problems of communication, coordination, cohesion, and trust. Dyer and Dyer (2020) also link co-location to high performance for tasks requiring reciprocal interdependence.

The high-performing agile teams that Schwaber and Sutherland (2020), Beck and Andres (2004), and Ockerman and Reindl (2020) describe are compatible with the high-performing teams described in the preceding section. In agile teams, the Scrum Master takes the role of the team leader/facilitator. The authors tailor the team model to the needs of software development by strengthening the requirements of cross-functionality, and co-location. They improve the links between business employees and developers by requiring both to work in the same team, and by introducing the role of the Product Owner. Beck and Andres (2004), in particular, strengthen co-location by requiring one open space for the team, and by requir-

ing pair programming, an extreme way of co-location. While stricter co-location requirements are less outspoken in Schwaber and Sutherland (2020), and Ockerman and Reindl (2020), the skeptical position of Ockerman and Reindl (2020) regarding distributed teams and outsourcing of production support fits well with a philosophy focused on co-location.

To sum up, high-performing teams are a well-studied research topic, although further research is needed regarding particular team-related work design decisions on performance measures. In the literature on high-performing teams until the 1990s, co-location represents an important job design characteristic, and its absence is associated with negative effects on team performance. High-performing agile teams can be seen as a specific implementation of high-performing teams as defined by Yeatts and Hyten (1998). The agile methodology strengthens the requirements of cross-functionality, and co-location to tailor the team model to the needs of software development. Over the last twenty years, even before the Covid-19 pandemic, the agile approach has been implemented in various formats, in co-located as well as in virtual, and hybrid formats. From the discussion, it becomes clear that the digital transformation of high-performing agile teams into hybrid and virtual formats, which the Covid-19 pandemic strongly accelerated, poses particular challenges.

3.2 High-Performing Teams in Hybrid and Virtual Formats

Aldag and Kuzuhara (2015) show that digital transformation stands at the center of several trends that not only favor self-managing teams, but that also require teams to be more virtual, global, and technology-dependent for the purpose of achieving business objectives. Nemiro et al. (2008) equivalently states that today's teams need to overcome given challenges of distance, time, and technology by finding solutions for team challenges of culture, trust, and leadership in a virtual environment.

Sobel Lojeski and Reilly (2020) go one step further by claiming that today's virtual teams should not be called teams any more, but "ensembles" pointing to the fleetingness of team creation for a certain purpose and team dissolution when the purpose is reached. In a similar vein, for Afflerbach (2020), high turnover in virtual teams of shared services organizations represents a particular challenge. From the point of view of agile theory, Ockerman and Reindl (2020) are critical of outsourcing support services as it is damaging to the very idea of fully accountable agile teams.

In this strand of literature, virtualization of team work is seen as a business requirement. This starkly differs from the views in preceding sections, where distance and time were simple team design characteristics, and technology a mere factor in the external environment (Yeatts and Hyten 1998), or where co-location was one of the required (Beck and Andres 2004), or at least desired (Schwaber and Sutherland 2020; Ockerman and Reindl 2020) team settings. As the virtualization of team work becomes a necessity, the advice of Beck and Andres (2004) to increase co-location, whenever there are problems with team performance, becomes difficult to implement.

The problems of identification at a distance, collaboration across time zones, and of training needs for ever-advancing collaboration technologies are aggravated, rather than ameliorated by cultural differences in global teams, and by challenges to develop trust, and to implement leadership at a distance in an environment mediated by digital technologies (Nemiro et al. 2008).

The temporary character of virtual teams (to an extent that they might not be called teams any more) emphasized by Sobel Lojeski and Reilly (2020) and observed by Afflerbach

(2020) is likely to further negatively affect team performance (Yeatts and Hyten 1998), and contradicts agile thinking, which stresses the need of team stability (Ockerman and Reindl 2020), and the requirement that team members exclusively work on only one project at a time (Beck and Andres 2004).

High performance of virtual teams obviously is difficult to reach. In fact, all the factors affecting team performance described by Yeatts and Hyten (1998) and shown in Figure 1 are still valid. Only they need to be analyzed and evaluated not assuming a co-located setting as a starting condition, but a virtual setting. Dyer and Dyer (2020), for example, stress the importance of team leadership in a virtual setting, and estimate that team leadership requires 50% more time in a virtual than in a co-located setting.

As authors use different terms to describe hybrid and virtual work formats, it is necessary to define these terms. Friedrich (2017) and Afflerbach (2020) investigate a virtual team setup, in which some team members work in a co-located format in one location (like in a German-speaking country), and other team members work in a co-located format in a different location (like Eastern Europe, or India). While Friedrich talks about virtual teams, and Afflerbach about hybrid virtual teams, this study will treat the described setup as a hybrid format. Silveira (2021) makes a difference between remote and distributed teams. In a remote team some team members work from anywhere, while the other team members are co-located at a single central office. In a distributed team, all team members work from anywhere without anyone being co-located at an office. This study will treat the remote setting as a hybrid format, and the distributed setting as a virtual format.

Sobel Lojeski and Reilly (2020) take the position that being virtual does not depend on physical location, but on the use of smart digital devices. In their analyses, they make a difference between remote and in-person workers, and measure remoteness on a percentage scale from "less than 20%" to "more than 75%". These percentages pertain to employees, and not to teams (in line with the authors' view that virtual teams are actually virtual ensembles). While this way of defining virtual is intriguing, for this study a virtual format means a format that does not allow face-to-face contact, because team members are not the same physical location.

