

Adapting Software Teams to the New Normal: An Early Case Study of Transitioning to Hybrid Work Under COVID-19

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Abstract

In the wake of the COVID-19 pandemic, many studies have begun to address what some refer to as the “new normal,” comprising hybrid arrangements of employees working from home and working at the office with varying schedule arrangements. While many of the studies to date addressed how employees coped with work-from-home, we sought to investigate how employees dealt with a transition to the new normal of hybrid arrangements. To shed light on this topic, we conducted a survey-based case study at one office location of a large, multinational software corporation. The site sought to transition employees fully working from home to working two days remotely and three predefined days in their shared workspace. Our survey results indicated a substantial decline in work satisfaction since the beginning of this transition, which can be explained by diverse work preferences. Furthermore, some software developers felt frustrated during this transition time; they described challenges they underwent and proposed potential solutions. In this paper, we present our lessons learned in this case study and describe some actionable recommendations for practitioners facing such transitions.

1. Introduction

The COVID-19 pandemic has enabled us to rethink remote and on-site modes of work in software development. In the wake of this pandemic, many software development organizations are moving towards hybrid work arrangements, with employees variously working from home and at the office, i.e., what some refer to as the “new normal” or “new work” [1, 2].

Transitioning to partial on-site work was presumably easier than unexpectedly transitioning to full-time working from home, but adapting to such a “new normal” still exposed many challenges for individuals,

particularly if their socio-technical conditions (e.g., social common ground, and readiness to hybrid collaboration technologies) were neglected by policy makers [3, 4]. While many existing studies have addressed how individuals, teams, and organizations have coped with remote [5, 6, 7] and distributed software development [8, 9], it is not yet clear how an organization can prepare and adapt its existing framework of multi-team collaboration to the new hybrid normal. Without a smooth transition, organizational productivity and individual well-being might be at risk, and inter- and intra-team collaborations might suffer during this special period [10].

We sought to investigate how developers coped with a transition to the “new normal” of hybrid work arrangements in this paper. To shed light on this topic, we conducted a survey-based case study at one office location of a large, multinational software corporation. Like many large-scale industrial software corporations, this site practices multi-team collaboration, and it sought to transition employees from fully working from home to working two days remotely and three predefined days in their shared workspace. This transition can be a representative case for organizations considering updating their status-quo of work arrangements. Around the transition, we distributed three surveys to investigate many aspects of developers’ experience, including satisfaction, work enjoyment, communication and collaboration quality, etc. To improve developers’ experience, we synthesized potential measures from the survey as participants are encouraged to report their major challenges and perceived solutions to optimize such a transitions.

Our survey results indicated a substantial decline in work satisfaction and enjoyment amongst local teams and the overall office while transitioning. The decline can be explained by many underlying factors, but mainly was due to developers’ diverse work preferences. Confirming prior literature [5, 6], this site’s developers demonstrated a mix of dichotomous perceptions (i.e., for some developers, remote work is an enjoyment, but

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for others it is unpleasant challenge) while switching between on-site and remote work. Furthermore, some software developers described themselves as frustrated and even burned out before and during the transition time, and often mentioned the extra effort it took to communicate with the colleagues, the challenge of grasping scattered information, and a lack of support for hybrid work. In addition to describing the challenges they experienced, they proposed potential solutions toward an improved transition to the hybrid arrangement, e.g., involving them in the design of the transition and new work arrangement.

Based on our findings, we present lessons learned from this case study and propose some actionable recommendations for practitioners. In particular, we discuss and provide recommendations on how to take advantage of the time when developers are co-located on-site. Furthermore, we illustrate some guides to convey information during the transition, and foster trust between developers and management. The lessons learned and recommendations of this study can thus benefit many organizations who are considering a hybrid arrangement or other types of “new normal.”

