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EMPIRICAL RESEARCH



An affordance perspective of team collaboration and enforced working from home during COVID-19

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ABSTRACT

COVID-19 has caused unprecedented challenges to our lives. Many governments have forced people to stay at home, leading to a radical shift from on-site to virtual collaboration for many knowledge workers. Existing remote working literature does not provide a thorough explanation of government-enforced working from home situations. Using an affordance lens, this study explores the sudden and enforced issues that COVID-19 has presented, and the technological means knowledge workers use to achieve their team collaboration goals. We interviewed 29 knowledge workers about their experiences of being required to work from home and introduced the term “enforced work from home”. This paper contributes to the affordance theory by providing an understanding of the substitution of affordances for team collaboration during COVID-19. The shifting of affordances results in positive and negative effects on team collaboration as various affordances of technology were perceived and actualised to sustain “business as usual”.

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1. Introduction

The COVID-19 pandemic has caused unprecedented challenges to public health systems and global economies (McKibbin & Roshen, 2020). Governments have implemented social distancing through control measures on many aspects of society, in particular, mobilities (Walker et al., 2020). Our social and work lives have been abruptly changed, and many countries are considering lockdown measures (governments forcing people to stay home) or social distancing (people staying at a certain distance from each other) to continue until the foreseeable future (Gallagher, 2020). For the first time in modern history, knowledge workers around the world are forced to work from home every day through government-enforced lockdowns and dealing with many new technological challenges they may not have been prepared for. Enforced working from home impacts people who never had any desire to or were not permitted to due to organisational policies. Therefore, this paper explores the sudden and enforced issues COVID-19 has presented to knowledge workers, and the technological means they use to achieve their team collaboration goals.

In existing work from home literature, studies focussed on the precondition that remote e-workers are voluntarily working from home to serve various purposes. For example, taking care of domestic duties (Versey, 2015), reducing commuting time (Kelliher &

Anderson, 2010) and avoiding distractions (Fonner & Stache, 2012). Also, there is a “power distance” between head office and the home office. Remote e-workers are often marginalised compared to their in-office counterparts which create feelings of social and professional isolation (Cooper & Kurland, 2002), missed informal learning opportunities, and decreased support from the company (Tietze & Nadin, 2011). Furthermore, these remote e-workers often do not work from home every day (Delanoeije et al., 2019). However, during COVID-19, many knowledge workers are forced to work from home every day, and the power distance between remote e-workers and their previously on-site colleagues has disappeared. Suddenly, knowledge workers are forced to use technologies in new ways to perform their work, engage with their colleagues, combined with added pressures of managing home environments that may not be suitable for work purposes. The existing remote e-working literature thus cannot provide a thorough explanation of the enforced working from home situations during COVID-19. Therefore, understanding knowledge workers’ home working experience is essential in contributing to the remote e-working literature in the context of a pandemic.

As COVID-19 forces entire companies to work from home, it is essential to explore how knowledge workers navigate through the challenges of changing working environments and how they can maintain “business as usual” through technological means and investigate the

organisational, behavioural, and societal impacts of the pandemic (Ågerfalk et al., 2020). In this war against the invisible enemy, we as information systems scholars can contribute to the global effort and explore how the current technologies can be leveraged by teams and organisations to develop new digital practices to survive and perhaps even thrive in these uncertain times (Ågerfalk et al., 2020). Therefore, our research question is: *how does the enforced working from home requirement due to COVID-19 affect team collaboration?* To answer this question, we use affordance theory (Gibson, 1977) to explore the behaviours associated with IT objects and goal-orientated actors (Volkoff & Strong, 2013) usually associated within workplace conditions but are now enforced within home offices around the globe. Affordances are useful for examining previously unrecognised roles of technology (Majchrzak & Markus, 2012), and therefore is a suitable lens for exploring how the affordances of achieving workplace goals have shifted to a new set of affordances to achieve the same goals. McKenna (2020) explored how the affordances of technology can be used in different ways voluntarily. However, COVID-19 has forced knowledge workers to explore existing and new affordances to achieve their desired outcomes. As these changes to our working lives occurred rapidly, knowledge workers were forced to adapt quickly to discover new affordances of technology or to repurpose existing technologies in new and creative ways. Therefore, our contribution is an understanding of the substitution of affordances for team collaboration during COVID-19, and how knowledge workers can use technology to achieve their goals during this pandemic. To the best of our knowledge this is the first empirical qualitative study that focuses on technology and team collaboration during COVID-19 while working from home.

This paper is structured as follows: first, we present the literature on remote e-working and COVID-19, and affordances and team collaboration. Next, we present our methodology, followed by our findings. Finally, we present our discussion and conclusion.

2. Literature review

2.1. Remote e-working and COVID-19

The literature on remote e-working discusses a wide range of issues such as work-life boundaries (Golden, 2012), autonomy (Dimitrova, 2003), productivities (Sheehy, 2008) and social roles (Marsh & Musson, 2008). A central part of the literature is the discussion on the paradoxical effect e-working has on wellbeing. Studies have emphasised the benefits of working from home and identified that remote e-working frees knowledge workers from office distractions and commuting, and helps concentration on individual tasks (Kelliher & Anderson, 2010; Mazzi, 1996). In turn, this

leads to increased job satisfaction (Fonner & Stache, 2012). Increased work autonomy that allows knowledge workers to have flexibility in their schedule has been reported as one of the key benefits of working from home and contributor to employees' wellbeing (Delanoeije et al., 2019). Moreover, with the blurring boundaries between the work and home space, remote e-workers have lower work-to-home conflicts (Golden et al., 2006). Because of technology, they can combine home and work demands and achieve work-life fusion (Haeger & Lingham, 2014).