From the proprietary data of Sobel Lojeski and Reilly (2020) shown in Table 1, little can be inferred with respect to the performance of teams in hybrid and virtual formats. One might be tempted to infer that a virtual team consisting of workers, that are all "more than 75%"-remote, is the best team setup, but this is an incorrect induction, if there are no such teams in the database. The virtual distance mapping process that the authors propose is in line with the literature on determinants for high-performing teams. Consequently, a virtual distance action plan that effectively reduces the virtual distance index between workers in a team, will also increase the entire team's performance.

The virtual team maturity model of Friedrich (2017) is similar in spirit to the virtual distance index of Sobel Lojeski and Reilly (2020), but it is tailored to processes of hybrid and virtual teams rather than to the relationships between single workers. The model is in line with the literature on determinants for high-performing teams presented earlier. The same holds true for Afflerbach (2020) who defines contextual challenges, and practices to overcome these challenges for teams working in a hybrid format.

Afflerbach (2020) points to the important contextual challenge of location-dependent subgroup formation in hybrid teams that negatively affects team collaboration. In Yeatts and Hyten subgroups are discussed for larger teams only (Yeatts and Hyten 1998: 94). While subgroup formation is also possible and even likely in virtual teams (Afflerbach 2020: 29),

location-dependent subgroup formation is a particular challenge for hybrid teams. Afflerbach proposes to mitigate negative effects from subgroups by team identity construction, and determination of common goals.

Silveira (2021) rejects the use of hybrid teams in software development altogether, and propagates virtual teams. In his hybrid setting with a single central office, off-site team members are at a systematic disadvantage compared with team members co-located at the single central office. This leads to destructive team dynamics. He thinks that face-to-face meetings of the virtual team ought to take place at least once a year, and that agile methodologies are well-suited to increase the performance of virtual teams. The first thought reiterates what already Yeatts and Hyten (1998) viewed as main remedy for problems in non-co-located settings. The second thought negates the fact that co-location is an important ingredient of agile methodologies.

To sum up, digital transformation and other trends lead companies to explore the virtualization of teams to reap perceived business benefits. The objective of high team performance is put under the additional condition of teams being virtual, a condition that is absent in earlier research. This condition is in contradiction with agile approaches that see increased co-location as a way to increase team performance. The observation that virtual teams are less stable is also problematic from an agile point of view, as agile approaches view team stability as another factor of high team performance. Overall, high performance of virtual teams seems to be difficult to achieve. Nevertheless, the potential high return from the use of virtual teams may justify their creation. Hybrid teams differ from virtual teams in the fact that in a hybrid teams some team members work in a co-located format, while in a virtual team no team member works in a co-located format. Consequently, hybrid teams benefit from more face-to-face contact than virtual teams, but they are subject to location-dependent subgroup formation that undermines team collaboration. While Friedrich (2017) and Afflerbach (2020) believe that these problems can be mitigated, Silveira (2021) rejects hybrid teams outright. Yet, even Silveira acknowledges that virtual teams may have to introduce a minimum of face-to-face contact to counteract problems of team cohesion. Researchers have developed tools to determine and mitigate problems of hybrid and virtual teams. These tools are largely in line with the earlier literature on high-performing teams, but do not address the specific concerns of agile approaches. Silveira believes that agile tools are helpful to increase the performance of virtual teams.

3.3 High-Performing Teams and Remote Work

The Covid-19 pandemic has forced all kinds of teams all over the world from a co-located into a virtual format in 2020. This has led to an increased research interest in the functioning of virtual teams as opposed to hybrid and co-located teams. The broader research, that encompasses workers and teams, runs under the key words “remote work” and “work from home” (WFH).

Neeley (2021) explicitly addresses the remote work of agile teams. She presents as new insights that collaborative tasks in agile team work represent only a minor share of time, while individual, focused work can be better done from home than in-office. From these insights, she concludes that with the right task engineering agile teams are actually more productive remotely than in-office. This seems to be a rather courageous, and not sufficiently founded conclusion. As Afflerbach (2020), Neeley raises and treats the issue of subgroup formation in hybrid teams, but without adding any new insights.

While Sobel Lojeski and Reilly (2020) see a transformation from co-located teams to virtual ensembles, Dyer and Shepherd (2021) see a transformation of work culture from "water polo" (on-site work culture) to "competitive swimming" (remote work culture). This is a large transformation from a team-oriented to an individual-oriented view that puts into question earlier thinking on high-performing (agile) teams. Dyer and Shepherd deny the need of co-location in agile teams, except for in specific situations like pairwise programming. Like Silveira (2021), they view agile methodologies as useful tools to increase the performance of virtual teams.

Belling (2021) (like Baumann and Sander, 2021) praises the advantages of remote work, and particularly the advantage, that remote work makes employees more autonomous than any form of in-office work. Belling discusses in detail how remote work negatively affects creativity and innovation, and proposes as a mitigation to introduce a sufficient amount of face-to-face contact into the remote work model. Apart from that he relies on the capability of companies to find solutions for remote innovation in the future.

Soga et al. (2022) with their systematic literature review on the downsides of flexible working practices give an excellent summary of all possible issues. Team-related issues of remote work are in line with the literature previously discussed. High performing (agile) teams are not specifically addressed in the reviewed literature. Soga et al. (2022) warns that long-term problems associated with flexible working practices represent systemic vulnerabilities, and are being overlooked in the current hype. Yang et al. (2022) with their case study on Microsoft give a very good account of how actual communication behavior changes with the drastic increase of remote work at the beginning of the Covid-19 pandemic. While the study is done at the employee, and not at the team level, the study's conclusions that new communication patterns impact productivity and innovation in the long term is in line with concerns previously discussed. Brodnicki (2021) finds in a survey of agile teams in Poland that agile team members see positive effects of remote communication on sprint meeting productivity. This result is directly applicable to our research question. Yet, it must be taken with some care as Gladstein (1984), in one of the first empirical studies of team performance, showed that self-reported performance is a poor predictor of actual performance (Yeatts and Hyten 1998: 25).

