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Remote, Mobile, and Blue-Collar: ICT-Enabled Job Crafting to Elevate Occupational Well-Being

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Abstract

Blue-collar remote and mobile workers (BC-RMWs) such as repair/installation engineers, delivery drivers, and construction workers, constitute a significant share of the workforce. They work away from a home or office work base at customer and remote work sites and are highly dependent on ICT for completing their work tasks. Low occupational well-being is a key concern regarding BC-RMWs. The objective of this research is to understand how BC-RMWs can use information and communication technology (ICT) to elevate their occupational well-being. Drawing from the job demands-job resources theoretical framework in occupational psychology, we theorize that the distinctive work characteristics faced by BC-RMWs can be viewed in the conceptual framing of job demands. We conceptualize BC-RMWs' practices of ICT use as possible ways to gather resources to tackle these demands. We conducted a study of 28 BC-RMWs employed in two private sector firms (telecom service provision and construction industries) in the UK across 14 remote work sites. Based on our findings, we developed the concept of ICT-enabled job crafting and theorized how ICT-enabled job crafting by BC-RMWs can help them increase their job resources to tackle their job demands and consequently increase their occupational well-being. The empirical context of the paper, i.e., the study of BC-RMWs, provides further novelty because these kinds of workers and their distinctive and interesting work conditions have not received much attention in the literature.

Keywords: Blue-Collar Remote and Mobile Work, ICT-Enabled Job Crafting, Occupational Well-Being, ICT Job Crafting Practices, Job Demands, Job Resources, Remote and Mobile Work, Grounded Theory, Post-Adoptive ICT Use

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1 Introduction and Motivation

Individuals can typically work from three places—the employer's premises (office), the home, and all other locations beyond the office and home. Those who spend the majority of their work time away from both the office and a home work base, and work at different locations are called *remote and mobile workers* (RMWs) (e.g., Crawford et al., 2011, Huuhtanen, 2005; Kurland & Bailey, 1999). An important but understudied subset of RMWs is blue-collar workers (Brodie & Perry, 2001). *Blue-collar remote and mobile workers* (BC-RMWs) are RMWs who execute a variety of physical jobs at different types of remote work sites or in their cars or vans (Hislop & Axtell, 2007). Such jobs include repairmen fixing office elevators, construction workers building roads or property, UPS delivery persons, insurance adjusters checking for home or car damage, technicians fixing broadband and phone connections, and so on.

BC-RMWs constitute an important and interesting segment to study. Sustained increase in the growth of

the service sector (e.g., telecom, construction, transport) over the last three decades has led to a significant increase in the number of employees whose work requires them to be spatially mobile (Felstead et al., 2005; Hislop & Axtell, 2007, 2009). In the UK, for example, the construction industry employs about 7%, and transport and communications about 9% of the workforce. In the US, about 3.5% of people work in the transport sector and about 2% as telecommunication installers and engineers. The number of truck and trailer drivers is expected to grow by 13%, while other categories for BC-RMW such as construction workers and landscaping and groundskeeping workers are expected to grow by 20% and 18%, respectively, creating over 700,000 new jobs.[1]

The work of BC-RMWs is service- and human intensive in that it requires interaction and coordination with clients and thus, unlike blue-collar manufacturing work, is less prone to automation. Indeed, such jobs are likely to be supported and augmented significantly by information and communication technologies (ICT) (Davenport & Kirby, 2016).

A distinct characteristic of BC-RMWs is low occupational well-being (Vartiainen & Hyrkkänen, 2010; Felstead et al., 2005; Crawford et al., 2011). Occupational well-being is described as employees' experience of the fulfillment of specific workplace-related conditions that include positive affect such as job satisfaction, positive job attitudes such as job engagement, positive performance attitudes such as job accomplishment, and meaningful social workplace relationships (Robertson & Cooper, 2011). BC-RMWs display indicators of low occupational well-being such as low job engagement, high job burnout, and poor job satisfaction (e.g., Leung et al., 2014). Low occupational well-being is thus an important workplace concern for BC-RMWs. Few studies have examined how this concern should be addressed. Further, previous research reports that BC-RMWs' efforts at tackling low occupational well-being have generally not been effective (Leung et al., 2012; 2016; Peterson & Zwerling, 1998).

Blue-collar remote and mobile work has salient characteristics. These include nonplanned work in the form of emergent and unexpected events and tasks, time constraints because of deadlines, and work tasks that are dependent on colleagues' tasks (Vartiainen & Hyrkkänen, 2010; Kakihara & Sørensen, 2004; Cattell et al., 2016; Brown & O'Hara, 2003) and require significant effort to tackle. Unplanned and unexpected events result in low latitude in terms of work timing since BC-RMWs must often respond to tasks as and when they occur—for example, BC-RMWs who perform deliveries or repairs. Very importantly though, the use of ICT is typically a primary enabler of BC-RMWs' work. BC-RMWs are highly reliant on ICT such as laptops, phones, and applications to access work-related information, communicate with colleagues and clients, and execute work tasks. Thus, the use of ICT is key both to accomplishing their work and improving their efficiency. Moreover, BC-RMWs use ICT in emergent and flexible ways in order to execute their tasks (Brown & O'Hara, 2003; Felstead et al., 2005).

The above discussion brings a few things together. BC-RMWs have low occupational well-being. Further, they face distinctive work conditions that impose significant demands on them. Moreover, BC-RMWs use ICT in flexible ways to do their work. This confluence of conditions suggests two things: First, addressing the demands created by their distinctive work conditions may be a way to tackle low occupational well-being. Second, BC-RMWs may use ICT in flexible ways and, in so doing, enhance their occupational well-being. Our research objective is thus to *understand how BC-RMWs use ICT to elevate their occupational well-being*.

Drawing from the job demands-job resources theoretical framework in occupational psychology (e.g., Bakker & Demerouti, 2017), we first theorize that the distinctive work characteristics faced by BC-RMWs can be viewed in the conceptual framing of job demands. We next conceptualize BC-RMWs' practices of ICT use as ways of enhancing job resources to tackle these demands. We conducted a qualitative research study of 28 BC-RMWs employed in two private-sector firms in the UK (in the telecom service provision and construction industries) across 14 remote work sites. We gathered 25 hours of data from interviews conducted with BC-RMWs. In analyzing this data, we found that: (1) BC-RMWs face job demands that impair their occupational well-being, (2) BC-RMWs need job resources to tackle these demands, (3) BC-RMWs using ICT for their core tasks engage in ICT use practices and have enhanced job resources and higher occupational well-being, and (4) BC-RMWs not using ICT in their core tasks have low occupational well-being. Theorizing from our findings, we introduce the concept of ICT-enabled job crafting to the IS literature, a theoretical concept that encapsulates how individuals can proactively shape the

[1] A number of reports support these observations. A few examples:
(a) https://www.bls.gov/oes/current/oes492022.Htm#(3);
(b) https://www.statista.com/topics/3797/construction-industry-in-the-uk/;
(c) https://www.ctp.org.uk/assets/x/53132;
(d) https://www.ethnicity-facts-figures.service.gov.uk/work-pay-and-benefits/employment/employment-by-sector/latest;
(e) https://www.brighthub.com/office/career-planning/articles/86776.aspx

task, relational, and cognitive aspects of their job through the use of ICT. Our theorizing explains how BC-RMWs engaged in ICT-enabled job crafting to increase job resources to meet the demands of their jobs and enhance their occupational well-being.

The paper contributes to IS discourse at the intersection of the use of ICT and occupational well-being (e.g., Tarafdar et al., 2019). We develop theorization for a positive role of ICT as an enabler of occupational well-being for BC-RMWs, in particular, but also for mobile and remote workers in general, thus extending the current literature, which has reported amply on the negative roles of ICT (e.g., Mazmanian et al., 2011; Barber & Santuzzi, 2011; Gajendran & Harrison, 2007). The empirical context of the paper—that is, the study of BC-RMWs—provides further novelty, as these kinds of workers and their distinctive work conditions have not received much attention in the literature. Moreover, in investigating the characteristics of work and the use of ICT by BC-RMWs, we strengthen and further the recent turn in the literature to consider the actual nature of work and what workers do (Barley & Kundra, 2012) in order to understand the relationship between work practices, work conditions, and use of ICT (Kellogg et al., 2012). Such consideration is necessary to understand how ICT use influences different kinds of present-day jobs—prominently among them the remote and mobile blue-collar jobs that we study.

2 Literature Review

Our study is broadly informed by two literature domains, namely, key aspects of the work of BC-RMWs and the use of ICT and workplace well-being for other types of remote workers (e.g., white-collar remote workers, gig economy workers, and IT professionals).