There are also negative impacts of remote e-working on wellbeing in the literature. First, the blurred boundary between home and work causes problems such as the "always-on culture" facilitated by information and communication technologies (ICT) makes it difficult for knowledge workers to switch off and results in work intensification (Derks et al., 2016), as well as distractions from the home environment and family members (Allen et al., 2015). Mazmanian et al. (2013) argued that the increased use of technology results in an "autonomy paradox". While ICT offers more flexibility for work and living arrangements, it also imposes pressure for knowledge workers regarding constant connectivity and responsiveness (Matusik & Mickel, 2011). Ashforth et al. (2000) found that the proximity of home and work is emotionally demanding and leads to fatigue and negative emotions (Sonnentag et al., 2008).

Although ICT today enables seamless communication, remote e-workers still have disadvantages in interaction due to physical distance, which results in feelings of alienation, isolation, and worry (Collins, 2005). Suh and Lee (2017) suggested that collaborative tasks which have low autonomy, when performed remotely will lead to technostress and job dissatisfaction. Studies have emphasised the importance of organisational support for colleagues that are working remotely to tackle feelings of social isolation and increase job satisfaction (Mulki & Jaramillo, 2011). At the individual level, Sewell and Taskin (2015) suggested that remote e-workers should initiate frequent communications with their team members through effective use of ICT to reduce potential negative consequences of working from home.

There has been frequent media attention around working from home during the COVID-19 lockdown (e.g., Hughes, 2020), and personal stories posted on social media. Apart from an opinion paper from Richter (2020) who addresses some common misconceptions of locked-down digital work, we were unable to find much empirical research in information systems journals. There are limited examples of other COVID-19 relevant topics in information systems. For instance, Laato et al. (2020) explored online information overload and the sharing of unverified COVID-19 information through social media. Naidoo (2020) explored how cybercriminals have

been exploiting COVID-19 to target victims, impersonating trusted sources, and using social engineering techniques.

In their editorial, Ågerfalk et al. (2020) addressed some potential research directions for COVID-19 and information systems. They discuss four primary areas for information systems research: 1) the centrality of information in the COVID-19 disaster, 2) the value and success of information systems during the pandemic; 3) behavioural, temporal, societal, and organisational aspects; and 4) the negative role that information systems could play during the pandemic. The work of Laato et al. (2020) and Naidoo (2020) has focussed on the negative role of information systems during the COVID-19 pandemic. However, there is little empirical research yet on the behavioural, societal and organisational aspects of COVID-19 and information systems (Ågerfalk et al., 2020). Therefore, we searched more broadly for research focussing on remote e-working and COVID-19. The research to date on remote e-working and COVID-19 is split almost evenly between editorials or commentary focussed papers, and empirical studies. Additionally, the journal *Human Relations* curated a special issue on virtual working compiled of working from home papers. However, the articles were previously published in a pre-COVID-19 world and were curated to give guidance to navigate working from home during the pandemic (Unsworth, 2020).

Organisations have been caught off guard and were ill-prepared for the sudden change, which has brought digital transformation into focus (Savić, 2020). The sudden change has negative impacts and disproportionately affects lower-paid and female workers, which must be taken into account when considering working from home arrangements (Avdiu & Nayyar, 2020). Rysavy and Michalak (2020), in a self-confessional piece, explained how they worked from home as librarians using technologies such as Slack for team collaboration, FlipGrid for daily video updates, Notion for project planning, and Sharepoint for file sharing. They found the transition less disruptive because they already used many digital tools to aid in asynchronous collaboration. However, working from home is not always easy as individuals from some groups who did not prefer to work from home were now forced into new arrangements (Kramer & Kramer, 2020).

The empirical studies to date have mainly focussed on COVID-19's impact on economics (Gottlieb et al., 2020), and labour markets (Coibion et al., 2020) with unemployment figures rising. Although not primarily focusing on COVID-19, some recent studies have discussed the potential impacts of their findings in the context of the pandemic. For example, Oksa et al. (2020) stated that social media use might become more critical during the pandemic. Also not explicitly focussed on COVID-19, Mysirlaki and Paraskeva

(2020) study virtual teams and massively multiplayer games, and state that they could be useful during the pandemic. There were only two qualitative studies we could find investigating remote working during COVID-19. The first was a personal reflection on social isolation and struggles of working from home for single women living alone and how technology helped them to connect with colleagues (Gao & Sai, 2020). The second study was a desktop analysis of the websites of Australian universities and how they support academic staff with caring responsibilities (Nash & Churchill, 2020).

The COVID-19 lockdown provides a unique context which is significantly different from the previous working from home literature. The differences with COVID-19 are that working from home is enforced, applied to all, introduces restricted mobilities, and did not allow for much planning. COVID-19 remote e-working, therefore, triggers challenges on duty arrangement, communications, home space negotiations, and wellbeing. To maintain “business as usual”, knowledge workers need to adapt quickly to non-conducive working spaces and unfamiliar digital platforms. In Table 1, we highlight the differences between remote e-working pre-COVID-19 and during COVID-19 across nine dimensions.

Working from home research to date has taken technology for granted, and a unique information systems approach is required to explore and theorise the technological aspects of working from home. As workers are forced to work from home, their online behaviour will inevitably change as they search for new ways to perform team collaboration tasks. As they have little time to prepare, the sudden change means that new ways of doing this must be discovered rapidly, with some trial and error, and within various restrictions. The unexpected ontological shift of the team collaboration modes and working environments require a theoretical perspective to offer an in-depth understanding. Thus, we applied the affordance theory to investigate the relational behaviours regarding the sudden withdrawal of the working environment, and the merger of working and living spaces. Rather than exploring the technology as a whole, using affordance theory enables us to use a finer grain lens to understand the behaviours offered by team collaboration technologies.