To sum up, the Covid-19 pandemic forced all teams into a virtual format on short notice and for an extended period of time. This caused a new research interest in remote work / work from home of individuals and teams. Neeley (2021), Dyer and Shepherd (2021), and Belling (2021) share the view that with adjustments to the team collaboration model an unchanged or higher team performance, both in conventional and in agile teams, is possible. The main idea is that individual work from home becomes more productive, and these productivity gains overcompensate productivity losses in collaborative work. Some degree of face-to-face contacts may be needed for processes of creativity and innovation. Co-location for agile teams is not necessary except under specific circumstances like in pair programming. In the academic literature, Soga et al. (2022) observe a neglect of long-term systemic vulnerabilities arising from remote work. Yang et al. (2022) show how the move to work-from-home changes the actual communication behavior in a way that may negatively affect productivity and innovation. Brodnicki (2021) presents results from a survey with a positive evaluation of remote communication in agile teams. Yet, survey results need to be taken with care as they may not strongly correlate with actual team performance.

This concludes the discussion of the literature with respect to the research question. In the discussion, the components of the research question are clarified. The development of thought by academics as well as by subject matter experts is studied over time from classical works on

high-performing teams via agile methodologies and hybrid/virtual teams to the post-Covid-19 world of remote work. Commonalities and differences in modeling high-performing teams are described and analyzed. A particular focus is put on comparing virtual teams, and remote work representing full virtualization on the one hand, with agile teams representing co-location on the other hand, as there seems to be a significant difference between these approaches.

4. Empirical Analysis

The goal of the empirical analysis is to gain first insights into how the Russian companies view the digital transformation of high-performing teams into hybrid and virtual formats and manage them. For this purpose, a set of hypotheses is formulated based on the analysis of the literature, and two empirical studies are carried out.

4.1 Hypotheses

Following Soga et al. (2022), the focus of the analysis is on the potential downsides of team work in hybrid and virtual formats. The hypotheses are following:

Hypothesis 1 (H1): It is more difficult to build a new high-performing team in a hybrid or virtual format than in an on-site format.

This hypothesis is motivated by the conjecture that going through the group development sequence of Tuckman (1965) is more difficult in a remote setting. Neeley stresses the importance of the pre-work, the way a team is designed, and of the launch, when the team comes together for the first time (Neeley 2021: 4).

Hypothesis 2 (H2): The effectiveness of high-performing teams decreases as the work mode changes from an on-site format to a hybrid or virtual format as neither team leaders nor other team members master the collaboration tools needed for virtual team work, or the collaboration tools have deficiencies.

Errichiello and Pianese (2021) point to the potential lack of technology-related support at companies that went remote, and identify investments in technology-related competences and skills for remote working as one of the key findings of their case study (Errichiello and Pianese 2021: 222, 232).

Hypothesis 3 (H3): The creativity and ability for innovation of high-performing teams decreases as the work mode changes from an on-site format to a hybrid or virtual format as personal exchange and close cooperation between team members is very important for innovation.

Belling (2021) emphasizes potential negative effects of remote work on creativity and innovation. Brucks and Levav (2022) find in a recent laboratory study and field experiment that virtual communication curbs creative idea generation.

Hypothesis 4 (H4): The social cohesion of high-performing teams decreases as the work mode changes from an on-site format to a hybrid or virtual format as social relationships can only be maintained to a limited extent in virtual space.

Ayache et al. (2021) stress that social cohesion is negatively affected in remote settings (Ayache et al. 2021: 243).

Hypothesis 5 (H5): The cooperation of high-performing teams becomes more conflict-ridden as the work mode changes from an on-site format to a hybrid as there is a fundamental asymmetry between employees on site and employees in virtual space.

The potential for conflicts due to subgroup formation in hybrid teams is discussed in (Afflerbach 2020: 29ff; Neeley 2021: 135ff; Seshadri and Elangovan 2021).

Brodnicki (2021) also develops hypotheses, but for the narrower question of how remote communication affects sprint meeting productivity of Scrum teams. Accordingly, his hypotheses differ from those in this study. Only his fourth hypothesis ("The effectiveness of remote work depends mainly on the tools for remote communication" (Brodnicki 2021: 82)) covers a similar topic as the second hypothesis in this study.

4.2 Survey of Heads of HR

The first part of our empirical survey is an interview of HR-heads of the Russian companies. The objective is to obtain information on the existence of high-performing teams, on basic characteristics of high-performing teams, and general risks perceived as being associated with the on-site, and the remote work format, respectively.

The survey was conducted at an HR conference that took place at Lomonosov Moscow State University in June 2022. Out of 113 conference participants, mostly heads of HR-departments of their respective companies, 51 were willing to answer the questionnaire. 32 completed questionnaires were returned, which equals a participation rate of 28%. The industry sector distribution, which is available for a subsample of 15 companies, shows 40% in trade, 27% in transport, 13% each in financial and in general services, and 7% in the extractive industry. Companies present at the conference were not representative of all companies in Russia, but biased towards larger companies with advanced management techniques. For the exploratory nature of our study this potential bias is not a problem because it is of significant interest how this particular sample of companies deal with the subject.