2. Background

2.1. Software Industry in the Remote Mode

The COVID-19 pandemic has indiscriminately circled the globe since early 2020. Similar to many conventional industries, the technology industry has been impacted at scale [5, 11]. Living up to their social responsibility values, IT-related organizations have had to figure out how to maintain their routine business while avoiding having their workers *work-from-office* (WFO) simultaneously at their local workplace. Under *work-from-home* (WFH) conditions and greater flexibility, many IT workers felt thrived, whereas others struggled to stay productive [6, 12, 13, 14]. This particular time yields many practical challenges and rich research opportunities [11]. Researchers from different disciplinary have taken a focused lens to study various perspectives of software engineering productivity [15] during the sudden transition to remote work.

Lacking co-located work experiences, organizational performance of engineering systems remains stable or becomes slightly better, but developers have dichotomous perceptions of their productivity [6, 16]. Ford et al.’s survey [6] found software developers have lower perceived productivity at the individual level, and self-reported survey data presented in the study by Ralph et al. describe a similar observation [17]. The difference between performance in engineering systems

and developer perceptions may be explained by the overall engineering hours of developers’ work. Russo et al. [7] leveraged self-reported data for understanding developers’ daily software engineering activities during the pandemic, finding that working remotely does not drastically affect how developers allocate time for each type of engineering activity. Gibbs et al. [16] employed activity record data to find that IT workers finished the same amount of tasks, but took a longer time to do so compared to their pre-pandemic performance. Their study was not able to identify whether COVID stressors or remote work caused the longer working time.

When remote work affords improved work flexibility for many software developers, formal work-related communication and collaboration have been affected in many contexts. By analyzing interaction data of Microsoft employees during the period of remote work, Yang et al. found remote work settings were associated with a more static and siloed collaboration network [18], which revealed a decrease in inter-team collaborations and outreach. In addition, their findings suggest professional communications tended to migrate from synchronous to asynchronous approaches. With fewer opportunities for synchronous communication, remote meetings cannot promise the same quality of communication and outcome as in-person meetings [3], and one of underlying factors is multitasking during remote meetings. Cao et al. investigated multitasking behaviors during remote meetings, finding that such behaviors caused considerable negative impacts, such as loss of engagement, mental fatigue, and disrespect [19].

2.2. Distributed Software Engineering

To meet the ever-changing requirements of this turbulent and dynamic world, software companies have a history of deploying distributed software development across the globe. However, more than half of such projects failed to achieve their goals [20]. These failures prompted researchers to investigate the factors that contributed to underachieve, and help us to mind the perils of distributed settings during the pandemic.

Advanced collaborative technologies enabled a growing trend of distributed work, but limitations are still substantial. Olson & Olson [3] investigated why distance matters in a globally distributed workplace. They identified four socio-technical conditions: common ground, collaboration readiness, collaboration technology readiness, and coupling of work to bring success to remote work. Then, their later work [4] defined a separate condition for the managerial aspect. Their attempt to investigate distanced work sparked future conversations. For instance, Hu et al. [10] applied

the Distance Matters framework in the remote inter- and intra-team collaboration context and identified the tensions for each condition to succeed in both inter- and intra-teams. Facilitating inter-team collaboration might harm intra-team collaboration and vice versa.

Researchers also attempted to identify different factors that can reduce the negative impact brought by distance. Trust has been identified as one of the pivotal factors to enable success and has been investigated thoroughly. Serial empirical case studies conducted by Javenpaa & Leidner [8] concluded that a high degree of trust results in various positive experiences for stakeholders, such as enthusiasm and predictable communication patterns. Al-Ani et al. [21] conducted interviews globally to capture the dynamic nature of trust and inform the practitioners and researchers in distributed software engineering. They extended Fulmer et al.'s process model [22], which describes trust as experienced through a series of phases (trust formation, dissolution, restoration), by adding an adjustment phase. Recognizing the salient role stakeholder expectations, they adopt Barber's frameworks [23] to structure the dynamic interactions between expectations and trust. Their work showed that trust intertwines both static determinant factors (e.g., expectations) and dynamic processes (e.g., trust's four phases).