2.2. Affordances and team collaboration

Affordances are the possibilities of action that animals have within their environment (Gibson, 1977) and are known as environmental affordances, while technological affordances are useful for examining technology and human relationships (Majchrzak & Markus, 2012). Volkoff and Strong (2013) defined affordances as “the potential for behaviours associated with

Table 1. The differences between working from home pre-COVID-19 and during COVID-19.

Dimension	Pre-COVID-19	During COVID-19
Choice	Voluntary decision (Versey, 2015)	Enforced (Walker et al., 2020)
Population	Depending on the organisational policies (Kossek et al., 2006)	Significant percentages (e.g., USA 50%) of the working population especially those engaged in information work including management, professional and related occupations (Brynjolfsson et al., 2020; Zhang et al., 2020)
Motivations	Fewer distractions, increased flexibility, increased autonomy accommodating private commitments and reduced commuting time (Delanoeije et al., 2019; Fonner & Stache, 2012; Golden et al., 2006)	Comply with governmental or organisational restrictions, and to limit the risk of infection, or spreading COVID-19 (Engle et al., 2020)
Preparation	Time to plan. Less training and support from the organisation (Tietze & Nadin, 2011)	Little time to plan and prepare mentally (Avdiu & Nayyar, 2020; Savić, 2020)
Space	Shift the location of work from office to the home (Tietze & Nadin, 2011)	Mock-up workspace at home, e.g., kitchen or living room leading to ergonomic challenges (McCarthy et al., 2020). Many household members may be sharing the same space to pursue their private, educational, or professional activities
Responsibilities	Performing usual professional and private roles (Versey, 2015)	Take on multiple roles, e.g., employee, teacher, cleaner, cook (Kramer & Kramer, 2020)
Wellbeing	Positive (autonomy and flexibility) and negative (blurred boundaries of work and life) effects on wellbeing (Delanoeije et al., 2019; Derks et al., 2016; Sonnentag et al., 2008; Suh & Lee, 2017)	Increased anxiety, stress levels, reduced life satisfaction, exposure to negative news and fear of being infected or infect others around them (Usher et al., 2020; Zhang et al., 2020)
Mobility	Free to travel for professional and social engagements (Golden et al., 2006)	Restricted freedom to travel for professional and social engagements (Georganas, 2020)
Social interactions	Marginalised professionally but with more flexibilities in personal contacts (Cooper & Kurland, 2002)	Social contact is limited to their household or on virtual platforms (Von Gaudecker et al., 2020)

achieving an immediate concrete outcome and arising from the relation between an object (e.g., an IT artefact) and a goal-oriented actor or actors” (p. 823). Affordances are the entanglement between human action and technological capability (Faraj & Azad, 2012). They are often shaped by social environments (McKenna, 2020), and their historical, and

institutional use (Van Dijk et al., 2011). Affordances can explore the design and usage of technology taking into account the goals of the users and community involvement (McKenna, 2020), or human responses to changes in affordances (Cai et al., 2020).

Technological affordances are considered as functional or social. Within a specific usage situation, a functional affordance is the relation between users and technology, and are the possibilities of individual behaviour offered by a technical object (Grgecic et al., 2015). Affordances only exist because of the presence of users’ intentions (Chemero, 2003). Therefore, depending on a specific usage situation, different affordances may arise from the same technology (Leonardi, 2013). An example of functional affordances is provided by Treem and Leonardi (2013), who suggested social media has four functional affordances: visibility, editability, persistence, and association. Other affordance literature has presented functional affordances specific to Wikis (Mansour et al., 2013), social media and knowledge sharing (Majchrzak et al., 2013), and new methods of organising (Zammuto et al., 2007).

Social affordances can be considered the possibilities of action that people may provide one another within an environment (Gaver, 1996). In the technology context, social affordances are created by technology’s material features (Treem & Leonardi, 2013), and invite social interaction (McGrath et al., 2016). For example, social media affords people to share, retweet, vote, or like a post (Lankton et al., 2015; Majchrzak et al., 2013). Social affordances also exist when technology is used for collective action and social transformation (Zheng & Yu, 2016). According to Kreijns et al. (2013), social affordances may sustain, encourage, or initiate social interactions. McGrath et al. (2016) were able to demonstrate that social affordances significantly impacted creative processes.

There is limited work on affordances and team collaboration. According to Leonardi (2013), teams may perceive technology as useful to their goal even if it was not originally designed to be used in a certain way. Virtual team performance can be enhanced if team processes are adapted for the affordances offered by the technology. To ensure that virtual teams can adapt rapidly, they must have adequate training on the technology and the work processes afforded by the technology (Rice et al., 2007). Gilstrap (2019) explored how mobile technologies can afford team leadership. Team leaders can use mobile phone affordances to 1) perceive team environments across physical and non-physical spaces, 2) use multiple communication processes, 3) complete collective tasks at varying times and speeds, and 4) understand the movements of people, technology, and networks.

In this study, we explore affordances and team collaboration within the context of issues faced by

knowledge workers during COVID-19. There is little research about enforced changes in affordances. Cai et al. (2020) explored affordance withdrawal; however, in their study, the goals of the users changed. During COVID-19 work goals remain the same, and therefore teams must substitute affordances for their needs.

3. Research methods

We applied a qualitative research approach building on the philosophical underpinnings of interpretivism (Klein & Myers, 1999) to explore how the enforced working from home due to COVID-19 has affected team collaboration. We followed the principles for interpretive research developed by Klein and Myers (1999).

3.1. Data collection

We conducted 29 interviews with knowledge workers (Surawski, 2019) who worked in office spaces before COVID-19 and were forced to work from home during the lockdown. The participants were recruited through posts on social media. The author team also contacted people in their professional networks. The data collection took place from April 11 2020 to April 26 2020. The authors also wrote self-reflections of their own experiences. The goal was to triangulate the data and be aware of their own biases (Brink, 1993). Table 2 provides an overview of the demographics of our interviewees and the authors.