Table 2 presents survey questions and aggregated answers. 88% of the companies confirmed that they employ teams as a mode of organization. Teams in general do not predominantly engage in one type of work. On average, 56% of the teams are seen as high-performing with a minimum of 15%, a maximum of 100%, and a median of 60%. About three quarters of the teams have clear goals, roles, and responsibilities.

About half of the teams use modern technologies in task management, apply a creative approach, and have a high level of coordination. Interestingly, only a quarter of the teams apply a formulated decision-making methodology, and only a minority (less than 18%) achieves a high level of innovation.

More than half of the respondents declared their willingness for further discussion, and eleven companies participated in the second survey discussed in section 5.3.

In Table 3, a simple cross-analysis is performed by comparing the distribution of high-performing team characteristics in the overall sample of the companies with the distribution in the subsamples of companies with a share of high-performing teams of over 50%, and equal to or smaller than 50%, respectively.

In the subsample of mostly high-performing teams, teams are much more often characterized by clear goals, roles, and responsibilities, and a high level of innovation than teams in the subsample with a share of high-performing teams lower than 50%. On the other hand, teams in the subsample of mostly high-performing teams are less often seen to apply a creative approach than teams in the subsample with a share of high-performing teams lower than half. Differences between the subsamples regarding the other characters are less pronounced.

Table 2. HR Heads Survey

Questions for Heads of HR	Choice of Answers	Result
1. Does your company employ teams as a form of organization? In case you answer "No", you do not need to answer further questions. Thank you for your time!	Yes / No	Valid: 32, Yes: 28, No: 4
2. Teams in your organization in their work (select one or several choices):	- use modern technologies in task management	Valid: 28, Yes: 13
	- are predominantly engaged in the same type of work	Valid: 28, Yes: 1
	- apply a creative approach	Valid: 28, Yes: 13
	- have a high level of innovation	Valid: 28, Yes: 5
	- have clear goals, roles, and responsibilities	Valid: 28, Yes: 18
	- have a high level of coordination	Valid: 28, Yes: 12
	- apply a formulated decision-making methodology	Valid: 28, Yes: 7
3. Which risks do you see in managing high-performing teams when moving to:	- a remote work format - an on-site work format	Constructed response (see Table 4)
4. Approximately what percentage of your organization's teams do you consider high-performing?	Percentage	Valid: 25, Mean: 56% Min-Median-Max: 15%-60%-100%
5. Do you feel like further discussing the factors that affect performance of high-performing teams (in the form of an interview or an extended questionnaire)? If you are ready for further cooperation, please leave your contact details.	- Yes + constructed response / No	Valid: 28, Yes: 16

Source: Own data and analysis.

Table 3. HR Heads Survey– Cross-Analysis of High-Performing Team Characteristics

Companies that	All	High-Performing Teams	
		>50%	<=50%
- use modern technologies in task management	54%	46%	58%
- are predominantly engaged in the same type of work	4%	8%	0%
- apply a creative approach	50%	38%	67%
- have a high level of innovation	21%	31%	8%
- have clear goals, roles, and responsibilities	75%	85%	58%
- have a high level of coordination	43%	46%	50%
- apply a formulated decision-making methodology	25%	23%	33%

Source: Own data and analysis.

Note: Percentages in column "All" are based on 28 valid answers. Percentages in columns "High Performing Teams" are based on 25 valid answers to the fourth question of the HR Heads Survey.

To conclude the discussion of the quantitative survey results, the most notable observations are as follows: 1) On average, Heads of HR characterize most teams in their companies as high-performing; 2) Heads of HR see most teams as having clear goals, roles, and responsibilities (and even more so if a large share of teams is high-performing); 3) Heads of HR consider few teams as applying a formulated decision-making methodology and having a high level of innovation (and the teams are even less innovative if a low share of teams is high-performing; 4) Counter intuitively, heads of HR do not see a higher share of teams applying a creative approach in companies where the share of high-performing teams is high.

Table 4 presents an overview of the risks that heads of HR see in remote and on-site work formats.

Table 4. HR Heads Survey– Risks in Remote and On-Site Work Formats

Remote work format:	On-site work format:
Control of active working time	Increase in conflicts between the employees
Potential loss of community spirit	Restriction of access to latest technologies
Less communication	Discussion of issues not relevant to work
Lack of balance in the absence of clear tasks	Loss of time when travelling
The employee getting distracted from work to household chores	Duration of meetings
Employee coordination	Solution of issues in small talk
Productivity assessment	Overstaffing
Loss of connection with the team	Lack of flexibility in hiring employees
Reduced control over task execution	Unclear definition of employee tasks
Discipline	
Lack of information about task execution	
Loss of management control	
Cyber responsibilities	
New cooperation format	
Disunity of actions	

Source: Own data and analysis.

Note: The table displays a redacted choice of answers to the third question of the HR Heads Survey.

The risks seen in the remote work format mostly concern task coordination, control, and assessment, and social aspects. Other risks addressed by the hypotheses of this study regarding new team creation, use of collaboration tools, innovation, and conflicts in hybrid formats are not mentioned. The risks seen in the on-site work format are partly known from the literature such as "discussion of issues not relevant for work", "loss of time when travelling", and "duration of meetings". Other risks reflect comparative advantages of remote work like "restriction of access to latest technologies", "lack of flexibility in hiring employees", and "unclear definition of employee tasks". Less clear is the risk of "overstaffing". In agile thinking, the "solution of issues in small talk" would rather be seen as an advantage of the on-site work format than a risk. Interestingly, an "increase in conflicts between employees"

is associated with the on-site work format, and not – as in the literature – with the hybrid work format. An overall observation is that the answers regarding a remote work format are more spread out, and do not repeat each other, while there is more consensus among the respondents regarding the on-site work format.