3 Blue-Collar Remote and Mobile Work

3.1.1 Work Conditions of Blue-Collar Remote and Mobile Workers

Remote and mobile workers work away from both the office and the home and include both white-collar and blue-collar workers. Examples of the former are professionals such as consultants and sales managers who work outside their homes and offices in places like clients' offices, hotels, trains, airplanes, and airport lounges and perform administrative and managerial functions in the office. However, they are not the focus of our study; rather, the focus of our study is blue-collar workers—in particular, blue-collar remote and mobile workers (BC-RMWs), who are variously described as nomadic, mobile, multilocational, or dispersed workers (Crawford et al., 2011; Huuhtanen, 2005; Jacobs, 2004; Kurland & Bailey, 1999) and who typically do shift work. They do not work from home and very rarely go to their employers' offices. Instead, they work from their cars/vans, at client's sites, or other sites that are remote from their employers' offices (Hislop & Axtell, 2007, 2009; Laurier, 2004; Lyons et al., 2007; Axtell et al., 2008). Examples of BC-RMWs include repair engineers, installation engineers, delivery drivers, and construction workers (Crawford et al., 2011). They are connected to their colleagues and employer's offices through various ICTs (e.g., smartphones, laptops, tablets, and associated applications and communication links), using them for task execution, work-related communication, and to access information remotely from multiple locations (Vartiainen & Hyrkkänen, 2010; Bailey & Kurland, 2002; Sullivan, 2003; Kleinrock, 1996).

Work conditions are aspects that reflect the nature of the work as it is situated in the workplace. BC-RMWs face a number of distinct work conditions. First, their work requires workers to be physically *mobile* in order to go from location to location to execute tasks at different sites (Vartiainen & Hyrkkänen, 2010; Kakihara & Sørensen, 2004). Second, their work is subject to *time constraints* because their tasks must be executed within strict deadlines (Cattell et al., 2016; Brown & O'Hara, 2003) or during clearly designated start and stop times (Hislop & Axtell, 2011). Third, their work offers little *latitude* to BC-RMWs to change those time constraints. Fourth, their work is *unpredictable*. For example, in the case of technical fault repair, there is a lack of predictability regarding what needs to be done and where, and what equipment and spares would be needed to complete tasks; further, workers may not have the information necessary to execute their work tasks (within the allotted time). Therefore, even though BC-RMWs may know their work situations broadly and approximately, they find it difficult to anticipate, on a given day, exactly what they will need to do and where and what resources they might require (Brown & O'Hara, 2003). Finally, BC-RMWs' work is *dependent* on their colleagues' work tasks (Cattell et al., 2016). For example, executing a technical fault repair at a particular site may require tracking the fault, getting repair equipment and/or spare parts from different locations to a central place, and, when necessary, liaising with colleagues, clients, or third-party suppliers. Thus, BC-RMWs need to communicate and collaborate with supervisors, colleagues (Lipnack & Stamps, 2000), and customers who may or may not be co-located. Hence, their employers may monitor their location and work progress so that they can be reached when needed. However, connectivity is sometimes a problem because of the remoteness of their work sites.

3.1.2 Low Occupational Well-Being of Blue-Collar Remote and Mobile Workers

Occupational well-being can be described as employees' positive experiences concerning their work. Aspects of occupational well-being include positive affect such as job satisfaction and a sense of purpose, job involvement/engagement, job-related growth and job accomplishment, affirming social workplace relationships, and positive psychological cognitions such as lack of stress (Sparks et al., 2001; Van Horn et al., 2004; Robertson & Cooper, 2011). Low occupational well-being is a consistent factor associated with blue-collar remote and mobile work (e.g., Leung et al., 2014). For example, BC-RMWs experience psychological work-related distress (Crawford et al., 2009)[2] in the form of high levels of anxiety and workload (Quinlan et al., 2001; Vartiainen & Hyrkkänen, 2010; Felstead et al., 2003, 2005). They face high levels of social isolation (Crawford et al., 2011; Felstead et al., 2005) because they often work individually at remote sites without communal and face-to-face interaction with colleagues and supervisors. They may further experience strain (Gatti et al., 2014), a sense of poor task accomplishment (Leung et al., 2016), increased turnover (Cooper & Dewe, 2008), and even accidents (Leung et al., 2012). Work conditions such as constant time pressures and dynamic tasks (e.g., Bowen et al., 2014; Pocock et al., 2007; Asquin et al., 2010; Mohr & Wolfram, 2010; Turner et al., 2008) may be associated with BC-RMWs' experience of low occupational well-being. Low occupational well-being is thus an important BC-RMW workplace concern. Sadly, there is a lack of understanding of how to effectively address this concern; studies have shown that BC-RMWs' efforts at tackling their low occupational well-being are largely ineffective (Leung et al., 2012, 2016; Peterson & Zwerling, 1998).

3.1.3 Use of ICT by Blue-Collar Remote and Mobile Workers

The use of various types of ICT—such as mobile phones, laptops, remote login applications, and chat or email applications—is an essential and ubiquitous aspect of BC-RMWs' work. Moreover, the use of such ICT is adaptable to the task at hand. For example, BC-RMWs might use their smartphones to do a number of things, including calling clients, instant-messaging colleagues to ask questions about a particular task, and inquiring about the availability of parts and equipment from their (remote) job locations. Broadly, BC-RMWs have flexibility in their use of ICT such as laptops, phones, and applications to execute their work (Brown & O'Hara, 2003; Felstead et al., 2005), which is in stark contrast to their low job latitude. Indeed, such flexibility of ICT use can have negative impacts. For example, service engineers have been known to use smartphones for social interactions during work hours, resulting in negative spillover between work and nonwork activities on the job, which may lead to potential work/nonwork conflicts and information overload (Hislop & Axtell, 2011). Or BC-RMWs may engage in dangerous multitasking by, for example, talking on their phone while driving (Laurier, 2004). Further, ICT-mediated communication can lead to potentially fatal misunderstandings, especially at work sites that involve the use of heavy machinery (Vartiainen & Hyrkkänen, 2010).

In summary, the literature suggests that BC-RMWs' work conditions are such that they require them to be on the move and execute tasks that are unpredictable and dynamic under constant time pressure and with low autonomy (e.g., Bowen et al., 2014; Pocock et al., 2007; Asquin et al., 2010; Mohr & Wolfram, 2010; Turner et al., 2008). Such conditions create difficulties that, if not dealt with effectively, can lead to low occupational well-being. However, BC-RMWs' flexible and adaptive use of ICT may be a possible means of tackling those conditions. The focus of our study is to develop a theoretical and empirical explanation of this possibility.

3.1.4 Use of ICT and the Workplace Well-Being of Other Mobile Workers

Given the relative dearth of BC-RMW studies, two additional literature strands helped us to further understand the context of our study. These include the use of ICT and well-being for (1) white-collar remote and mobile workers (WC-RMWs), and (2) workers doing gig-economy work.

3.1.5 White-Collar Remote and Mobile Workers' use of ICT and well-being

The use of ICT by WC-RMWs is associated with both negative and positive effects on occupational well-being. Negative effects stem from working outside regular work hours (most commonly, answering emails and filing reports) (Fenner & Renn 2010), dealing with work distractions and interruptions (Middleton & Cukier, 2006), and signaling professional presence (Sewell & Taskin 2015). These behaviors can result in increased exhaustion, work-family conflict (Duxbury et al., 1992; Hill et al., 1998; Mazmanian et al., 2013), stress (Fonner & Roloff, 2012; Gajendran & Harrison, 2007; Mazmanian et al., 2013; Raghuram & Wiesenfeld, 2004), and feeling

[2] Studies have shown that as high 65% of BC-RMWs may be subject to high levels of psychological distress

overly connected to others (Fonner & Roloff, 2012). WC-RMWs also experience burnout due to work interruptions from ICT and the need to respond urgently (Barber & Santuzzi, 2011; Park et al., 2011). Professional salespersons, for example, experience technostress and increased burnout and exhaustion because they find it difficult to deal with the expectations of constant availability and immediate response beyond regular hours, high levels of work-related communication, and information overload from the use of mobile email and CRM applications (Day, 2012; Tarafdar et al., 2015). Positive well-being effects associated with ICT use include increased organizational identification and connectedness (Fonner & Roloff, 2012), a sense of work-related accomplishment (Mazmanian et al., 2013; Middleton & Cukier, 2006), and flexibility and control with regard to the timing of work (i.e., work timing latitude), which are made possible through the use of ICT (Gajendran & Harrison, 2007; Hill et al., 2001). WC-RMWs generally have latitude in their work (i.e., task latitude) (Sardeshmukh et al., 2012) and are not closely monitored.

WC-RMWs face a number of paradoxes with respect to the effect of ICT on occupational well-being. For example, they tend to experience a connectivity paradox: ICT-enabled connectivity increases their sense of connectedness and organization identification but also leads to frequent interruptions that increase stress by making it hard to complete their work (Fonner & Roloff, 2012) In the autonomy paradox, mobile knowledge professionals such as consultants are often voluntarily constantly connected to work using mobile email devices, which, however, exposes them to work-life balance issues, stress associated with greater communication needs, and increased normalized expectations about their behaviors. However, rather than feeling frustrated or trapped, they report that this constant connectivity offers them greater capacity to perform more work and increases their sense of professional competence (Mazmanian et al., 2013). Such workers typically have latitude in the ICT they use, although there may be restrictions relating to equipment and software compatibility among team members.