The interview guideline was developed by the author team in two iterative circles and was informed by research in the fields of connectivity (Dery et al., 2014; Kolb et al., 2012), remote work (Charalampous et al., 2019; Koslowski et al., 2019) and technology disconnection (Cai et al., 2020). The interview guideline consisted of questions around if and how the enforced working from home situation has changed the way our participants use technology to a) complete their work tasks, b) collaborate with their peers and superiors and c) interact with their clients. Further, we asked what challenges or benefits our participants experience with regards to team collaboration and how the different functionalities of technologies in use lead to or mitigate these challenges and benefits.

The interviews were conducted in a semi-structured manner and were conducted via Zoom because of the social distancing requirements and due to participants often being located in other countries than the interviewers. The interviews were recorded, and notes were taken. The average interview took 55 minutes (min 34 mins; max 91 mins), and the audio files were professionally transcribed.

3.2. Data analysis

We conducted a thematic analysis following the guidelines of Braun and Clarke (2006). We familiarised ourselves with the data and generated initial codes that emerged from the data. We then identified and

Table 2. Demographics of interviewees and authors (self-reflections).

Pseudonym	Age	Gender	Has kids	Has partner	Experience working from home	Industry
Anna	20–30	Female				Transport
Barry	30–40	Male		X		Fitness
Hamza	30–40	Female	X	X		Academia
Aisha	40–50	Male		X	X	Project management
Oliver	30–40	Male	X	X	X	Recruiting
Mansour	30–40	Male	X	X	X	Data science
Liam	30–40	Male				Engineering
Liz	30–40	Female	X	X	X	Veterinary
Rajani	20–30	Female				Web development
Salim	30–40	Male				Academia
Adam	30–40	Male		X	X	Construction
Wendy	30–40	Female		X		Recruiting
Sia	30–40	Female		X		Finance
Jacques	30–40	Male	X	X	X	Finance
Nick	30–40	Male	X	X	X	Finance
Emilia	30–40	Female		X		Consumer goods
Jacob	20–30	Male		X		Consulting
Rachel	20–30	Female		X		Copywriting
Jane	40–50	Female			X	Academia
Harry	30–40	Male		X		Recruiting
Pete	40–50	Male		X	X	Economic development
Laura	40–50	Female	X	X	X	Food
Garry	30–40	Male		X	X	Banking
Daniel	40–50	Male		X		Project management
Matt	30–40	Male				e-commerce
Alexander	40–50	Male		X		Food
Sandra	30–40	Female		X	X	Construction
Terry	40–50	Female		X	X	HR
Patricia	40–50	Female	X	X	X	Health
Ebba	30–40	Female		X		Academia
Li	30–40	Male		X	X	Academia
William	30–40	Male		X	X	Academia
Henry	30–40	Male	X	X	X	IT

Table 3. Illustrative quotes and abductive coding results.

Quote	Code
People Slack me to know if they want to have the same conversation. I've probably got an <i>increase in number of scheduled meetings</i> , probably about, I would say in a day now, two to three hours of scheduled meetings. (Daniel)	Social affordance: Enabling online conversations Effect: increase in scheduled meetings
The people I collaborate with. Socially, it's changed. Face-to-face is no longer there, and the people that I used to be able to walk 10 steps over to, I now have to call on Microsoft Teams and share a screen and stuff like that which – It <i>adds an extra layer of difficulty</i> when explaining things because it's never quite as good as having someone looking over your shoulder, but we're still able to solve most problems in a reasonably swift manner. (Liam)	Withdrawal of workplace environmental affordances: Enabling face-to-face communication ad-hoc information exchange Ad-hoc problem solving Viewing knowledge artefact Social affordance: Reaching out virtually Enabling technology-mediated communication Sharing knowledge artefact Explaining problems faced Problem solving Effects: Increased barriers for team communication Maintaining the ability to solve problems
We also have a bar in our office which helps to socialise a bit more. Usually when there are birthdays or people leave or people join, then always people bring a big amount of food and then they share that, and that <i>creates this kind of like social atmosphere</i> . (Oliver)	Withdrawal of workplace environmental affordances: Socialising Sharing and consuming food and drinks Effects: Creating and maintaining social ties Getting to know colleagues on a private level

reviewed themes in iterative circles. We held many team meetings to discuss the emerging themes and how they related to specific codes and the entire data set. In this last step, we identified the theory of affordance (Strong et al., 2014) as a lens to explore the patterns that we have found in the data. We then followed the abductive logic (Bygstad et al., 2016) and moved back and forth between theory and data to find the best explanation for our research question. Table 3 provides examples of our abductive coding phase.

4. Findings

Due to the COVID-19 outbreak, our participants that used to work in an office space were forced to work from home due to the social distancing requirements issued by their country of residence. However, it is important to note that this enforced working from home was very different to any pre-COVID-19 crisis remote working scenarios. First, none of the employees had the choice to work from home, but they were required to by governmental regulations. Second, most of the company's workforce needed to work

from home, not only a few employees or teams. Third, due to the high infection risk and death toll, employees were concerned about their own, their families' and their work colleagues' health, putting additional stress on employees. Fourth, our participants often worked in a space that was shared with other occupants of the household, which led to distractions and difficulty to focus on work tasks. Fifth, the lack of physical activity due to the closure of sports facilities and minimal social contact with anyone else outside their home environment affected our participants' mental and physical well-being equally. Therefore, it is important to note that our findings should be read against the backdrop of the extreme working and living conditions our participants were facing.