2.3. Summary

The ongoing WFH mode of the software industry yields rich research opportunities to rethink and reflect on critical challenges in distributed software engineering, e.g., the classic "Distance Matters" framework [3] and trust factors in collaboration [21, 24]. The existing literature on remote work during the pandemic often employs self-reported data from interviews [12], surveys [6] and diary studies [7, 19], as well as activity logs [16, 18] to extract insights for actionable recommendations. Even though the new normal ought to promote face-to-face collaboration and utilize shared workspace and facilities once again, we do not yet have much knowledge to anticipate risks and uncertainties during the hybrid transition.

3. Research Method

3.1. Case Study Design

To explore developers' perceived challenges and proposed solutions during the transition, we conducted this exploratory, holistic, and single case study [25]. This case study explores a unique situation of transitioning between fully remote and hybrid work arrangements for one office site performing large scale

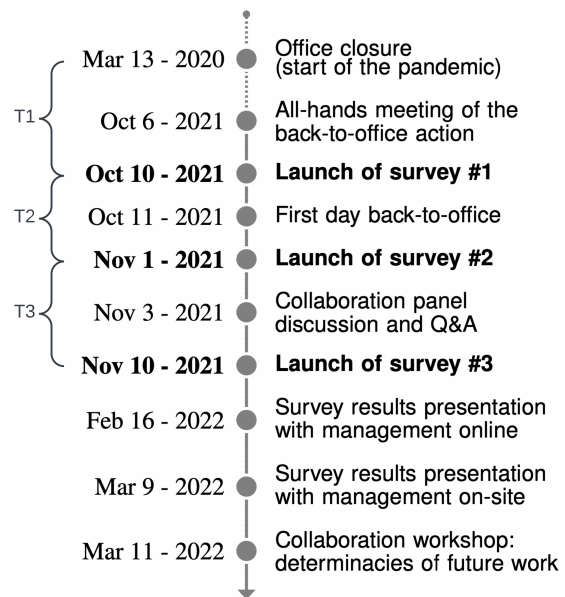


Figure 1. The event timeline around the transition

distributed software development. The main objective of this study is to understand the experiences of software developers during the transition from WFH to the hybrid normal. In particular, we sought to answer the following two main research questions:

RQ1: *What are the experiences of software developers when transitioning from work-from-home to a hybrid work arrangement?*

RQ2: *How can we improve the transition process based on the perceptions of software developers?*

The case under investigation is an office of a multinational software corporation located in North America, and the unit of analysis is its transition from work-from-home to a hybrid arrangement during October to November 2021. Fig. 1 presents the event timeline around this transition. The main data collection method is through three online surveys, which were sent by the office's internal survey system.

3.2. Survey Design

Our survey includes four closed-ended and six open-ended questions. The survey was distributed at three specific times, to measure experience and collect feedback at the period of starting (T1), during (T2), and finishing (T3) the adjustment for the hybrid transition. Between T2 and T3, the Collaboration Panel is an event organized at the site to better leverage workspace and in-person collaboration time. An overview of survey questions can be found in Tab. 1. The survey responses are completely anonymous, which protects participants' privacy and minimizes any possible effects on their

Question	Topic	Type
Q1(a)(b)	Job satisfaction [26]	Likert
Q2(a)(b)	Communication [8, 10]	Open-ended
Q3(a)(b)	Enjoyment of work [26]	Likert
Q4 and Q7	Solutions towards status-quo challenges	Open-ended
Q5 and Q6	Challenges of productivity and work experience [15]	Open-ended

Table 1. Survey question summary

professional and personal activities.

To measure work satisfaction of developers, the survey includes four 10 point Likert-scaled questions. As satisfaction is a board topic [26], we aim to measure their anxiety, depression and emotional exhaustion, towards both their co-workers and office.

Open-ended questions elicited the challenges and solutions that software developers perceived during the transition. Participants were asked to describe significant obstacles during their last six week’s work, as well as to propose ideas for improving productivity of their local teams and the site office. Some examples for open-ended questions include:

- *What are your greatest lessons from current work experience, and which do you wish to see become rituals moving forward?*
- *What are your current ideas for initiatives that could bring us closer together as one team?*
- *If you could improve one aspect about the communications within your team/office, what would it be? ...*

The survey was sent to every developers in the office team, including software engineers, product managers, UX designers and researchers, etc.