4.3 Empirical Survey of High-Performing Teams

The second part of the empirical survey is an interview of the members of high-performing teams of the Russian companies. The objective of the survey is to obtain information on high-performing team characteristics in 2019 and in 2021, changes in the work of high-performing teams from 2019 to 2021, and testing the five hypotheses presented in section 4.1.

The survey was performed from April to July 2022. For the purpose of the survey, the authors communicated with high-performing teams at the three companies: "Yandex", "Gazprombank", and "Russian Railways". 32 questionnaires were sent out by means of an electronic platform, and 19 completed questionnaires were returned. In addition, four questionnaires were returned from companies that participated in the first exploratory survey described in section 4.2. The participation rate equals to 53%.

Overall, the survey consists of 8 sections and 49 questions. The sections cover: basic data, the five hypotheses (new team, collaboration tools, innovation, social interaction, and conflicts), and sections on high-performing team characteristics, and on changes from 2019 to 2021. All questions and results are given in Appendix 1.

Table 5 compares characteristics of high-performing teams in 2019, i.e. when teams generally worked in the office, and 2021, i.e. when most teams continued to work in hybrid or virtual formats because of the Covid-19 pandemic. The only obvious change is that in 2021 less teams were of ideal size (5-11 employees) than in 2019. In particular, the share of large teams (>11 employees) doubled from 22% to 44%. Other figures do not change significantly, while generally there is a tendency towards deterioration of organization and performance.

Table 6 presents changes of in the work of high-performing teams that took place from 2019 to 2021. Most noteworthy is that almost half of the respondents observe a deterioration of social interaction from 2019 to 2021, while only 9% note an improvement. This supports our fourth hypothesis stating that social cohesion of high-performing teams decreases when

Table 5. Survey of High-Performing Teams – Comparison 2019 and 2021

The Team …	2019	2021	Trend
… was highly effective (answer choices: 4 and 5)	78%	74%	Down
… was agile	74%	74%	Unchanged
… followed the Scrum rules	70%	65%	Down
… was of ideal size (5-11 employees)	70%	44%	Down
… was self-organizing	17%	17%	Unchanged
… was cross-functional	74%	83%	Up
… showed results higher or much higher than the sum of the results of individual team members	67%	64%	Down

Source: Own data and analysis.

Note: Section 7: High-Performing Teams Survey. Questions 29-42.

moving to a hybrid or virtual format. The frequency of conflicts is considered to decrease by 27% of the respondents, while only 5% report an increase in conflicts. This reiterates an observation in our first survey discussed in section 4.2, and contradicts our fifth hypothesis that cooperation of high-performing teams becomes more conflict-ridden as the work mode changes to a hybrid format. All the other responses show a more balanced picture, not lending any noteworthy support for our remaining hypotheses.

Table 7 summarizes the expert assessment of the survey results regarding the five hypotheses. For each hypothesis, the survey contains four to five questions. Given the complexity of the topic, and the relatively low number of responses, a quantitative hypothesis testing is not feasible. Therefore, the answers to each question were analyzed with respect to the hypothesis, and it was assessed, whether there is a (weak) support or lack of support for the hypothesis. Some of the answers rendered an inconclusive assessment, and are marked as such. The overall judgment results from the equally weighted results of the underlying questions. Since the complete information set is given in Appendix 1, the assessment procedure is fully transparent.

Table 6. Survey of High-Performing Teams – Changes from 2019 to 2021

If we are to compare my team in 2021 and 2019 … (before and after)	Worse	Better	Trend
… team performance …	14%	18%	Up
… share of individual performance in the team …	18%	18%	Unchanged
… integration of new team members …	36%	32%	Down
… communication within the team …	27%	27%	Unchanged
… creativity and ability to innovate …	23%	23%	Unchanged
… social interaction …	46%	9%	Down
… the frequency of conflicts …	5%	27%	Up

Source: Own data and analysis.

Note: Section 8: High-Performing Teams Survey. Changes 2019-2021. Questions 43-49.

Table 7. Survey of High-Performing Teams – Hypotheses

Hypothesis	Assessment of Questions	Overall Judgment
H1 (New Team)	Q7: Confirmed, Q8: Weakly confirmed, Q9: Weakly confirmed, Q10: Rejected	Confirmed
H2 (Collaboration Tools)	Q11: Inconclusive, Q12: Inconclusive, Q13: Confirmed, Q14: Confirmed, Q15: Rejected	Confirmed
H3 (Innovation)	Q16: Rejected, Q17: Confirmed, Q18: Neutral, Q19: Rejected	Rejected
H4 (Social Interaction)	Q20: Rejected, Q21: Rejected, Q22: Rejected, Q23: Rejected	Rejected
H5 (Conflicts)	Q24: Rejected, Q25: Rejected, Q26: Weakly rejected, Q27: Rejected, Q28: Inconclusive	Rejected

Source: Own data and analysis.

Note: Section 2-6: High-Performing Teams Survey. Hypotheses. Questions 7-28.