Applying the lens of affordances, we have observed that due to the loss of environmental affordances that meeting rooms, contained and open offices, common areas, bars and restaurants offer, teams are forced to increasingly actualise technological affordances. These affordances enable teams to be able to continue to work on their projects, to discuss and distribute tasks, to strategise, and to maintain and foster their social relationships. Functional affordances remained almost the same before and during the lockdown. We have observed an increase in social affordances that was, on the one hand, an enabler for team collaboration, but on the other hand led to increased role conflict, blurring of work-life boundaries, and virtual meeting fatigue.

4.1. The change in ad-hoc conversations and the impact on team communication and knowledge sharing

Due to the forced withdrawal of workplace environmental affordances, knowledge workers no longer naturally bump into each other anymore to engage in ad-hoc conversations about their current projects, their tasks, or their daily life. As they do not share a common physical space anymore, social affordances offered by video-conferencing platforms (for example, Zoom or Teams) become more important for communicating and discussing ideas. During enforced working from home, the environmental affordances in the office that previously facilitated face-to-face communications have shifted towards technological affordances which were largely neglected before COVID-19. The withdrawal from the environmental affordances of the office space reduced the frequency of ad-hoc meetings due to the lack of spontaneity. It led to a more planned and orchestrated collaboration: "*communication is good but far less frequent. Before we would bounce ideas off each other quite a bit. Right now it feels a bit more silo. There is still collaboration but it's very much orchestrated and less spontaneous in a lot of*

ways” (Sia). To talk to each other, knowledge workers first need to actualise social affordances offered by video-conferencing platforms or social media channels and usually indicate a topic they want to discuss. That way the conversations become much more purpose-driven and focused, which enhances the efficiency and allows people to complete their tasks much faster: *“whereas now when you work remotely, every time I talk to a person it tends to already have a subject. I can’t just bump into somebody and have a chat. For those things, it’s like when I speak to anybody now at home, it will be either to talk about the requests or the report. It’s not as frequent to have a general chat. Yes, it’s definitely a lot more effective. I’d say overall, how fast I can get something done nowadays is so much faster than before”* (Sandra).

While the reduction of spontaneous ad-hoc meetings decreases physical disruptions, it also impedes knowledge sharing and spontaneous coordination. Mainly, for new employees, the withdrawal of the environmental affordances affects their confidence in asking questions about their work tasks, as they cannot easily walk over to their colleague and tap them on their shoulder. Virtual channels cannot readily mitigate the loss of environmental affordances as employees cannot see if their colleague is busy or not, and they do not want to bother them by sending too frequent instant messages. Therefore, they refrain from actualising the social affordances offered by the chat function of various enterprise collaboration platforms, which affects their learning journey negatively: *“because I feel like when you’re next to each other, it’s way quicker. It’s like, ‘Hey, do you think this is okay?’ or like, ‘Can I ask you a question?’ You could see if they are busy. You can see if they’re not busy. You know what I mean? Whereas I’ve just sent an email and then I realised I forgot to ask a question a minute later. I’d have to send another one. Then it just keeps adding up. Obviously, I can’t do that. I can’t constantly ask someone. They told me I can, but I can’t. Before, I used to go to meetings with them just to see what’s going on, just to shadow people. Because I can’t do that, I feel like it’s a barrier between my learning time”* (Anna). Learning and knowledge sharing is crucial for team collaboration and success. Therefore, the barriers that exist due to the withdrawal of the work environmental affordances can threaten the problem-solving and innovation capabilities of the team.

4.2. Virtual meeting as a double-edged sword for team collaboration

Due to the withdrawal of workplace environmental affordances since COVID-19, knowledge workers no longer have a space for formal meetings and discussions. Organisations tried to mitigate the loss of environmental affordances with the implementation of

daily stand-ups or regular formal meetings afforded by video-conferencing platforms. Many teams have implemented daily stand-ups to check in on the well-being of their team members, and discuss the progress of tasks and the challenges they are facing: *“there’s 8 to 10 people. We do a daily check-in at 8:45 in the morning. The purpose of that meeting is just to get a gauge of how everyone’s feeling that day. On a scale of one to five, five being fantastic, one being very poorly. Any issues or challenges that you see in your work or personal day coming up”* (Garry). This is particularly important against the backdrop of COVID-19, as many employees are concerned about their own and their family and friends’ wellbeing. Further, some people live on their own, which can lead to feelings of isolation and loneliness. For many participants, the daily morning meeting symbolised the start of the workday and was important to feel part of the team. The daily stand-ups that many teams only implemented due to the forced withdrawal of the workplace environmental affordances improved the communication and coordination between team members as they now had to be very clear in their updates and with their task instructions. *“In a lot of ways, it’s more convenient. The other benefit of it is you’re forced to provide better instructions on what you want because you know that the person can’t just come back to you easily with a question, so you deliberately provide more detailed answers or instructions”* (Barry). Due to the social affordances offered by video-conferencing platforms, team leaders could better allocate work tasks to their team members without overloading or demanding too little from them. *“And they have noticed that they have nothing to do, or not enough to do. So, I’m basically now giving them more tasks or pushing my team member to give them also stuff. That was more like the side effect which I didn’t predict there.”* (Oliver).

For some people, the social affordances of video conferencing became too overwhelming, and many participants suffered from “virtual meetings-fatigue” as virtual meetings are far more attention-taxing than face-to-face meetings. *“There is a big issue with ‘Zoom-fatigue’, a lot bigger than face-to-face fatigue in meetings before”* (Terry). Holding too many virtual meetings can backfire as employees perceive them as too intrusive if they clash with their professional or private schedule. *“From a survey in our organisation, ca. 80 people, many people find that Zoom calls are intrusive. Before you would check someone’s schedule before calling, or put something in the calendar, but that has gone out the window completely. There is no etiquette for a virtual tap on the shoulder”* (Terry). The overwhelming amount of virtual meetings affects collaboration negatively, as people are exhausted and do not engage in communication and coordination outside of the virtual meetings which can affect task and project progress: *“All of a sudden, we have started to plan everything in*

as meetings, which means that I don't have a - single minute in my calendar where I can just call someone up, and if I do, that person will not reply" (Jacob).