3.3. Data Analysis

We reported the descriptive statistics of four closed-ended questions including median difference of ratings as well as the response rate across the three surveys. We also provided a visual summary of trends in the rating responses across three surveys with boxplots.

We leveraged and iteratively improved a team-based codebook to analyze open-ended responses [27]. We labeled codes for responses into two groups according to the survey topics (as we illustrated in section 3.2): work preferences between work-from-home vs. -office, and participants’ perceived challenges and resolutions during the transitions. To strengthen the validity of our study, we applied observer triangulation by having two researchers to create the initial codebook. They revised the codebook after inspection of a senior qualitative

researcher. After establishing the initial codebook, the two researchers examined their inter-rater reliability on survey responses from five random participants.

There was a substantial agreement between these two researchers based on Cohen’s $\kappa = 0.703$. The two researchers discussed all emerging disagreement with the research team in weekly meetings until reaching consensus, and then one researcher proceeded with the remaining survey responses. Finally, the coding was presented to and inspected by the whole research team, including stakeholders at the case office.

3.4. Case Office Narrative

We conducted this case study in one of the branch offices in a multinational corporation known for its integrated enterprise software. This office has been spearheading a new business unit since mid 2019. In March 2020, the global hit of COVID-19 forced its employees to work from home, which they did for over 20 months. When the Delta-variant of COVID-19 was fading out around October 2021, the office planned to utilize its work space again with a “new normal” of hybrid arrangements. Across all three basic work arrangements (fully on-site, fully remote and hybrid), the organization applied a similar set of collaboration tools with small variances across local Scrum teams.

The case office included seven Scrum teams. The office grew from 20 employees to 40 in the first quarter of 2020, and later tripled (to around 65) during the local stay-at-home order. With a competitive local market for software talents, the attrition rate also elevated at the same time. Consequently, employees who joined later had neither collaboratively worked with their colleagues in-person nor experienced the site. The management level in this organization believed return to the shared workspace might enhance employee engagement and trust amongst individuals, which had been suffered during the pandemic. They argued that office time would enhance collaboration via in-person activities. Furthermore, the management conjectured that effective face-to-face check-ins would reduce the number of scheduled meetings, improve collaboration effectiveness and alleviate meeting fatigue.

The regional stay-at-home order was no longer mandatory since the third quarter of 2021, which also eased work restrictions. Moreover, several products of the site had just gone live. On Oct 6th, the office made an announcement, which requested its employees to adapt a hybrid normal: utilizing shared workspace for three predefined weekdays. However, not all office facilities were ready for the shift: supplier issues caused by the pandemic kept the office from upgrading, e.g., the office

did not have enough monitors for all developers, neither collaboration equipment to support hybrid meetings.

We started distributing surveys right after the announcement. As the branch office is located near the university of three authors, the site has maintained research connections with the university since its opening, and thus provides the access. The first survey received responses from 51 out of 64 participants (80%). The second survey received 40 out of 64 participants (63%), while the last survey received 39 out of 60 participants (65%). Moreover, as open-ended questions were optional, the average valid responses for such a question is 18.95 and length is 21.00 words.

4. Results

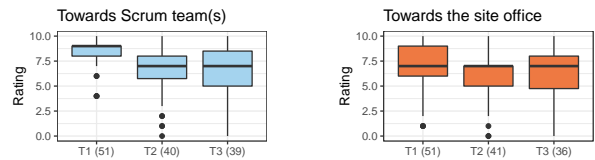
4.1. Survey Results

The results for four closed-ended questions are plotted above in Figure 2. Through plotting responses of closed-ended questions, we found some pattern shifts across three points of time. During the transition, the median of software developers' overall satisfaction towards their local Scrum teams reduced from T1 to T2, but did not significantly differ from T2 to T3. On the other hand, the median of their overall satisfaction towards the office does not vary significantly over the three surveys. Moreover, there was a slight drop of the median of work enjoyment towards their local Scrum teams from T1 to T2, while there was a larger drop towards the office at T2. Many low ratings on satisfaction and work enjoyment were reported on T2. For further details to explain the above observations, we present our findings on the open-ended responses.