The overall result is that the first hypothesis that it is more difficult to build a new high-performing team in a remote format (H1), and the second hypothesis that the need of high-performing teams to get accustomed to the (possibly, deficient) collaboration tools in a remote format reduces team effectiveness (H2) are *confirmed*. The other three hypotheses, that creativity and the ability for innovation of high-performing teams decreases (H3), that social cohesion of high-performing teams decreases (H4), and that the cooperation of high-performing teams becomes more conflict-ridden (H5) in a remote format are rejected.

Beyond the confirmation or rejection of a hypothesis, a few interesting moments can be pointed out:

- 48% of the respondents mostly trust colleagues with whom they work together in the office, while only 13% mostly trust colleagues with whom they work as part of a hybrid team. (Section 2, Question 7)
- 44% of the respondents are personally more productive in the office, and only 26% when working remotely. (Section 3, Question 13)
- For 82% of the respondents, it is customary to discuss work issues in an informal setting. (Section 3, Question 14)
- While the majority (57%) of the respondents does not see any interference of the household irritants with remote work, a significant share of 35% does. (Section 3, Question 15)
- 70% of the respondents are more likely to receive new tasks at the direction of the management rather than on their own initiative. (Section 4, Question 16)
- For 48% of the respondents it is more convenient to agree on tasks in the course of a discussion with the manager rather than obtaining clearly formulated tasks. (Section 4, Question 17)
- While the majority (83%) of the respondents has the opportunity to remotely control the work of their colleagues, a negligible share of 17% does not have it. (Section 5, Question 23)
- While the majority (65%) of the respondents thinks that their manager devotes enough time and attention to communicating with them, a significant share of 35% does not. (Section 6, Question 26)

To sum up, taking the literature as a basis, hypotheses have been formulated for an empirical analysis of high-performing teams in the Russian companies. With these hypotheses in mind, two surveys have been developed, one targeting heads of HR departments of the Russian companies, and one targeting employees in high-performing teams of the Russian companies. The HR heads see a relatively high share (>50%) of high-performing teams in their companies. In companies where most teams are regarded as high-performing, this is related to a high level of innovation, and a set of clear goals, roles, and responsibilities, but not with a high level of application of creative approaches. Heads of HR are aware of a number of risks in both remote and office formats, although the risks mentioned only partially cover the scope of the formulated hypotheses. Employees in high-performing teams identify only a small deterioration of high-performing team characteristics from 2019 to 2021, i.e. over the time period that most teams were forced to move into a remote format. Most notably, they identify a deterioration of social interactions, but also a reduction in conflicts in the remote format. Other factors remain balanced. Of the five hypotheses, the two regarding new teams, and collaboration tools can be confirmed, while the three regarding innovation, social interaction, and conflicts are rejected. Overall, the results are mixed, and mostly inconclusive. One reason for this may be a relatively low number of the respondents in the

two surveys (32 in the HR Heads survey =, and 23 in the survey of high-performing team members). For further research, it would be necessary to increase the number of companies and respondents that work in hybrid and virtual formats.

5. Conclusion

This study seeks to answer the research question of how the work of high-performing agile teams is affected by the digital transformation into hybrid and virtual formats.

The motivation for this research question is based on the following three observations: 1) In the business world, there is a general impression that agile teams belong to the highest-performing teams; 2) Agile methodologies view co-location of agile teams as an important determinant of high performance; and 3) The Covid-19 pandemic has forced all teams into remote work for an extended period of time, and may have effected a change in team work from a co-located to a hybrid/virtual format.

This study consists of an extended literature review, discussion of the literature with respect to the research question, empirical analysis exploring the situation in the Russian companies, and this conclusion, which outlines the answer to the research question. The literature review is divided into the research areas: 1) Team performance, 2) Agile teams, 3) Hybrid and virtual teams, and 4) Remote work. While the literature review represents those ideas and thoughts from the selected literature that are relevant to the research question, discussion of the literature clarifies the meaning of the components of the research question, relates the different strands of research with each other, and collects insights regarding the research question. The empirical analysis starts from a set of hypotheses regarding potential downsides of high-performing team work in hybrid and virtual formats. The hypotheses concern the setup of new teams, use of collaboration tools, creativity and ability for innovation, social cohesion, and intra-team conflicts. The hypotheses form the background for the two surveys at the Russian companies. One targets heads of HR with the objective of collecting general information on high-performing teams, their characteristics, and risks associated with office and remote work formats. The other targets members of high-performing teams with the objective of obtaining specific information about their work in an office in 2019 before the Covid-19 pandemic, and in a remote format in 2021 during the Covid-19 pandemic.

The main conclusions of our study are as follows:

There is a long-standing tradition of academic view on teams and team performance, factors influencing team performance are well-studied with future research needs being defined. Over time, researchers and practitioners have developed numerous tools to improve team performance.

Since their inception at the beginning of the 2000s, agile teams have become a synonym for high-performing teams in the business world. From software development in the U.S. they have spread to many industries and to many countries all over the world. Before the Covid-19-pandemic, for most agile teams, co-location represented an important condition for high performance. Only for globally distributed agile teams, the co-location requirement was weakened, and tailored to the circumstances, likely at the cost of reduced team performance.

In parallel to the development of agile methodologies, the digital transformation and other trends have led to the increase in the number of hybrid and virtual teams over the past

twenty years. In general, it is difficult to achieve and sustain high performance of virtual teams, but extraordinary returns of their use may justify their formation. Many tools have been proposed that can be used to improve performance of hybrid and virtual teams.

Before the Covid-19-pandemic, virtual and agile teams were mostly seen as incompatible, because virtual teams are not co-located, while agile teams usually are, and because virtual teams are often of a temporary nature, while agile teams are based on stability.