The enforced working from home not only led to a shift from workplace environmental affordances to technological affordances, but also to a clash between the affordances offered by the home environment and the pursuing of team collaboration goals. The main problem during times of lockdown is that everyone faces different challenges. While people that live on their own crave for social contact, working parents and caregivers struggle with the number of online meetings. *"It drives me nuts. I think the thing is everyone is coping with this so differently. There's some people who don't see a single person in a day, and then there is me who is surrounded by people. it's different, because even the other people in the team with kids, they still want adult conversation, whereas I get enough adult conversation in my daily conversations with my team members"* (Rajani). Especially with working parents, we have seen a clash between home environmental affordances and work technological affordances which affect team collaboration. Parents need to keep their children occupied when they are working; however, if their children are playing loudly or scream in the background, parents cannot focus on the meeting or their work tasks. In contrast to normal working from home scenarios where children are in kindergarten or school, during the lockdown, almost all occupants of the household were in the shared work/home space, hindering a conducive working environment. Also, the actualisation of functional and social affordances of productivity software like the MS Office or Zoom in the home environment leads to a complete blurring of work-life boundaries and role conflict of working parents and caregivers.

4.3. Socialising and networking through virtual channels

Many companies have a social gathering once a week afforded by common areas, bars and restaurants. Due to the withdrawal of the environmental affordances that these physical spaces offer, the social affordances of collaboration software were increasingly perceived and actualised to afford these social networking events virtually. The new social affordances allow colleagues to get to know their team members from other affiliations: *"this has definitely removed some of the barriers between our offices in NZ, AUS and UK. We have a weekly social gathering on Friday afternoons, and this sometimes goes on for hours. I think the big difference from before is that people are already at home and don't need to worry about being late home from the office on a Friday"* (Terry). Social affordances also allow people to frequently connect with colleagues from other areas of the business and build social ties between the

employees: *"we now have a weekly quiz with staff from all offices, and these are people I would normally see once a year - at the Xmas function. Again, we could have done this before, but we never did."* (Henry).

Before the enforcement of working from home, remote e-workers often had difficulties integrating into the on-site teams and missed out on all social gatherings. Due to the actualisation of social affordances by all employees, remote workers are much better connected and integrated. The reason is that on-site workers became remote workers and cannot leverage the workplace environmental affordances anymore to discuss topics or socialise. *"We're speaking more frequently than we ever did before. Which I'm finding better just because I can communicate more regularly, and so I feel more connected than I ever did before when I used to go up once a month or once every two months. Now that everybody's doing it, and we've figured out ways to make it work, it's actually much more quality now, in my opinion, much more consistent"* (Wendy). Virtual social events can also be less conducive for communication and socialising, as without leveraging certain functionalities like breakout rooms, everyone has to listen to one person, and there is a lot of overtalking. *"It's weird because you have to wait for the other person to finish. In the office, we'd have like - I'm not saying we were divided and that we'd have our little mini-groups, and we switched around and all that. We're going through every conversation but here's it's one conversation in a way"* (Rajani).

We observed that teams leverage the social affordances of their collaboration platforms and social media much more, which allows them to get to know each other on a personal basis and improves their team bonding. *"I think it's allowing some people to show their true colours in terms of their sense of humour and the like as well. We're often exchanging gifs and emojis and funny videos and things that we necessarily wouldn't be sharing in the past before"* (Garry). Before COVID-19, some teams did not meet for coffee or any other social activities because it was not regarded as a value-adding activity. *"And at the end of a team meeting, you might have five minutes, but you never have that. Because people fear it's unprofessional. People fear it's not a value-added activity. That time that they have in the office is incredibly precious"* (Laura). Social affordances now allow teams to catch-up virtually and maintain or even foster their social relationships *"But the remaining have been incredibly caring of each other and we've seen that different level of bonding coming out."* (Laura).

5. Discussion and conclusion

Before COVID-19, workplace environmental affordances (Zammuto et al., 2007) and technological

affordances (Majchrzak & Markus, 2012) complementarily enable functional and effective team collaboration (Leonardi, 2013). Technological affordances at this time were largely actualised as supporting functional affordances to complete tasks or as social affordances to connect with remote e-workers and teams. Environmental affordances in the workplace facilitated a wide range of professional and social interactions. When enforced working from home was introduced, a shift in affordances was observed. The workplace environmental affordances were withdrawn, and more features of the technological affordances were perceived and actualised to maintain “business as normal”, including those professional and social interactions previously enabled by environmental affordances. In addition to affording previous task-orientated activities, technological affordances (Majchrzak & Markus, 2012) during the lockdown facilitate a wide range of activities for team collaborations such as, virtual team stand-ups, formal meetings, and after-work virtual drinks. Various communication platforms afford opportunities for team leaders and peers to regularly check on team members’ wellbeing and facilitate team bonding in this distressing time.

Due to the lockdown, the previous unequal social distributions between those who work in the office and home workers (Cooper & Kurland, 2002) no longer exists. Instead, the technological affordances enable equal opportunities of communications regardless of the physical proximity as well as a less hierarchical structure between the leader and team members for communication. The disappearing dichotomy between head office and home office addressed issues that used to be unfavourable for home workers such as, social and professional isolations (Cooper & Kurland, 2002) and fewer opportunities of career progressions (Tietze & Nadin, 2011). Technology affordances during the lockdown bring those previously “marginalised” home workers “socially” closer.