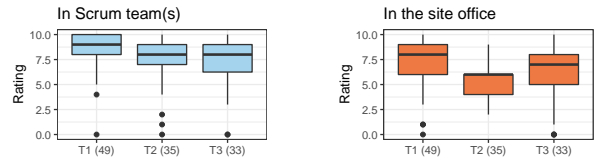
Particularly, our codes can be categorized as the challenges developers faced and solutions they proposed (see Figure 3). Following sections elaborate on identified themes and some corresponding quotes.

4.1.1. Communication One of the major themes that manifestly emerged when coding open-ended responses was *communication* difficulty. We adopted a more general definition of communication: "...a process by which information is exchanged between individuals through a common system of symbols, signs, or behavior. We categorized textual content matched with the above definition under this theme, but excluded those explicitly related to management and informal communication while building corporate culture.

Challenges: To exchange formal or informal information with colleagues, developers heavily relied on sporadic and **formal meetings** when working remotely. However, the increased number and frequency



(a) Responses on *general satisfaction of work* in Q1a and Q1b



(b) Responses on *enjoyment of work* in Q3a and Q3b

Figure 2. Ratings of closed-ended questions

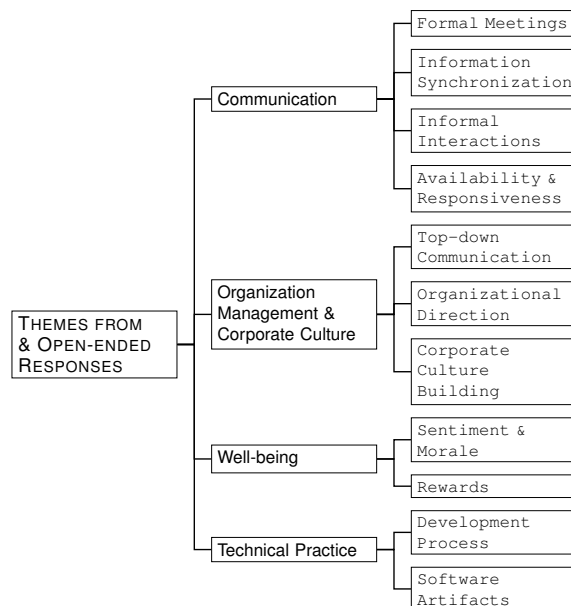


Figure 3. Themes for challenges and solutions during the transition based on open-ended responses

of meetings challenged developers to find time to stay productive with their own development tasks. Some developers struggled to squeeze the development time between intermittent meetings, for instance, "...sometimes I spend 50% of my day in meetings which makes dev time hard to find" (T1).

Transitioning to the hybrid arrangement did not significantly rectify such challenges. During the transition, developers had to frequently host "hybrid" meetings, i.e., some coworkers attended from the office, while some were still remote. In this meeting format, some participants felt frustrated and unfairly treated due to a combination of on-site and remote attendance: "...either everyone needs to be in person for important meetings or everyone should call in from their own

laptop. [I]t does not work currently” (T3).

Developers adapted their strategies by utilizing multiple communication tools or online knowledge centers to organize **information synchronization** in the hybrid arrangement. However, they perceived challenges while navigating and locating the exact needed piece of information in these scattered channels. One participant expressed their struggles, “...if we could clear up the confusion [with] information channels, that would be very helpful” (T1). Moreover, developers complained about the large number of emails and the need to send messages in a more aggressive manner via IM to retrieve information. While embracing the hybrid arrangement, some developers claimed the communication improved at the intra-team level while they were in-office through some **informal interactions**, but still required hybrid support, e.g., “...cross-team communication is flowing much better in the office, but still need some additional channels to support off-site members” (T3).

Before this transition, developers had realized the importance of collaboration readiness [3] and reaching the right person in time (**availability & responsiveness**), “...[virtual meeting] is not the best substitute for walking over to your colleagues desk.” (T2). However, their colleagues often entered and left the office asynchronously during the transition, which resulted in barriers for in-office communication and discouraged those who arrived at site in core hours.