A specific category of WC-RMWs is IS professionals who often work at distant client sites during the week. They typically need to work with the ICT available (or desired) at the client site. However, connectivity to the internet/Wi-Fi, cloud resources, and collaborative work tools typically do not present an issue. They face conditions such as constant learning, close client interactions, monitoring of their progress by the client, travel, system breakdown and maintenance demands, and career concerns (Igbaria, 1994; Lim & Teo, 1999). These workers are subject to work-family conflict, perceived work overload, limited task latitude, work timing latitude, and latitude in the choice of ICT—factors that contribute to work exhaustion. (Ahuja et al., 2007; Moore, 2000). They also have been found to experience the connectivity paradox to the extent that constant connectivity leads to a reduced sense of distance from professional colleagues but also contributes to work/family conflict (Leonardi et al., 2010). A serious organizational consequence is their high turnover rates, attributed distally to role ambiguity and, more proximally, to low job satisfaction (e.g., Igbaria & Shayo, 2004; Joseph et al., 2007).

3.1.6 Gig Economy Workers' Use of ICT and Occupational Well-Being

The gig economy consists of on-demand workers who are not officially employed by an organization but who work as independent freelancers or contractors and use ICT to do their work from their homes or other locations with good connectivity. More traditional gig workers are self-employed professionals such as freelance editors, illustrators, translators, and independent contractors who do technical work such as writing and software programming/coding. They work alone on a project- or hourly basis for various clients and use ICT (such as email) to communicate with them. Like WC-RMWs, these workers face both positive and negative effects on well-being due to their use of ICT. On the positive side, they have leeway in terms of work hours and work location and can flexibly interleave clients' needs with domestic commitments, for example. Typically, their clients cannot monitor their activities. On the negative side, they face constraints due to clients' needs because their work routines are determined by their portfolio of clients (Tremblay & Genin, 2010). Thus, they also often work irregular hours under pressure from clients' working patterns and deadlines, especially when work inflows are uncertain or insecure, which can thus cause asymmetry in their work-home balance. Compared to BC-RMWs, self-employed gig workers have more leeway in their hours and work but pay for this flexibility with irregular work hours and time off and work/family conflicts.

The current sharing economy has given rise to digitally mediated on-demand remote and mobile gig jobs that require workers to use digital platforms to find and execute these jobs. Examples include driving or delivering for an app-mediated taxi service or delivery service (e.g., Uber, Lyft, and Deliveroo). In this case, all aspects of the job (e.g., job allocation, job execution, job progress tracking) are mediated through the digital platform. The platform matches the work and workers, e.g., drivers and passengers. These gig workers also face both positive and negative effects vis-à-vis occupational well-being. On the positive side, they can choose their work hours and can also experience a sense of accomplishment when rewarded

for meeting system-set goals. On the negative side, they are tethered to the platform and all their task-related actions are tracked through the platform, implying constant surveillance. The tracked data are (often automatically) analyzed through algorithms to calculate performance and implement rewards, compensation, and retributions (Lee et al., 2015). Such automated calculations are so opaque that gig workers may not understand them nor have the time to figure them out. This lack of transparency creates information and power asymmetry between the worker and the platform organization (Rosenblat & Stark, 2016); while the company knows everything about the worker, the reverse is not true. Further, such workers have very limited options for questioning decisions. Support call centers are usually outsourced from distant countries such that support representatives lack contextual information about the worker's situation (Rosenblat & Stark, 2016). Without adequate knowledge about their jobs and without recourse to human interaction, gig economy workers may feel frustrated, confused, resentful, and dehumanized (Mohlmann & Zalmanson, 2017). They may experience role stress through role conflict and role ambiguity (Page et al., 2017) and even feel abandoned (Curchod et al., 2020). Being tracked, together with being evaluated and judged by each client, may have a negative psychological impact on for example, Uber drivers with low-performance ratings (Lee et al., 2015).

4 Literature Synthesis and Research Objective

We synthesize the literature on the use of ICT by remote mobile workers in Table 1. We present our synthesis in terms of work conditions, low and high occupational well-being, and job demands and job resources. The literature suggests that different types of remote and mobile workers face different job conditions in terms of a number of parameters, such as latitude in terms of tasks, timing, and ICT use, monitoring, and ease of connectivity. The literature further reports that for both WC-RMWs and gig workers, the use of ICT is associated with both high and low occupational well-being, although the type of well-being varies across worker categories. While most studies report these well-being effects separately for different instances of ICT use, some studies note that the same aspect of ICT use, for example, connectivity, can lead to both high and low occupational well-being. Emerging ideas (e.g., ter Hoeven et al., 2016) suggest that such a "paradoxical" effect can occur because the use of ICT is associated with both *job demands* and *job resources.*

Job demands refer to workplace requirements perceived by individuals as necessary to undertake their work tasks (Demerouti et al., 2001; Cattell et al., 2016). They include job aspects that require sustained physical, cognitive, or emotional effort and are therefore associated with physiological and psychological costs (Xanthopoulou et al., 2007). Examples include high work pressure, physically difficult work environments, time pressure, and emotionally difficult interactions with co-workers or clients (Xanthopoulou et al., 2007; Bakker & Demerouti, 2007). Job resources are those job aspects that help individuals achieve work tasks, often by enabling them to tackle job demands (Xanthopoulou et al., 2007), and include social support from colleagues (van der Doef & Maes, 1999), supervisory feedback (Lee & Ashforth, 1996; Hackman & Oldham, 1980), and job autonomy (Karasek, 1979). Job demands and job resources are both dependent on the specific organizational and professional context; together, they influence occupational well-being (Demerouti et al., 2001; Schaufeli & Bakker, 2004; De Lange et al., 2004; Xanthopoulou et al., 2007; ter Hoeven & van Zoonen, 2015; ter Hoeven et al., 2016). Some studies do not examine the interplay of job resources (e.g., autonomy, communication efficiency) and job demands (e.g., interruptions, unpredictability) vis-à-vis well-being (Ter Hoeven & van Zoonen, 2015), while others adopt a more nuanced stance. For example, when job demands such as workload and time pressure are high, and job resources such as job control and work autonomy are low, employees experience burnout, exhaustion, and absenteeism (Demerouti et al., 2001; Karasek, 1979). The presence of job resources can enable individual workers to tackle job demands; as such, the presence of job resources is associated with high engagement and job satisfaction (e.g., Bakker & Demerouti, 2007) and lower levels of exhaustion. Job resources can buffer the negative effects of job demands on well-being. For example, work autonomy and social support are important buffers of the effect of job demands on job burnout for home care workers (Xanthopoulou et al., 2007). Literature shows that when both job demands and job resources are high, occupational well-being is higher than when demands are high and resources are low (Bakker et al., 2005; Demerouti et al., 2001; Bakker & Demerouti, 2007). More specifically, the match between job demands and job resources is favorable for high occupational well-being because individuals are motivated to utilize resources to tackle the demands and, in so doing, accomplish positive work-related outcomes (Bakker & Demerouti 2007; van Emmerick et al., 2009; Schaufeli et al., 2009).

At the same time, the use of ICT can provide resources such as flexibility and control over work time and location. Low occupational well-being is present when the use of ICT is associated with different kinds of job demands, e.g., constant availability, urgent client response, and constant surveillance. High occupational well-being is observed when the use of ICT is associated with job resources such as flexibility over the timing, location, and choice of work.

Table 1. Use of ICT in Remote and Mobile Work

Type of remote and mobile worker and their work conditions	Job demands and job resources through ICT	Use of ICT associated with occupational well-being
White-collar remote and mobile worker—typically, consultants, sales professionals: high latitude in terms of tasks and work timing; moderate-high latitude with ICT use; low monitoring and ease of connectivity; long-standing client relationships, and ambitious work targets	*Job demands through ICT*: Signal presence, interruptions, constant availability, urgent response to clients, information overload, normalized expectations *Job resources through ICT*: Flexibility and control over work location and work timing	*Low well-being-related outcomes*: Work/family conflict, burnout, exhaustion, stress, technostress, lack of work engagement *High well-being-related outcomes*: Work capacity, professional competence, target achievement, connectedness, less isolation, organizational identification
White-collar remote and mobile worker—IS professionals: travel to and long stays at distant client sites, irregular work timings, constant dealing with system breakdowns; low latitude in terms of tasks, work timing, and ICT use; moderate monitoring; high ease of connectivity	*Job demands through ICT*: Constant learning, urgent response to clients, work overload *Job resources through ICT:* Flexibility (sometimes) over work timing	*Low well-being-related outcomes*: Work/family conflict, turnover, low job satisfaction, loss of control *High well-being-related outcomes*: Reduced sense of distance
Gig worker—self-employed professionals typically freelance editors, etc., and independent contractors: work on a project or hourly basis for various clients; work routines determined by clients; moderate-high task latitude; low latitude in terms of work timing; high latitude regarding ICT use and ease of connectivity; low monitoring	*Job demands through ICT*: Irregular work hours based on client needs *Job resources through ICT:* Flexibility and control over work location and number of work hours	*Low well-being-related outcomes*: Work/family conflict, new time constraints, delayed vacations *High well-being-related outcomes*: Flexibility in interleaving clients' needs with domestic commitments
Gig worker—performing digital platform mediated work, typically taxi driving and delivery: work delivered only through digital platforms with almost no human interaction, platform-worker information asymmetry; low latitude in terms of tasks and ICT use (must be platform); high latitude in work timing; low-moderate ease of connectivity; high monitoring	*Job demands through ICT*: Constant tracking and surveillance, opaque and confusing work instructions. *Job resources through ICT:* Flexibility over number of work hours	*Low well-being-related outcomes*: Role ambiguity and role conflict, frustration, confusion, and dehumanization *High well-being-related outcomes*: Sense of accomplishment when obtaining rewards for meeting system-set goals
Focus of our study		
Blue-collar remote and mobile worker—typically doing fault repair, equipment installation, construction: Work done at remote work sites such as repair vans, customer premises, and building sites. Low latitude in terms of tasks and work timing; High latitude in ICT use; Low ease of connectivity; High monitoring Low occupational well-being—anxiety, social isolation fatigue, sense of poor task accomplishment, high turnover, and accidents	Distinctive work conditions—unpredictable and emergent tasks, technically difficult tasks, tight deadlines - represent potential *Job demands* Flexibility and latitude in terms of the use of ICT such as laptops, phones, and applications—represent potential for *Job resources* to tackle job demands *Research Objective*: To understand how BC-RMWs use ICT to elevate occupational well-being	