Since technology is the only channel to afford team collaboration, teams that follow the same communication pattern as pre-lockdown might experience difficulties. Although various potential technological affordances were perceived and actualised (Strong et al., 2014) for functional communications during the lockdown, the communication styles are required to adjust due to the constraints of technological affordances. For instance, the findings suggest that it is challenging to have group conversations when multiple people are talking at the same time, while during the virtual after-work drinks, it is impossible to mingle from group to group. These constraints press challenges of seamless communications and might result in less efficiency and negative emotions. Also, the findings suggest that although well-meaning colleagues want to make sure others are coping (Sewell &

Taskin, 2015) with the lockdown measures, some find that virtual meetings and check-ins are too frequent and unnecessary, affecting their wellbeing and productivity. COVID-19 has dramatically shifted affordances, thus requiring a new pattern of communications in terms of the frequency, length, and the style.

There is also a shift of affordances from the complementary relationship between environmental affordances and technological affordances in the office to a conflicting relationship between technological affordances and the environmental affordances at home. When the environmental affordances from work were withdrawn due to the lockdown, the home and workspace merged. Some environmental affordances from home need to be compromised to enable work activities, whilst domestic activities enabled by home environmental affordances would affect the productivity of team collaborations (Sheehy, 2008). Also, with enforced working from home, the environmental affordances are very much limited to the home environment, which has constraints in affording social interactions (with friends and families) or physical activities. These limitations affect the wellbeing of employees and indirectly affect the effectiveness and efficiency of teamwork. Differing from the previous working from home literature where remote e-workers have the autonomy to flexibly schedule their professional and domestic tasks (Gajendran & Harrison, 2007), the enforced working from home creates various challenges for many knowledge workers as they often share their new work-home environment with other members of their household that leads to various distractions. The hybridity of work technological affordances and domestic environmental affordances thus trigger issues of mental health, productivities, and work-life balance.

We synthesise the shift of affordances in Figure 1. To ensure the same team collaboration goals are still achieved during enforced working from home, the affordances largely shifted from workplace environmental affordances (affordance 1) to technological affordances (affordance 2). This shift comes with positive and negative effects on team collaboration. Also, during enforced working from home, the home affordances interfere with technological affordances and affect employees’ wellbeing and the quality of team collaboration.

5.1. Theoretical contributions

This study contributes to the affordance theory by providing an understanding of the substitution of affordances for team collaboration due to the enforced working from home requirements related to COVID-19. We explain that the increased perception and actualisation (Strong et al., 2014) of social affordances (Zheng & Yu, 2016) only took place due to the

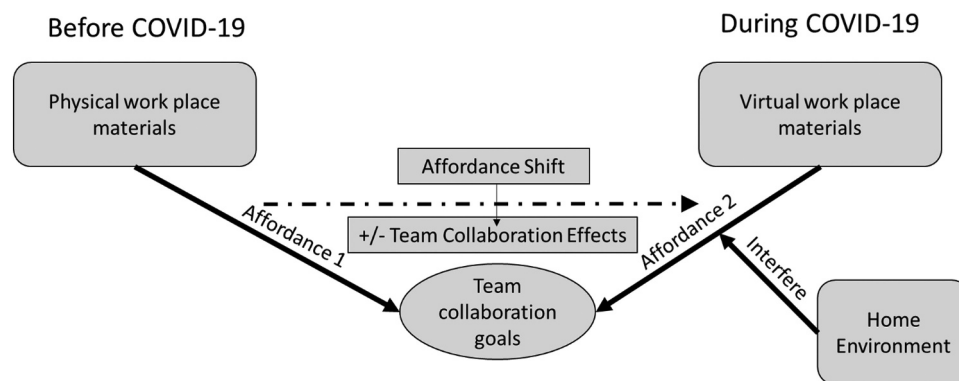


Figure 1. Affordance shifts and resulting team collaboration effects.

withdrawal of workplace environmental affordances due to COVID-19. The shifting of affordances results in positive and negative effects (Chemero, 2003) on team collaboration. The understandings of the withdrawal and shift of affordances (Cai et al., 2020) can be transferable in the context of mobilities, and crisis situations that associate with significant changes of affordances.

In addition to contributing to affordance theory, the affordance lens in this study also provides new understandings of remote work and team collaboration during the lockdown, as well as reflections and implications for the post-COVID-19 era. First, the focus of affordance shift in this study allows investigating how the changes and merges of working and living spaces lead to (re)negotiation and (re)arrangement of knowledge workers' working patterns and work-life balance, which potentially affects their well-being and productivity. Second, the affordance lens enables us to critically examine the functionalities of digital technologies during the lockdown and relational behavioural change in communication patterns. While actualised technological affordances enable team collaboration to continue in various innovate ways, these affordances also create barriers and constraints for the traditional ways of communication and coordination. Through the affordance lens, we can explain why and how teams adopted new ways of interacting to maintain their productivity and effectiveness. Issues such as, communication frequencies, flows and manners were reflexively adjusted to leverage the opportunities of the new affordances. Third, the affordance lens also allows us to explore why and how digital technologies during lockdown provide opportunities for inclusion of previously marginalised remote workers and how the actualisation of technology affordances offers more equal career and social opportunities. These benefits have implications for organisations to apply digital technologies better and pay more attention to remote workers in terms of career opportunities in the post-COVID-19 era.