Solutions: As a developer suggested, meetings could be hosted in the same format, either completely virtual or completely in-person, until the office was ready to enable a better hybrid meeting experience. Further, meeting time and frequency could be minimized to leave time for engineering tasks. Finally, the office could consider regulating the use of personal electronics during in-person meetings for efficiency.

Developers also postulated various methods to synchronize the cross-site and -function information. For instance, details of tasks should be properly communicated when people are out-of-office and knowledge sharing sessions should be hosted regularly in-person: “Communicating task handoff better in cases when individual is [Out of Office]” (T2).

4.1.2. Organization Management and Corporate Culture When other research discusses the peculiar role of *organization management* in remote and hybrid collaborations, they argue that, “when working virtually, distance amplifies dysfunction” [28]. The remote settings of work had created many obstacles of bonding trust and conducting activities for team building. Through qualitative analysis, we confirmed that the

challenges of management mentioned in [4, 28] had indeed amplified during remote work, and even more so in the transition to hybrid work.

Challenges: The predominant issue was that the communication between management and developers was undermined by various work arrangements (**top-down communication**). This issue increasingly introduced difficulties in grasping scattered information and conducting hybrid meetings concerning the team and **organization direction**. Consequently, developers expressed obscurity, delay, and non-transparency when trying to participate in the managerial decision-making processes, as the following quote demonstrates, “delays, re-work or mid-sprint changes that could have probably been avoided with effective decision making process” (T1). Another developer expressed disappointment in the extra effort required to communicate with management, “I have to constantly decipher, to infer what might actually be going on” (T1).

The developers reported the office-wide dearth of **corporate culture** while working remotely. In addition, they seemed to have different interpretations of what type of culture would best serve the organization. Some perceived corporate culture as a set of best routine practices, such as suggested in the quote: “...we never invested in how to establish a remote culture. It is going to be impossible to avoid remote work now, so [our organization] has to establish hybrid working best practices...” (T1), while some saw it as a sense of belonging, “...if you feel comfortable with your teammates by bonds and interactions, despite possibly being introverted you may still become comfortable enough to share an important opinion” (T2).

Solutions: Developers consistently referred to their need to be trusted, included, and listened to in the decision making process with management. As this developer suggested, “...decisions should not only come from managers but also from the real developers who have more relative feelings” (T1).

Developers also suggested that their managers should offer to help build in-office, hybrid, and remote culture-building practices. Moreover, developers who sensed the loss of belonging believed the informal interactions, such as team building activities, could help remove organizational silos, e.g., “I think some collaboration and team building has suffered while remote. I think once in-person, you make connections to people that you would normally not interact with in your project/team scope. These relationships help remove silos, and raise collaboration” (T1).

4.1.3. Well-being The notable impact on individual *well-being* has often been reported in COVID-19

related research on software development [5, 6]. We adapted definitions from [29] to focus on the work-life balance, which refer to pleasant experiences and positive self-realization at work. We found that many developers reported that their well-being had been further affected during this transition.

Challenges: Besides the results presented in Figure 2, the qualitative data revealed some signals of a **sentimental and morale** decline during the transition. One participant suggested that they experienced a decline in happiness because the transition required them to adapt a new hybrid arrangement after they had already adapted and become accustomed to the remote setting. Others felt burned out because of their workload and the constant context-switching that was aggravated by the transition, “...*too many tasks and context switching leaves me feeling exhausted and unable to be fully productive*” (T1).

Some remarked that working from home during the pandemic had helped with their work-life balance, and therefore they were reluctant to adapt the new hybrid arrangement. Working from home saved their commute time, afforded focused work sessions, and increased their perceived productivity. For instance, developers commented that “...[when WFH], *additional 2 hours of my life per day with no commute*” (T2), and “*there is more focused time to get work done with stay at home policy*” (T2). Others felt their lives were taken over by work, “...*I’ve found myself working anywhere from 10-14 hours a day forgetting to take breaks or lunch, which took a toll mentally and exhaustion wise*” (T1).