The Covid-19 pandemic has impressively shown the capabilities of hybrid and virtual teams in a large-scale world-wide real-life experiment. Many academics and practitioners alike were surprised by these factual capabilities, and started to adjust their concepts of high-performing team work, basing them on the assumption of remote work. These new conceptions put more weight on individual, rather than collaborative work, and include face-to-face work periods for innovative activities, team-building, or specific activities like pair programming. Digital agile tools are deemed to be useful in these conceptions to increase team performance. These new ideas mean that the conceptions of agile and virtual teams are no longer juxtaposed, but united.

The current discussion in business does not revolve around the question agile versus virtual, but around the question, whether a hybrid or a virtual format is preferable. The hybrid format is characterized by more face-to-face contact, but also by location-dependent subgroup formation, and by larger infrastructure costs, while the virtual format treats all team members equally, independent of physical location, and is more cost-effective, but is characterized by less face-to-face contact.

The recent studies show mixed results regarding the new propositions. Soga et al. (2022) conclude, after having reviewed the research on the downsides of flexible working practices over the last ten years, that there is a neglect of long-term systemic vulnerabilities, and Yang et al. (2022) show how communication at Microsoft, after all employees had been sent to work remotely, deteriorated in a way that – if unchanged – would negatively affect productivity and innovation in the long-term.

The empirical survey of the authors shows mixed results as well. The survey of heads of HR reveals that many teams are seen as high-performing, which is related to having clear goals, roles, and responsibilities, and a high level of innovation. The risks that heads of HR-departments identify in the remote work format mostly concern task coordination, control, assessment, and social aspects.

The survey of high-performing teams in the Russian companies provide support for two of the five hypotheses. Building new high-performing teams is more difficult in a remote format compared to the co-location mode. Collaboration tools still show weaknesses and their use requires dedicated training. The other three hypotheses regarding innovation, social interaction, and conflicts cannot be confirmed, although respondents report a clear deterioration of social interaction from 2019 to 2021. In both surveys, we observe a decrease in conflicts in remote work formats, which contradicts to our fifth hypothesis stating that conflicts in a hybrid format are more likely than in the co-location mode.

Overall, we conclude that high performance of teams generally is difficult to achieve and difficult to sustain. From our analysis, we believe that collaboration in teams is more difficult to achieve and sustain in a virtual format rather than in the co-located one. Yet, the objective of the team can justify either the additional investments to reach the needed level of collaboration, or being satisfied with a lower level of collaboration. For example, a global business project may have such high returns that it is worth making high investments to improve the collaboration of the assigned globally distributed project team, or it may have

high returns even though the collaboration of the assigned project team is less than optimal. For another example, a product development project may rely so much on creative and innovative collaboration, that it can only be done in a co-located manner, as compromises on collaboration are not acceptable, and investments are prohibitive to reach the needed level of collaboration in a virtual format. For a final example, if the team members live in the same city, a co-located or a hybrid format are likely to lead to higher team performance than a virtual format.

The digital transformation has expanded the possibilities of high-performing agile team work in hybrid and virtual formats. Yet, this does not mean that all agile teams ought to work in hybrid and virtual formats. Companies will have to decide for each of their agile teams, whether a co-located, a hybrid, or a virtual format is optimal given the team's specific objective.

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7. Appendix 1: Survey of High-Performing Teams

Section 1: Basic Data (23 answers)

1. Enter your age	up to 30 years old: 34.8%, 30-39 years old: 47.8%, 41-50 years old: 8.7%, 51-60 years old: 4.3%, 61 and older: 4.3%
2. Your gender	male: 60.9% female: 39.1%
3. How many years have you been working in the company?	less than 1 year: 21.7% 1-3 years: 34.8% 3-5 years: 13% 5-10 years: 13% over 10 years: 17.4%
4. Current position	employee with no subordinates: 47.8% middle manager: 34.8% top manager: 17.4%
5. What percentage of your work time over the past year did spend in the office?	no more than 25%: 34.8% 25-50%: 17.4% 50-75%: 21.7% 75-90%: 4.3% 90-100%: 21.7%
6. What mode is your division currently operating in	face-to-face: 34.8% remote: 17.4% mixed: 47.8%

Section 2: New Team (Hypothesis 1)

7. Which of your colleagues do you trust the most? (Colleagues with whom you work together in the office: 47.8%, colleagues with whom you work as part of a hybrid team: 13%, equally: 39.1%), 8. Suppose a project team has been created in a hybrid work environment. In your opinion, in what case will work be carried out more efficiently? (if you distribute voluminous individual tasks between the group members and at the end combine the results at the manager level: 39.1%, if you regularly sum up the results in the subgroups of the project and involve more employees in one subtask: 56.5%, other: 4.3%), 9. How is it preferable to organize the work of a newly hired "hybrid" employee during the probationary period? (mainly in the office, and after he adapts, transfer to a hybrid format of work: 47.8%; immediately adapt in a hybrid, that is, partially remote format: 52.2%), 10. In your opinion, can employees, who originally worked full-time at the company, fully adapt to work after a hybrid transformation? (yes: 91.3%, no: 4.3%, other: 4.3%) (23 answers)

Section 3: Collaboration Tools (Hypothesis 2)