Paradoxical effects are present when the same ICT is associated simultaneously with both job demands and job resources. For example, WC-RMWs experience the connectivity paradox because ICT increases connectivity and, at the same time, results in a loss of control over their time (Rennecker & Godwin, 2005). In the autonomy paradox, mobile email devices can increase work timing latitude and simultaneously increase the demand for urgent responses to clients (Mazmanian et al., 2013). IS professionals experience the connectivity paradox because they seemingly have greater work timing latitude yet suffer from a loss of work timing latitude by always needing to be available (Leonardi et al., 2010). A study by Evans et al. (2002) found that technical IT professionals became contractors to enhance their professional autonomy and temporal control but then found that they made little use of their flexibility, worked more (not less) hours, and created new time constraints for themselves.

The use of ICT by WC-RMWs and gig workers is associated with both job demands and job resources. For example, the need to be available through ICT may result in employees experiencing persistent temporal pressures that consequently lead to difficulties in dealing with competing demands on their time (Kellogg et al., 2006) or responding urgently to clients.

We draw from the above-discussed notions to suggest that BC-RMWs' distinct combination of job conditions represents job demands that create difficulties. For example, BC-RMWs have low task latitude because they are required to do specific tasks and have limited latitude over the time in which they must do their work. Further, their mobility, remoteness, and associated physical isolation limit social support from colleagues and often make it difficult to stay connected. Being away from an office base means that supervisors must rely on monitoring to know what BC-RMWs are doing and where they are. Unfortunately, supervisors are seldom able to provide adequate feedback. However, BC-RMWs' use of ICT is flexible and adaptable to the task at hand. This suggests that they could potentially use ICT as a means of gathering job resources to address their job demands and thus enhance their occupational well-being. We develop a theoretical and empirical explanation of how this can happen.

5 Research Methods

Given the nature of the research question, which asks how the use of ICT influences the occupational well-being of BC-RMWs, we adopted a qualitative research design. We employed a multistage Straussian grounded theory method (Strauss & Corbin, 1998; Corbin & Strauss, 1990; Corbin & Strauss, 2015). The grounded theory method (GTM) is appropriate for developing "theoretical explanations that reach beyond the known and offers new insights into a variety of experiences and phenomena" (Corbin & Strauss, 2015, p. 6). Straussian GTM was the GTM most often chosen by IS researchers (i.e., 81%) in a review of 43 articles by Wiesche et al. (2017). Through our application of the Straussian GTM approach, we sought to understand the job demands for remote and mobile work, the occupational well-being of BC-RMWs, and how these workers used ICT for work tasks.

Some grounded theory researchers argue that they should not conduct literature reviews at the start of their projects so that they can approach their GTM projects with a completely open mind. Others, however, argue that it is impossible for researchers to conduct GTM research with a completely blank slate (Urquhart & Fernandez, 2016). As noted above, we did conduct a literature review of ICT use and the occupational well-being of BC-RMWs. Our review of the occupational well-being literature also included the job demand and job resources literature to better understand the "paradoxical" use of ICT. Throughout our study, we attempted to maintain theoretical sensitivity.

5.1.1 Study Sites

We conducted our study in two private sector organizations in the UK: a construction company and a telecom company. The first company employs BC-RMWs to execute on-site construction, repair, and maintenance of structures such as buildings, roads, and pavement. The second employs BC-RMWs to maintain and repair on-site telecommunications equipment such as switches and routers. Both companies thus provided an excellent opportunity to study BC-RMWs who use ICTs in their jobs. The empirical data was collected from 14 employees in each firm for a total of 28 BC-RMWs. Every respondent was a remote and mobile worker who went from site to site to execute various tasks and/or worked on different sites. Their tasks included site engineering, site supervision, site contract management, and transport supervision (for BC-RMWs in the construction company), and field maintenance, field service, and repair engineering (for BC-RMWs in the telecom company). See Appendix A for details about our respondents. The unit of analysis was the individual worker.

5.1.2 Access, Data Collection, and Theoretical Saturation

In terms of access, BC-RMWs were contacted through the human resources (HR) department of their respective organizations. The first author met with HR department employees in each organization and explained the purpose of the study. The author was then referred by the HR department to the immediate supervisors of the BC-RMWs, who in turn connected them to the respective respondents.

Data was collected through interviews, conducted in person by the first author with each respondent at the respective BC-RMWs' work sites, covering 14 remote work sites in the UK. In setting up the interviews, the first author experienced a number of interesting challenges. Each worker was at a different location, and sometimes several locations, on a given day. Given the nature of the work, it was not always possible to predict these locations, even the day before. When a particular BC-RMW knew the day before where he was going to be the next day, the first author visited that site. If other BC-RMWs were scheduled to be at nearby sites, then she visited those as well. When it was not possible to know the site beforehand, the first author scheduled interviews in real time by phone and went to the respective sites. This process of scheduling and coordination was emergent, which gave the first author an initial sense of the work conditions that she would later hear the respondents discuss at length in their interviews. The geographical area of coverage was two adjacent counties, approximately 3800 square miles. Some remote sites had multiple respondents, at the time of the interviews.

Each interview lasted from 30 minutes to an hour. The interviewing stopped when the first author realized that she was hearing similar things in each successive interview and thus determined that theoretical saturation had been reached (Strauss & Corbin, 1998) and that further interviews would not enrich the emerging concepts.

Concepts from our literature survey of BC-RMWs' work—namely, their job demands, job resources, low occupational well-being, and practices of ICT use—informed our data collection. Accordingly, we asked open-ended questions pertaining to (1) the BC-RMWs' work conditions and work norms, (2) the resources they had, (3) how they used ICT at the workplace, and (4) situations in which they experienced high and low occupational well-being. The interview (questionnaire) schedule is presented in Appendix B.

The first author also made handwritten field notes for each interview. At the end of each day, she analyzed the field notes and iteratively compared them to those of the preceding days to assess similarities and differences. In this way, the collection of data and its initial analysis were virtually simultaneous and recursive at the time the interviews were conducted (Birks et al., 2013).

5.1.3 Coding

Each interview was recorded and transcribed, yielding 12-15 pages of text. The main coding took place in five passes (described in detail in Table C1, Appendix C) though, admittedly the passes are clearer in the telling than they were in the doing because of the highly iterative nature of the task. Memos (text and diagrams) were created to record, relate, and integrate the categories that emerged; we thus relied on analytical and theoretical memo-ing throughout data analysis (Birks et al., 2013). See Appendix D for examples of memos (texts and figures).

In the *first pass*, the first author coded the data in the tradition of the Straussian grounded theory method. This pass was iterative, as is characteristic of this method, and adopted the open and axial coding guidelines recommended by Corbin and Strauss (2015). The open coding was performed line by line. Open coding broke the data into manageable analytic pieces and delineated concepts to stand for meaning. From iterating this process, four main preliminary categories emerged: job demands, job resources, ICT use, and occupational well-being. We used axial coding to compare, reorganize, and place the data into subcategories. Each new element of text was tested for fit through constant comparison against existing subcategories. The constant comparison allowed us to combine the open and axial coding in integrated cycles such that we could understand the concepts as they emerged and relate them both to the job demands and resources literature and to the phenomenon that we were analyzing (i.e., how BC-RMWs' well-being was affected by the use of ICT). Job demand yielded six second-level subcategories, job resources four subcategories, ICT use six subcategories, and occupational well-being two subcategories.