The COVID-19 context in this study provides a unique picture of enforced and unprepared working

from home scenario that applied to all with restricted mobilities and social interactions with a focus on the organisational, behavioural, and societal impacts of the pandemic and information systems (Ågerfalk et al., 2020). This unique context contributes to a new understanding of remote e-working literature and not only offers empirical understandings of how knowledge workers adapt, negotiate and struggle with the sudden changes of the affordance shift, but also broadens the scope of the work from home literature beyond the voluntary nature. Many findings in the existing literature do not hold true in the idiosyncratic remote e-working conditions that knowledge workers are facing during the pandemic. The benefits of working from home in the existing remote e-working literature might not be applicable to the COVID-19 context. Our findings show that employees often have to work in home environments that may jeopardise the original benefits such as reduced distractions or increased productivity (Kelliher & Anderson, 2010; Mazzi, 1996) and affects team collaboration negatively. Further, a typical challenge of pre-COVID-19 remote workers was professional isolation (Cooper & Kurland, 2002). However, our data shows that all formal and social communications now take place through digital channels which allows pre-COVID-19 remote workers to be socially and professionally integrated.

5.2. Managerial implications

This study has several managerial implications that can facilitate new ways of working during and after COVID-19. First, it is crucial to ensure that business goals are achieved during the enforced working from home period. The pace and patterns of working before COVID-19 should be re-examined, and employee well-being and domestic situation should be considered when allocating team tasks and planning team communications. Second, post-COVID-19, businesses could evaluate how to change processes to keep the benefits arisen during COVID-19 such as increased productivity, reduced communication barriers, and integrated remote e-workers. Thirdly, businesses could evaluate

how instigating occasional working from home could maximise the benefits from office affordances and home affordances.

5.3. Limitations

A limitation of this research is that many participants were new to working from home or had only minimal experience before the enforced working from home due to COVID-19. For a more balanced study, future research can include participants from broader demographics and who have experience in working from home to understand better how affordances have changed. Further, our participants experienced various

degrees of lockdown so that the enforced working from home conditions are not uniform across the study.

5.4. Avenues for future research

We have witnessed this rapid adoption of digital technologies, especially of collaboration software in the team and organisational context that disrupted many industries. The pandemic could be the starting point of a new era for world-wide flexible working arrangements and digital team collaboration. Based on our findings, we have developed the following three streams of directions with specific research questions that future research could address in [Table 4](#).

Table 4. Future research agenda and potential research questions.

Agenda	Potential Research Questions
Theory of affordances in the during/post-COVID-19 world	
Affordance gains, withdrawals, and the merger of spaces in the context of mobilities, uncertainties and sudden changes.	<ul style="list-style-type: none"> • What are the detrimental and beneficial impacts of the affordance changes during COVID-19? • How are the restrictions of mobilities (during-COVID-19) or the gradual lifting of lockdown measures (post-COVID-19) associated with the shift in affordances and their impact on user behaviour? • What is the impact of conflicting or complementary technological and environmental affordances on the integration of remote e-workers in the post-COVID-19 era?
The potential shifting of affordances in the post-COVID-19 transformation and disaster recovery.	<ul style="list-style-type: none"> • If and how do the affordances regained after lockdown transform user experiences in the post-COVID-19 era? • How did the lockdown experience affect the perception and actualisation of environmental and technological affordances in the post-COVID-19 era? • How can affordances provide a theoretical lens in understanding post-COVID-19 crisis management?
(Re)arrangement, (re)construction and (re)negotiation of space and the associated home affordances due to COVID-19-related remote e-working.	<ul style="list-style-type: none"> • How does the merger of working and living space during COVID-19 affect productivity and wellbeing of employees? • How will the home and work environment be renegotiated and rearranged if flexible working arrangements are adopted in the post-COVID-19 era?
A new vision for team collaboration in the during/post-COVID-19 era	
Adoption of virtual or hybrid team collaboration in the post-COVID-19 era and the potential change in (social) team dynamics.	<ul style="list-style-type: none"> • How will newly formed virtual or hybrid teams negotiate and adopt new norms of team collaboration in the post-COVID-19 era? • How do social relationships between colleagues transform after the adoption of virtual or hybrid teams in the post-COVID-19 era?
Usage and potential of digital collaboration platforms in the post-COVID-19 era and the impact on communication effectiveness, knowledge sharing and decision-making.	<ul style="list-style-type: none"> • How will digital collaboration platforms lead to new practices of knowledge sharing in hybrid or virtual teams? • How has COVID-19 impacted communication effectiveness and team decision-making through digital collaboration platforms? • What are the organisational, behavioural, and societal impacts on collaboration through digital platforms in the post-COVID-19 era?
Comparison of efficiency and effectiveness of team collaboration between pre-COVID-19 and during COVID-19.	<ul style="list-style-type: none"> • If and how has work productivity and efficiency been affected during lockdown with the use of digital collaboration platforms? • How does the style, frequency and length of online communication affect the efficiency and effectiveness of team collaboration during COVID-19?
A broader research scope of remote e-working	
The process of adopting remote e-working in the post-COVID-19 era from an organisational perspective.	<ul style="list-style-type: none"> • What policies have been initiated and implemented, and how do they support or hamper remote e-working in the post-COVID-19 era? • How has organisational culture shifted and transformed towards the perceptions of remote e-working and flexible working? • How do organisations create value from information systems during COVID-19?
Working from home, labour division and possible inequalities between returned employees and remote e-workers in the post-COVID-19 era.	<ul style="list-style-type: none"> • How and why has remote e-working reinforced roles and gender division after the lockdown? • Will the marginalisation of remote e-workers reappear after COVID-19 lockdown and in which forms? • What are the experiences of returning employees back to the office after the lockdown is lifted?
Digital health, work-life balance and wellbeing during COVID-19, and its long-term impacts.	<ul style="list-style-type: none"> • What are the long-term impacts of COVID-19 on digital wellbeing? • How do the technology usage patterns during the lockdown affect the post-COVID-19 work-life balance?

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