Moreover, some developers had set up and become accustomed to their home office, preferring it to returning to a shared office space, “*I also have a very good setup at home regarding space, privacy and equipment that can’t be replicated at the office*” (T1). They perceived themselves as more productive when working from a private home office, “...*I’m more productive in my slow thinking and [development] tasks if [I] can work from home*” (T1), and similarly, “...*easier to get in flow state, no people loudly talking and gossiping next to you [when WFH]*” (T2).

Solutions: After assessing the benefits of being remote versus on site, developers suggested some solutions such as providing various forms of **rewards** for maintaining their personal well-being during the transition to a hybrid arrangement. The first recommendation was to provide developers the freedom to choose the work arrangement that they prefer. The option includes more than the choice between fully remote or fully on-site, including individual and team preference for the number of days and hours at home versus the office. Second, developers expressed that

they need support to customize their office spaces so that they could still feel flexible, comfortable, and have concentrated and uninterrupted work sessions, as one developer commented: “...*more work from home freedom and new monitors on the desks*” (T3).

4.1.4. Technical Practice Though the transition continued over a limited period of time, we observed many perceived challenges in the technical practice. We include and organize all of these textual content relevant to **development process** and **software artifacts**.

Challenges: Regarding artifacts, some responses in the survey expressed concerns for the declining quality of the code base, particularly for some tasks that were completed during the transition. They argued for the need to further refactor and conduct other quality improvements. A developer mentioned, “...*our [recent] code is one big hack job. I doubt that WFH is entirely at fault here but it surely didn’t help*” (T1).

As for the development process, although some developers stated that they perceived no significant impact, some mentioned that sprint planning, estimation, or activities that require brainstorming were impacted due to the missing visual communication clues and the lack of whiteboards and sticky notes. One developer specifically mentioned, “...*planning and refinement done in person, has a much better outcome. If you are explaining a plan, and someone doesn’t understand, you can also get visual communication clues that you are losing their grasp of the concept*” (T3). While some favored in-person interaction, some did not, as the quote below: “... [online collaborations tools] *allows developers to contribute at the same time without having to defer to a [lead engineer] or manager who has more control in live interactions. This [is why] I would love to continue*” (T1).

Solutions: Developers emphasized the importance of code quality. Some suggested the site should establish guidelines for code quality and set up mentorship sessions for newcomers which are better in-person.

4.2. Comparison: WFH versus WFO

According to survey responses across various questions, software developers often expressed the perceived advantages and disadvantages when working in hybrid i.e., switching between work-from-home or -office. We organized the results in Table 2 to illustrate comparisons for designing improved work arrangements. In particular, developers enjoyed the flexibility, work-life-balance, comfort, and focused work sessions during work-from-home, and felt that there was no productivity loss; they also perceived

	Work-from-Home	Work-from-Office
Advantages	<ul style="list-style-type: none"> + Productivity gain from focused sessions + Flexible work time + Saved commuting time + Improved work-life-balance + Available and private facilities 	<ul style="list-style-type: none"> + Productive meetings and brainstorming sessions + Organization and team culture: a sense of belonging + Ease of asking quick questions and collecting scattered information
Disadvantages	<ul style="list-style-type: none"> - Impact on technical process and artifacts - Difficulties in remote communication - Difficulties in socialization and team building 	<ul style="list-style-type: none"> - Productivity loss due to interruptions - Negative emotion and low morale during the hybrid transition

Table 2. Perceived advantages and disadvantages of work-from-home and -office

difficulties in experiencing corporate culture, socializing with colleagues, and conducting effective meetings.

5. Discussion

This transition was not a positive experience for individual developers in our case. To enable successful collaboration in software development during work transitions, we identified four sets of challenges and potential solutions proposed by software developers within this site. Prior research had identified several pivotal socio-technical factors for distributed work settings, such as common ground, managerial aspects, as well as trust, are significantly echoed in our findings [3, 8]. While embracing various adjustments during the transition, software developers especially felt the difficulties of consolidating scattered information to build a common ground among colleagues. On the other hand, software developers offered many practical solutions to improve work transition, as we reported in Section 4.1. In the next sub-sections, we summarize the major insights from this case, and make some recommendations to promote organizational success.