In order to ensure theoretical sensitivity, the second pass was conducted considerably after the first. In the *second pass*, the second author coded the data using open and axial coding in the tradition of the Straussian grounded theory method. The second author was less familiar with the literature than the first author and thus entered the coding with even more of a blank slate than the first author. This pass was also highly iterative and involved open and axial coding. Six preliminary categories eventually emerged from the open coding in the second pass: job demands, job resources, the individual extent of ICT use on the job, ICT use practices, occupational well-being, and management practices in the two organizations that directly impacted BC-RMW jobs. Axial coding was used to compare, reorganize, and place the data into the subcategories, which were constantly compared and assessed against existing subcategories. Especially useful insights came from comparing across organizations and the individual level of ICT use in the jobs. We explored the initial relationships among the categories and subcategories. Job demand yielded five second-level subcategories, job resources four subcategories, the individual extent of ICT use on the job two subcategories, ICT use practices seven subcategories, occupational well-being two subcategories, and management practices two subcategories. For job demand, job resources, and ICT

use practices, the subcategories were similar in many cases to those of the first author but were not always the same.

It was not anticipated that the first and second coding passes done independently by the two authors would yield exactly the same categories or subcategories—and they did not! While the categories and subcategories were broadly similar, there were some differences. The *third pass* at the data was to develop the categories and subcategories that would be used in subsequent analysis. This was done by both authors who jointly compared and discussed the categories and subcategories, renamed them where necessary, and eliminated redundancies. See Table D1 in Appendix D, for code examples for the five main categories at the end of the third pass. See Tables D2a, D2b, D2c, D2d, and D2e and Figure D1 in Appendix D for code and memo examples that existed at the end of the third pass for the second-level categories (i.e., subcategories).

The prior passes did not explain how the use of ICT affected the work of the respondents. The *fourth* pass was thus initiated in which each second-level category of ICT use practices was examined using open and axial coding to analyze how the practice shaped the work of the BC-RMWs. Through this, we identified the central "core" category as *job crafting with ICT*. Urquhart (2001) notes that the core category may be a process and, in our case, this fit well with our research objective of understanding *how BC-RMWs use ICT to elevate occupational well-being*. We then initiated selective coding (Strauss & Corbin, 1998; Corbin & Strauss, 1990). This involved iteration among data and literature concepts, most notably the job crafting literature. We iterated among the data, codes, and literature to analyze the changing task, relational, and cognitive aspects of the job, which are key concepts in the job crafting literature (Wrzesniewski & Dutton, 2001). See Table D3 in Appendix D for codes relating to this pass. Our theoretical explanation was thus developed on the core concept of *job crafting with ICT*.

Job crafting is defined as individuals proactively changing particular aspects of their jobs, such as *workplace tasks* (e.g., number or content of tasks), *relationships* (e.g., nature and extent of contact with colleagues), or *cognitive aspects* (e.g., the knowledge component of the job), without necessarily involving their superiors or management (Wrzesniewski & Dutton, 2001; Oldham & Hackman, 2010). Viewed from the point of view of the job demands and job resources perspective, such changes can alter job demands and job resources. Thus, job crafting can be described as behaviors that alter the task, relational, and cognitive aspects of work in order to increase job resources and/or reduce job demands (Tims et al., 2012; Petrou et al., 2012). The significance of job crafting rests partly on the growth of the service sector, which has more flexible workflows, and also on the ubiquitous use of ICT in the workplace, which provides flexible ways to access information and communication. Given that both these factors are salient with regard to the focus of our study, we consider ICT-enabled job crafting as a potential means for BC-RMWs to increase their job resources and use the increased job resources to deal with their job demands.

The prior passes also did not link ICT use practices to BC-RMW occupational well-being. Thus, a three-step *fifth pass* was initiated in which each second-level code of high occupational well-being was examined to analyze how practices of ICT use responded to the job demands. In the first step, we employed open and axial coding to analyze the demands, resources, and ICT use practices present in each category of well-being enhancement. This involved iteration among the data and codes of these three categories as well as among the third-level subcategory codes of well-being enhancement. The second step used selective coding to link the categories and all key elements, as demonstrated in Table D4. What emerged was that the respondents were using their ICT use practices to change aspects of their job to increase the resources available to them, thus successfully tackling their job demands while consequently increasing their own occupational well-being. We added third-level subcategories to job resources. See Table D4 and Figure D2 in Appendix D for codes and memos relating to this pass. We also found that the subcategories of low occupational well-being were linked to the categories of job demands and non-ICT work practices.

6 Findings

We present our findings in five parts. First, we provide a description of the tasks involved with the BC-RMWs' jobs and the associated job demands. Then, we present the resources that BC-RMWs needed to do their jobs. Next, we describe technologies/applications they used in executing their jobs. Thereafter, we introduce the work practices that BC-RMWs RMWs who used ICT heavily in their core tasks developed to meet these job demands; we further examine their job resources and occupational well-being. Finally, we similarly examine the work practices and related outcomes for BC-RMWs who did not employ ICT in their core tasks. All names of individuals and sites are pseudonymized. We refer to the two companies as Telecom and Construction.

6.1.1 Tasks and Job Demands

The BC-RMW jobs had particular tasks. The BC-RMWs from the construction sector company were responsible for managing and working at remote construction sites. Specific tasks included scheduling and executing civil engineering jobs (e.g., digging,

roadworks, electrical installations, building), ordering and managing the inflow of construction materials, transferring resources (human and material) across work sites, coordinating with external organizations (e.g., vendors, civic authorities, utility companies), communicating with the remote office for project specifications and deadlines, and logging updates regarding project progress. Many worked at multiple construction sites. Those from the telecommunications sector company were responsible for the repair and maintenance of technical electronics and communications equipment (e.g., exchanges and switches) in an assigned geographical area covering two adjacent UK counties. Typical tasks included selecting which tasks to execute, logging task progress, ordering spare parts, repairing faults, and preparing and executing equipment maintenance schedules.

BC-RMWs in both companies faced the same distinctive job demands (i.e., traceability, responsiveness, knowledge work, boundary spanning, emergent work, and coordination). We describe them and provide illustrative text in Table C2 in Appendix C.

Traceability: BC-RMWs were required to be identifiable and traceable by location, even though they were mobile. Traceability was important for allocating tasks in different locations, contacting BC-RMWs when needed, and determining who was going to take care of which tasks as well as where and when they were going to be executed. Several respondents described the importance of traceability for job performance:

> *We need to know which other of our colleagues are where. Like today they rang me to say "we've got an important fault in [location A]." I said to them "well give Gordon a ring, because he's near that site and can get there before I can," because I happened to know where he was. But if I had not known if someone was in that area, then we could have missed that deadline*. (Henry, field engineer/supervisor, telecom)

> *If they [the van drivers] break down, they just have to ring up and say look I've broke down. If they're not sure of where they are, that's when I can go on there [the vehicle tracker] and say right, you're on such a street. I'll get somebody there*. (Joseph, transport supervisor, construction)

Another respondent discussed legal requirements associated with traceability:

> *Tachograph analysis is a legal requirement … it records what the drivers of vans are doing; records all their actions; makes sure they take a break after 2 hours of driving—i.e., a part of his job is monitoring the drivers so the tracking system records what they are doing; also dash cams in the vans and in the yard.* (Edward, transport supervisor, construction)

Responsiveness: BC-RMWs needed to respond to situations quickly and as they were occurring. Such situations usually related to breakdowns/faults that needed to be repaired immediately or tasks that needed to be completed quickly. This involved trade-offs among a potential set of many tasks that needed to be completed. Diverted attention to one task could have unintended negative consequences for many other tasks. One engineer said:

> *A lot of the jobs have a time target that we've got to try and hit. So, it's a judgment call all the way. If my boss asks, "Why didn't you do that job, because you went somewhere else and did another job, why did that one fail?" If I can say well that one's got a lot more customers potentially affected, or I know it's part of another problem.* (Ethan, equipment/maintenance engineer, telecom)

To meet overall deadlines, BC-RMWs had to be responsive to daily targets as well as emergencies:

> *We've got to hit certain targets on certain days otherwise we'll fall behind* (Jacob, site supervisor, construction)

Knowledge work: BC-RMWs required knowledge to perform tasks such as repair, troubleshooting, technical analyses, engineering, and client solution development. The problems were not necessarily familiar or easy and hence the solutions were not necessarily straightforward. As illustrated by these two quotes, knowledge work is important for both companies:

> *When I'm changing a router or a switch or hub, we have a big array of different leads and cords and things. So, quite a few times I've got to something I've never done before and I say we'll just fire it in, log into it and try this and that … they don't tell you what to do, it's just up to you*. (Samuel, equipment/maintenance engineer, telecom)

> *And I've got a fancy bit of kit called a [name of the kit] which is an instrument that uses coordinates from ordinance surveys to be able to plot those line and level. So, it is turning a drawing, as you see on the hanger there, into the real thing [on the ground]. So, I get given the drawing, which is obviously you know massive. I provide the line for the new curb line, the drainage that's to go in.* (Harry, civil engineer, construction)

Boundary spanning: BC-RMWs were often required to interface frequently with customers, vendors,

subcontractors, design teams, and the public. They needed to devise solutions with customers and third-party contractors. They also needed to be in contact with vendors to know, for example, if spare parts are available. Two respondents said:

> *Yeah, there's been the occasion where the client has had a deadline for information they wanted and left it very late to ask for that information and it's meant quite a lot of [last minute] work involved producing documentation for the [client] meeting*. (Archie, site contract supervisor, telecom)