11. While working remotely, what is your preferred method of communication when a question arises in your current job? (telephone: 26.1%, email: 52.2%, messenger: 78.3%, online

meetings: 56.5%), 12. In the office, what is the priority method of communication you will use when a question arises in your current work? (telephone: 39.1%, email: 43.5%, messenger: 65.2%, online meetings: 21.7%), 13. Are you personally more productive when working remotely or in the office? (when working remotely: 26.1%, in the office: 43.5%, hesitant: 30.4%), 14. Is it customary in your organization to discuss work issues in the office in an informal setting, for example, in a canteen, a smoking room, etc.? (yes: 81.8%, no: 13.6%, hesitant: 4.3%), 15. Do household irritants interfere with your work remotely (noise from family members, limited space, etc.)? (yes: 34.8%, no: 56.5%, hesitant: 8.7%) (23 answers, except question 14 with 22 answers)

Section 4: Innovation (Hypothesis 3)

16. Are you more likely to receive new tasks on your own initiative or at the behest of the management? (only by order of the management: 8.7%, more often at the direction of the management: 60.9%, more often on their own initiative: 17.4%, always on my own initiative: 13%), 17. During remote work, is it more convenient for you to receive tasks from the manager clearly formulated or to agree on them during the course of a discussion with the manager? (always clearly articulated: 30.4%, always in discussion: 47.8%, hesitant: 21.7%), 18. What can prevent you from being creative in solving problems in a remote work format? (management decision: 39.1%, lack of motivation: 60.9%, other: -), 19. Do you think that when working remotely your work has become more formalized? (yes: 4.3%, no: 87%, hesitant: 8.7%) (23 answers)

Section 5: Social Interaction (Hypothesis 4)

20. If you have questions about working remotely, who would you rather turn for advice to? (check all that apply: to your leader: 56.5%, to a subordinate: 13%, to an employee of your level: 91.3%, I'll wait until the issue is resolved by itself or becomes irrelevant: 8.7%), 21. While working in the office, if you have questions, who would you like to turn to the most? (check all that apply: to your leader: 52.2%, to a subordinate: 13%, to an employee of your level: 91.3%, I'll wait until the issue is resolved by itself or becomes irrelevant: 4.3%), 22. Do you have the opportunity to contact your supervisor with a question? (yes: 91.3%, no: 8.7%), 23. Do you have the opportunity to remotely control the work of your colleagues (subordinates) while working? (yes: 82.6%, no: 17.4%) (23 answers)

Section 6: Conflicts (Hypothesis 5)

24. Will you be able to ask for help and get it from a colleague on an issue that is not part of his/her direct duties? (yes: 65.2%, no: 4.3%, not always: 30.4%), 25. In the event that, due to the oversight of your colleague, the unit could not complete the work on time, who will correct the error and be responsible? (colleague: 21.7%, whole team: 52.2%, supervisor: 26.1%), 26. Do you think your manager devotes enough time and attention to communicating with you? (yes: 65.2%, no: 34.8%), 27. Have you had conflicts while working remotely and, if so, with whom? (yes, with colleagues: 8.7%; yes, with direct guidance: 0%; yes, with top management: 4.3%; no: 91.3%), 28. Describe one of the conflicts and specify, please, how it was resolved? (Nine constructed responses) (23 answers, except question 28 with nine answers)

Section 7: High-Performing Team

29. How effective was your team in. 2019 (minimum: 1: 13%, 2: 0%, 3: 8.7%, 4: 39.1%, maximum: 5: 39.1%), 30. In 2021? (minimum: 1: 13%, 2: 0%, 3: 13%, 4: 26.1%, maximum: 5: 47.8%), 31. Was your team an agile team in 2019 (yes: 73.9%, no: 26.1%), 32. In 2021? (yes: 73.9%, no: 26.1%), Did your team follow the Scrum rules 33. in 2019? (yes: 69.6%, no: 30.4%), 34. In 2021? (yes: 65.2%, no: 34.8%), Number of employees on your team 35. in 2019? (less than 5 people: 8.7%, 5-11 people: 69.6%, more than 11 people: 21.7%), 36. In 2021? (less than 5 people: 13%, 5-11 people: 43.5%, more than 11 people: 43.5%), Was your team self-organizing (without formal leadership) 37. In 2019? (yes: 82.6%, no: 17.4%), 38. in 2021? (yes: 82.6%, no: 17.4%), Was the team cross-functional 39. in 2019? (yes: 73.9%, no: 26.1%), 40. in 2021? (yes: 82.6%, no: 17.4%), Results of my team 41. in 2019 (equal to the sum of the results of individual team members: 33.3%, above the sum of the results of individual team members: 52.4%, much higher than the sum of the results of individual team members: 14.3%), 42. in 2021 (equal to the sum of the results of individual team members: 36.4%, above the sum of the results of individual team members: 45.5%, much higher than the sum of the results of individual team members: 18.2%) (23 answers, except question 41 with 21 and question 42 with 22 answers).

Section 8: Changes 2019-2021

If I compare the position of my team in 2021 with the position of my team in 2019, 43. the team performance (decreased: 13.6%, increased: 18.2%, hasn't changed: 68.2%), 44. the share of individual performance in the team (decreased: 15.2%, increased: 18.2%, hasn't changed: 63.6%), 45. integration of new team members (has become more difficult: 36.4%, has become easier: 31.8%, hasn't changed: 31.8%), 46. communication within the team (has become more difficult: 27.3%, has become easier: 27.3%, hasn't changed: 45.5%), 47. creativity and ability to innovate (decreased: 22.7%, increased: 22.7%, hasn't changed: 54.5%), 48. social interaction (interaction with other colleagues outside the team) (decreased: 45.5%, increased: 9.1%, hasn't changed:45.5%), 49. the frequency of conflicts (decreased: 27.3%, increased: 4.5%, hasn't changed: 68.2%) (22 answers).

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