5.1. Lessons Learned

Meetings, a primary work mode of communication, were not a satisfactory experience for developers during the transitioning. The intermittent frequency and vast number of meetings frustrated many developers. Although on-site meetings are presumably more effective which provide more common grounds, overloading meetings into the on-site schedules was unsustainable. To take advantages of on-site days, *organizations may consider scheduling group creative sessions when software developers are physically present in office, as developers reported how they felt thrived with these sessions on-site; however, performing regular updates online would afford flexible and focused sessions as developers requested.* In addition to meeting frequency, developers also complained about the insufficient infrastructure and services for hybrid meetings, which was also observed in [30].

The amplified dysfunction during the work arrangement shift not only impacted communication, but also, without sufficient awareness elements [31], such as availability and developer activities, required *the management to spend more effort on fostering working culture, trust, and empathy with employees.* Without face-to-face communication and social activities, software developers, who bear heavy workloads, could easily perceive distrust [8]: they might lose trust to colleagues and management due to ill-timed check-ins, and vague responses during collaboration. During a work arrangement transition, management may consider fostering a transparent decision-making process and leveraging the designated information channels to invite and listen to the opinions of software developers, or even adopting a bottom-up approach for decisions about work preferences. Therefore, an organization may alleviate or avoid a substantial decline in employees' work satisfaction due to the transition.

While the root causes for deteriorated well-being may vary for each individual developer, diverse work mode preferences and constant context switching were most mentioned in the survey. Confirming prior literature [5, 6], software developers have diverse preferences regarding work modes, which can lead to various experiences towards remote as well as on-site collaboration. That is, some developers enjoyed the flexibility enabled by remote work, whereas others felt exhausted due to more fully integrating their private lives with work. Some also expressed their concerns about various group creativity tasks without physical interaction. Although it was hard to identify a balance point that would satisfy every developer's diverse preference, our findings suggest that an organization can support and guide its employees when adapting a new work arrangements. For instance, an organization may *provide its employees with opportunities and the freedom to design their preferred work experience when collaborating at the level of their local Scrum teams and the entire organization.* A continuously improving culture may benefit both organizational productivity as well as individual well-beings in the long run.

5.2. Recommendations

For software development organizations that are transitioning to the hybrid or other arrangements, we propose the following actionable recommendations:

- Consolidate announcements and key information in limited and designated channels, especially during the work arrangement transition.
- Leverage on-site opportunities for collaborative and creative tasks, for instance, meetings of customer co-innovation, refinement and planning. However, avoid overloading on-site schedules with meetings and leave room for ad-hoc conversations and social interactions for building trust.
- Assess social-technical conditions regularly [3, 10], e.g., readiness for hybrid collaboration technologies, and common ground of organizational goals with developers. Prepare work arrangement adjustments with a transparent decision-making process.
- Include developers in designing and piloting their future work patterns according to their preferences, and also consider team and the entire organizational benefits as part of a continuously improving practice.
- Research, observe, and (re-)configure services and hardware infrastructure for an organization's work arrangement iteratively.

6. Concluding Remarks and Future Work

We reported on a case study to provide the research community with a unique glimpse into the transition from work-from-home to a hybrid work arrangements. We provided the lessons learned and recommendations derived from four sets of observed challenges and solutions for practitioners and future researchers.

This case study has several limitations to be noted. First, our observation also results from confounding factors illustrated in the case narrative, such as the COVID situation in 2021 and organizational expansion. Second, the survey is subject to response bias and survey fatigue during the transition. Factors such as participants' personal traits, prior experience in various work mode, and team workload during the survey period could also affect individual responses. Third, survey responses only comprise self-reported data without cross-validation, and the single-item measurements on work satisfactions are subject to limitation without further fine-grained investigation [26].

To accommodate diverse feelings toward varying work arrangements, we plan to host a series of participatory design thinking workshops [32] that allow developers to iteratively design their future work

patterns and improve the transitioning process. In addition, to verify the subjectively perceived factors for improving productivity and well-being, we plan to investigate developers' logged activities in engineering systems, and collect these data from other organizations undergoing hybrid transitions as well.

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