> *On the job I'm on at the moment I'm doing a bridge, so a lot of the information I've got is from [the] external structural engineer*. (Leo, site supervisor, construction)

Emergent work: BC-RMWs faced unexpected situations that could not be predicted beforehand. This unpredictability could be for many possible reasons: a task at a remote site was more complicated and difficult than anticipated, all material needed to complete a task was not available due to delivery delays, or a task such as a fault repair requirement came up unexpectedly. One engineer described his work in this way:

> *I'm generally reactive work so most of my day I'm reacting to faults and going and doing it*. (Samuel, equipment/maintenance engineer, telecom)

Another engineer elaborated:

> *We might have cables laid out or anything and then somebody rings you and then you're under instant pressure because you can't just walk off and leave cables trailing across the floor; you've got to tidy it all up before you run off somewhere so then it puts a bit of pressure onto you*. (Arthur, equipment/build engineer, telecom)

Frequent changes at the remote work sites, necessitated by situations such as materials not delivered and subcontractors not showing up as planned also created this job demand, as illustrated by this quote:

> *The plan at the weekly meeting will be we're doing A, B, and C. A could be build a wall, B could be clad a wall, C could be doing some drainage. You turn up and obviously you've planned but then you find the pipes haven't arrived and you don't know where they are and someone has not turned up and you don't know why*. (Theo, site supervisor, construction)

Coordination: BC-RMWs needed to coordinate different factors to complete a task. For example, the delivery of materials, labor, and transportation needed to be carefully coordinated. One site worker said:

> *Now I've got all the materials, but the rubble and soil have to be shifted. My biggest hindrance is not having enough wagon time. I need a wagon constantly, and unfortunately that is been split between jobs. So, if I can't get the rubble off-site then I've got people standing around doing nothing*. (Charlie, site worker, construction)

Information regarding all the factors needed to come together in order for the task to be completed, but that information was not always available. According to one equipment/build engineer:

> *We'll get a job, and the job has a due date. And that is for the entire job, whether it's what we can do or whether it's a mix of all the other stuff behind it as well. So, for me to get that job done by the due date, everything else has to be right. A few things get delivered to [Store X]. Then on Monday, I'm going down to [City A] to meet the courier who's bringing a selection of parts from [Vendor name] because they come direct from [the vendor] and we have to arrange with a courier to get them and then test them all and everything*. (Thomas, equipment/build engineer, telecom)

6.1.2 Job Demands and Low Occupational Well-Being

BC-RMWs' experienced low occupational well-being regarding their job demands, as illustrated in the quotes below. For instance, they reported experiencing pressure and feeling inadequate in their job performance when they could not tackle emergent tasks.

> *Yeah. It's a problem with that. Yeah. Just interruptions. Yeah. And you could have your day planned out, not necessarily in the one building in the day, you'd pick a few jobs that are pretty central in one patch and your phone could ring and they might want you to go somewhere else which is not what you've planned for that day. And then you might have trouble reaching, hitting your targets for the dates that those customers want those jobs finished*. (Mason, equipment/build engineer, telecom)

The traceability job demand was associated with stress and annoyance because it put pressure on the BC-RMWs and prevented them from doing their job effectively:

> *There's of course stress because you're… it does cause stress because in the back of*

> *your head it's like Big Brother looking down on you all the time, they know exactly where you are every minute of the day. It's trackers in the vans and they can tell from this where it is.* (Mason, equipment/build engineer, telecom)

The responsiveness job demand was accompanied by anxiety, poor sleep, and burn-out/poor health:

> *Yes, especially because I am on call. I'm on standby one day in every six; for that day I'm on edge because I know that can go off or my house phone can go off at any time during that 24-hour period. Well, I don't know, not being able to sleep, waking up, sat there wondering what's coming because you never know. That's about it really, deal with it. Getting on with it, because you have to, it's your job.* (Robert, power/maintenance engineer, telecom)

BC-RMWs being responsive in meeting time deadlines also created stress, as evidenced by these comments:

> *But my job, on the whole, is quite, it's quite stressful at times … because you're under pressure to get things done at certain times and so you're rushing and you've got to still make sure the work is to a high standard, especially in the town centers.* (Theo, site supervisor, construction)

Job resources needed by BC-RMWs: Given the nature of their work, BC-RMWs needed a number of job resources (i.e., job latitude, social support, time control, cognitive resources) to do their work. Our participants referred to their tasks as "jobs," in the industry parlance; job latitude is thus the same as task latitude. We describe these job resources below and provide definitions and illustrative text in Table C3 in Appendix C.

Job latitude: Many tasks were emergent; they had to be completed as they came along. They required different technical skills. BC-RMWs needed job latitude in deciding which ones they could effectively accomplish and what they needed to do to accomplish them.

> *We don't have absolute power, obviously there's faults and things come in and sometimes you'll be thinking it's getting towards the end of day, I'll be wanting to go home shortly and then a fault will … a high priority fault will drop in that's miles in the opposite direction, and you're the nearest man and you don't really want to go but you think "I've got to. It's not going to get fixed otherwise."* (Henry, field engineer/supervisor, telecom)

In the following example, the respondent did not have the latitude to order material from an alternate supplier because it would cost more, which means that he was unable to attend to an emergent task.

> *Well, they'll say go to Burdens but Burdens are in Manchester [2-3 hours to get back]. Now Travis Perkins is only 10 minutes down the road and [if we get it from them] he's carrying on doing whatever he does [the task at hand without delay]. So, we say it's not cost productive [to go to Manchester]. However, the management will say well it is because you've got to keep to these bulk order areas [they are cheaper].* (Leo, site supervisor, construction)

Social support: BC-RMWs worked in far-flung locations, were often socially isolated, and were subject to potential physical danger. There were times when one or more of them were working at the same site; however, most of the time they worked by themselves. Thus, they needed social support.

> *No, I wouldn't see anybody. I've seen nobody today. Isolating as well, completely isolating. Even when you're ill, it's isolating. You don't speak to anybody, you ring a number with an option. So, like, option one is [the] flu, option two is a headache, option three is a bad back.* (William, maintenance engineer, telecom)

In the following example, the respondent talks about carrying devices that would alert safety authorities in case workers isolated at remote sites were in trouble:

> *We have a call-out system, there's like five of us. So, we do a week each. So, any emergency or the public need to ring up they'll ring the emergency number if there's a call-out or traffic lights are down or something like that, we'll get called out and we go. We carry a thing, it's a lone working device which we attach to a belt or whatever. If you get like attacked by anyone or you fall over, it sends an alarm off and they can then send emergency services out to you.* (Charlie, site worker, traffic, construction)

Time control: BC-RMWs had limited time for job completion for several reasons: because of service level targets, because other jobs were waiting for the particular job to be completed, or because too many jobs might have come in. Thus, they needed time control to effectively juggle and complete the different jobs on time, as illustrated by the following.

> *We do have periods where … there'll be loads and loads of faults and when you look on in the morning you can see that some of them are going to fail because you*

> *physically can't get around in time so, yeah … I can feel a little overwhelmed at that point, I feel like whatever I do I'm still not quite going to get everything fixed*. (Samuel, equipment/maintenance engineer, telecom)

> *I'm on this right job now [on the remote site] and I've found that some of the drawings aren't right. I think some of them are in the wrong order or for a different job. I've been given the wrong drawing [from the office], I'm going to have to request a different one [and wait for it before I can get on with the job]*. (Noah, site supervisor, construction)

Cognitive resources: BC-RMWs needed technical qualifications, knowledge, skills, and training to do their work. In other words, they needed cognitive resources. The example below illustrates the cognitive resources the respondent needed to do his job.

> *You need to be skilled. I was a qualified electrician before I joined [company name] but your average electrician couldn't do this job because are working with generators and DC power systems, a lot of specialized equipment that your bog standard electrical engineer wouldn't deal with. We're also qualified refrigeration engineers because of the cooling equipment to keep the exchange temperatures down … So, there's refrigeration systems we need to deal with, generator systems, DC power systems, a huge amount of different equipment. It's quite a skilled job.* (Ethan, equipment/maintenance engineer, telecom)

> *I mean my background originally is not very academic, from school, so it's all been a learning curve. My background is I was a mechanic and I worked here as a mechanic and then I worked my way up. So, everything's been a learning curve. So, anything that I use, in my eyes, it's beneficial to me*. (Edward, transport supervisor, construction)

6.1.3 Devices and Applications Supporting Core Tasks

The BC-RMWs in the telecom company were all heavy users of ICT for their core tasks. They typically carried at least two work-related mobile devices: a laptop and a work smartphone. Some had an additional, personal smartphone. Two types of applications were loaded on the work-related devices. The first type were applications used to execute their work—for example, to select specific tasks, confirm the progress or nonprogress of jobs, log in at current locations, log in remotely into technical equipment, order spare parts, download/upload technical documents, and coordinate with the head office or external organizations such as vendors. The second type were communication-related applications such as email, Skype, and messaging apps, which were used to convey urgent and emergent information (to clients, office colleagues, and BC-RMW colleagues).

Many BC-RMWs in the construction company typically did not use ICT for their construction-related core tasks. The company's management strongly advised employees not to use smartphones at construction sites because of potential safety concerns; consequently, smartphone use at the construction sites was greatly limited. Further, as noted by one respondent (George, assistant civil engineer, construction): the "construction industry is sort of catching up with using technology." Several interviewees noted that they wanted to learn more about applications that they could employ in their construction-related tasks. Eight respondents had low levels of ICT use for core tasks, indicating that they seldom if ever used computers for such tasks—for example, one engineer (Harry, civil engineer, construction) said: "We don't really use the technology, to be honest." Several site supervisors mentioned that it was hard to use computers on-site because of the lack of connectivity. Six construction respondents, however, had high levels of ICT use for core tasks. Indeed, some used ICT in the same construction-related tasks that their eight colleagues did not. For example, one site supervisor tethered his laptop off his phone for worksite connectivity to write his site reports, while four other site supervisors were low-level users of ICT for their core tasks who had to return to their offices to complete their reports. Another civil engineer downloaded a free CAD program on his phone to view construction drawings on-site so he did not have to walk back to the site cabin every time he wanted to view them. Others used project management applications (e.g., Microsoft Project) to track their work. Whether or not they used ICT for their core construction-related tasks, all BC-RMWs in the construction company used applications such as email for general communication and administration tasks.

6.1.4 BC-RMWs with a High Level of ICT Use in Their Core Tasks

BC-RMWs with a high level of ICT use in their core tasks engaged in particular ICT use practices. They also had high levels of job resources and experienced high occupational well-being. We present illustrative findings below and the details in Table 2 and in Table C4 in Appendix C.

6.1.5 ICT Use Practices

In order to meet the job demands described above, the BC-RMWs who used ICT in their core tasks engaged in *ICT use practices*. These practices changed different aspects of their job, notably the tasks they did, their

relationships with co-workers, and the knowledge component of their work. We describe them below and highlight with bolded italics how they were used to meet job demands. We provide definitions and illustrative text for each practice in Table C4.

Self-selecting tasks: BC-RMWs used ICT to self-select their own jobs, thus exercising discretion over what tasks they did. They did this by logging into an application, looking up the different tasks that were required to be done, and selecting those that they would do. One engineer said:

> *We've got like a work stack and we have to self-allocate our own work. Each job will have a job pack on it, so we've got an application to access the job pack to see what there is to do and we download the job pack and then if there's any problems there will be a planner's name on it who has planned the job and you get in contact with them. So, it's all basically down to us just using the laptop and the links to everything*. (Arthur, equipment/build engineer, telecom)

This practice altered the ***task aspects*** of the BC-RMWs' work because it helped them choose their tasks. The practice was also related to the ***cognitive aspects*** because the BC-RMWs could select only those tasks for which they possessed the requisite skills and knowledge. It was associated with the job demands of coordination, emergent work, and traceability. Consider how the following engineer responds to the job demand of emergent work in an area where he does not usually work by working with colleagues to self-select tasks:

> *So, I've been put with the Cumbria staff but going back to what I said before we have the flexibility to use our common sense and go where we need to go. So, at the moment we're physically in the Lancashire patch so I signed on this morning and there wasn't any … I think my nearest high-ish priority fault was up in Kendal which is, you know, a lot of driving for me and there's people further north who are in today. So, I generally don't bother, if it's further north than Lancaster I don't normally look too closely at it unless somebody says, "Dave there's nobody in the rest of Cumbria today can you keep a closer eye on the stuff further north," in which case I will.* (Henry, field engineer/supervisor, telecom)

Self-prioritizing tasks: BC-RMWs used ICT to dynamically prioritize their jobs. Many BC-RMWs allocated time windows to check for task requests and prioritized them accordingly.

> *Once you're on-site and you're organizing you're really busy. If it's something urgent that is brought to your attention [by email or text], if not then I don't see any reason why it can't wait till later on in the day.* (George, assistant civil engineer, construction)

This practice shaped the ***task aspects*** of the BC-RMWs' work because it helped them choose the order of execution of their tasks. It was related to the job demands of coordination and emergent work and responsiveness. For example, it was associated with the job demand of responsiveness because it ensured that the most pressing jobs were executed as soon as possible.

> *Yeah, it's helping me be able to prioritize which is the most important work to be carried on. I have too much work but the technology itself does help find out what is the most important issue at the time to be dealt with. Sometimes I have too many issues so you just have to prioritize.* (Ethan, equipment maintenance/repair/power engineer, telecom)

Demarcating devices: BC-RMWs received task-related information on different devices (e.g., laptop, work smartphone, personal smartphone). Each device had different applications that needed to be accessed for completing work tasks such as remote equipment login applications, communication applications (e.g., email, Skype, and Slack) as well as task workflow management applications. The potential danger was not being able to access the devices and applications when required, which given the time pressures, could lead to delays. BC-RMWs worked out device demarcation strategies such that they knew what device and application they would use for what task, depending on what information they wanted to access and how. One respondent said:

> *I always pick up my emails on my phone and then if it's a short email I'll just use my phone to write back but if it's a longer email or I need to sort of get information from the laptop, i.e., drawings or quotations and stuff I'll go onto my laptop and use that*. (Leo, site supervisor, construction)

They also worked out timing strategies for which application to respond to when. For example, many did not have their work email application on their smartphone because they did not think it was helpful to answer email while they were mobile and working on their tasks. They preferred to be contacted through voice calls or instant messaging if something was urgent. Thus, they had voice and instant messaging applications on their phones and their email application on their laptop. They would respond to the former while on the move and the latter at planned times during the day. One engineer said:

> *If we use the Skype, you can actually see if people are online so you might instant message them or if you wanted to talk you can see they are there so you would ring off your mobile or send them and IM to say, "can you talk?" especially if you want an instant answer to it really because with emails not everybody gets back straight away.* (Arthur, equipment/build engineer, telecom)

This practice shaped the ***task aspect*** of the BC-RMWs' work because it helped them decide whether or not to interrupt their work. It also affected the ***relational aspects*** of the BC-RMWs' work by influencing when and how they interacted with colleagues, such as in this case:

> *We don't have a lot of manuals and stuff but ringing people up if I'm stuck with something. I know that I can see who's online. I can ring them up or I can just call them. Yeah, that is useful because it's that support network, isn't it?* (Samuel, equipment maintenance/switching transmission engineer, telecom)

This practice was related to the job demands of coordination, emergent work, traceability, and responsiveness. For example, the quote above from Arthur demonstrates how using Skype supports the job demand of traceability because it can help him know where a colleague is. At the same time, it allows a more immediate response than email would, supporting the job demand of responsiveness.

Using ICT for self-training: Given that they faced complex technical tasks, BC-RMWs used ICT to find solutions to technical problems, for example, by accessing digital manuals of equipment and past project solutions. One engineer said,

> *It stretches you; it pushes you or whatever* [then as an example] *Quite a few times I've got to something I've never done before and I say, we'll just fire it in, log into it, and do this. Then you have to, they don't tell you what to do, it's just up to you to do that.* (Samuel, equipment maintenance/switching transmission engineer, telecom)

This practice shaped the ***cognitive aspects*** of the BC-RMWs' work because it helped them gather the expertise they needed to do their work. Thus, it was related to the job demand of knowledge work.

Seeking technical support: BC-RMWs used ICT to give and receive technical support to and from colleagues. This was critical for sharing experiential knowledge about specific equipment or technical tasks since there were many technical problems for which the standard technical manuals did not have solutions and it was quicker to ask colleagues who might have solved similar problems before. Technical support personnel could also be contacted for help:

> *But if, for power engineers, if we had a problem, like a major problem there's always power-tech support who are higher than us, so they'd have the information to hand. They are very clued up on how everything works and if they don't know they'll find out for you and if they need to, they will come down to [the] site and show you or walk through the fault with you, so it's good to have them. They are on call as well so if you had a major problem, you could always phone one of them.* (Robert, power/maintenance engineer, telecom)

This practice shaped the ***cognitive aspects*** of the BC-RMWs' work because it helped them pool the expertise they needed to do their work. It was related to the job demands of knowledge work and responsiveness.

Seeking social support: Given the potential for social isolation inherent to their jobs, BC-RMWs used ICT to give and receive social support to and from their colleagues, maintaining social conversations and contact. One engineer noted how he and his colleagues would ask for help from others in his "close-knit" group for help in solving technical problems:

> *We tend to be quite close-knit. We talk to each other and if we have any problems. We'll speak to each other … it's never an email. It will maybe start off as an email but always ends up with a conversation over the phone.* (Dylan, equipment/maintenance engineer, telecom)

This practice shaped the ***relational aspects*** of the BC-RMWs' work because it influenced their social interactions with colleagues. It was related to the job demands of coordination, traceability, and knowledge work.

Recording information processing trails: BC-RMWs used ICT to create and record communication trails, which despite their mobility and task unpredictability, allowed them to log information that was key to a task. Engineers, for example, logged their workflow steps on an application with notes about what went wrong or right. In general, they used a location tracker application to track their colleagues, a task tracker to understand whether they were stationary or mobile, and ICT devices and applications as per their demarcation strategy to contact them. Another way to create visible records of communication was to create email communication records, especially with clients and suppliers. These communications were important for executing tasks and maintaining important social relationships. One site supervisor said:

> *I'll speak to them [clients] on the phone first, rather than initially writing a massive email. I'll explain the situation, maybe they have a solution on the phone. If they have a solution*

> *I'll say: Right, well can you put that in an email so I've got proof that we've tackled whatever the issue was*. (Leo, site supervisor, construction)

This practice shaped the ***task, cognitive,*** and ***relational aspects*** of the BC-RMWs' work. The first, because it was another task they had to do and because it provided the information necessary for other tasks. The second, because the record could then serve as a collectively pooled cognitive resource that could be referenced later by anyone when a similar situation arose. The third, because it influenced how they interacted with colleagues (internally) and customers/suppliers (externally). The quote by Leo illustrates a common use of email to address the emergent nature of the work by creating documentation trails as a record. The practice was used to respond to the job demand of responsiveness and coordination.

6.1.6 Greater Job Resources and Higher Occupational Well-Being

Our findings indicate that BC-RMWs who engaged in ICT use practices had higher job resources than those who did not. They also experienced higher well-being. We provide illustrations below and summarize them in Table D4.

Those who used ICT to *self-select tasks* derived added time control and job latitude. The example below illustrates that Henry, who self-selected his tasks, experienced higher job latitude and higher occupational well-being (greater satisfaction at work):

> *They've decided that it's a lot better to let us pick, trust us to pick the right jobs and it seems to work a heck of a lot better. It's certainly a lot more pleasurable to do it that way. I feel pretty positive about it. Generally speaking, most of the time we have the power to do what we want and make the right judgment calls and that is really good … I class that as a really good thing. Most days it's pretty good to come to work.* (Henry, field engineer/supervisor, telecom)

Another respondent who reported *self-prioritizing tasks* also had greater time control and job latitude and experienced higher occupational well-being (was able to execute the most important tasks):

> *Yeah, it's helping me be able to prioritize which is the most important work to be carried on. I have too much work but the technology itself does help find out what is the most important issue at the time to be dealt with.* (Ethan, equipment maintenance/repair/power engineer, telecom)

Those who *demarcated devices* had more social support, job latitude, and time control. Demarcating devices helped BC-RMWs communicate more quickly and effectively if the BC-RMWs knew their co-worker's demarcation preferences. One engineer described how he was able to gain more control over his time:

> *If you wanted something urgently, with Skype, you can actually see if people are online so you might instant message them to say, "can you talk?" and then you would ring their mobile. Because with emails not everybody gets back straight away. Or you could IM [instant message] their phone to say "can you talk?" and then call, especially if you want an instant answer because with emails not everybody gets back straight away*. (Mason, equipment/build engineer, telecom)

Those who engaged in device demarcation also experienced higher levels of well-being (lower stress). As one field engineer said:

> *In our job, people are driving a lot of the time and, obviously, you're not supposed to phone anybody up while we're driving. If I know somebody's likely to be driving, I won't phone them but if their Skype is up on their laptop then I know that they're not driving, they're with the laptop somewhere so I can [call them]. It saves me from the stress of bothering them when they are driving.* (Henry, field engineer/supervisor, telecom)

Those *using ICT to seek social support* experienced greater emotional and social support from colleagues. For example, we illustrate below that one engineer who worked at an isolated and remote work site used ICT for social support. He also reported experiencing higher occupational well-being (his confidence increased and he was excited about his work).

> *So, having that [social lifeline] help has been essential to me getting where I am today. Being more confident with working on it; not phoning people all the time. But, at the time when I first came on, I needed that help and support so it's good to have it, brilliant to have it. But it is difficult when you know that the closest person is forty miles away and they've got to come over the lakes over the water. It's just, yes, good to have it, though.* (Robert, power/maintenance engineer, telecom).

Those *using ICT for self-training* had greater individual cognitive resources. One engineer who engaged in ICT use for self-training described having more individual cognitive resources:

> *Phew! Similar sort of thing is the piece of equipment we've got in here, that we put in. We did quite a few around the area but it was like five years ago. Last October one came in, to be put in in Lancaster and you're just expected to*

> *do it. Well, you haven't done it for five years [laughs]. Everything has changed, none of the links that you have got work anymore, everything is changed around. And so, you have to start delving into it and solve your problems.* (Mason, equipment/build engineer, telecom)

He further went on to say that self-training "makes life more interesting" because it is a challenge, suggesting higher positive well-being.

Those *using ICT to seek technical support* indicated that they drew on one another's expertise. In addition to their own individual cognitive resources, they had access to their collective pooled cognitive resources. They also experienced higher well-being:

> *If I have a piece of equipment and I'm not sure or want some advice from a colleague I take a photograph, email it to them, or do a Skype video call and say, "have a look at this, what do you think" for a second opinion. The technology makes life a lot easier.* (Ethan, equipment/maintenance engineer, telecom)

BC-RMWs who engaged in the practice of *using ICT to record information processing trails* could control their time better and had access to collectively pooled cognitive resources. They also experienced higher occupational well-being (less worry). As one site supervisor said:

> *I think it takes time to write but by writing them everything is there and you are able to go oh yeah A, B, C that was there, that was there. It eventually saves time. We shut down a site the other week because there was an issue with a pothole that had been left because some work hadn't been done properly, which the client had to take care of. We had taken pictures of the site. I could answer the email client and my boss, and say "well, it wasn't us because of this, this and this and there's a picture, that's what we did." I prefer to do more and have to worry less about things. So, I prefer everything to be logged, everything to be A, B, C, and done.* (Theo, site supervisor, construction)

6.1.7 BC-RMWs with a Low Level of ICT Use in Their Core Tasks

BC-RMWs with low levels of ICT use in their core tasks executed work practices in response to the job demands of traceability, responsiveness, boundary spanning, emergent work, and coordination. Three frequently mentioned work practices were attending meetings, going to remote work sites, and working during nonwork hours. These are described and illustrated below.

Attending meetings: Construction teams and subcontractors had weekly meetings days to respond to the coordination and boundary-spanning job demands. This is explained below:

> *We get our main information on Friday. Then if we've got subcontractors, we'll gather them together on-site and say right, we're doing this on Monday, Tuesday, Wednesday, and Thursday: Can you make sure you've got the resources to fulfill that?* (Freddie, civil engineer, construction)

On-site coordination: BC-RMWs who did not use ICT in their core tasks, coordinated with team members by physically going to various remote sites to learn about problems and take steps to ensure smooth operations. Here is how one respondent explained the practice:

> *[It's] very important to see the site because if you don't see the site you don't know what's going on, you don't know how you're going to, you know it could be, the site could be a mess.* (Jacob, site supervisor, construction)

Another respondent said:

> *Well, we will phone them [the members of his team], but we won't generally email or we'll be on the site and it's generally—we'll wait for them or we'll go and see them. We generally like to go and see them on-site.* (Freddie, civil engineer, construction)

This practice was in response to the job demands of emergence and coordination. It was also in response to the boundary spanning job demand because it made it possible to interface with subcontractors and inspection of materials supplied by vendors.

Working outside of site work hours: Some interviewees came to the office early or took work that could be accomplished off-site at home. For example, some respondents reported sending email at home on their work laptop that they could not send at the remote work site. In this way, they attempted to tackle the job demand of responsiveness by working outside of their regular work hours. One site supervisor said:

> *I normally come in an hour before everybody gets on-site so I can do the, I can finish the paperwork off from the day before just recording everything what's happened and also just write a bit of a plan what everybody's doing that day. Because if I can get in before everyone else gets in it means I can spend more time out on-site watching people.* (Jack, site supervisor, construction)

These three work practices may have hindered more than helped BC-RMWs meet job demands. For instance, the weekly meetings were time consuming and made it more difficult to focus on site-related work; further, they were too far apart to keep up with the dynamic nature of the

work. Thus, attending meetings sometimes hampered responsiveness. Also, because emergent work often could not be dealt with until the day of the meeting, this sometimes created stressful situations when, for example, customer requirements were not processed quickly enough.

On-site coordination was time-consuming since one needed to drive to the site and also created additional stress:

> *It can get stressful with keeping your eye on the lads making sure they get the job done on time. That's why I do come in early so I can spend as much time on-site as, because I think when you don't spend time in here you don't know what's, they don't work as well as they can do.* (Jack, site supervisor, construction)

Working during nonwork hours allowed the respondents to control when they did their work; however, this went against the work culture at the construction company, as evidenced by the following quote:

> *Within [the construction company] there's not as much pressure as I have seen in previous work that I've done all the time … There is an element of respect for the, you know there's[a] period for work and then there's a period when you're not working.* (Archie, site supervisor contracts, construction)

While this practice gave the respondents extra time to work outside regular site-shift hours, it took away from their nonwork time.

7 Discussion

We draw on our findings to theorize how BC-RMWs use ICT to elevate their occupational well-being. Figure 1 depicts our theorization. The findings presented in the previous section show that BC-RMWs face a number of job demands—namely, traceability, responsiveness, knowledge work, boundary spanning, emergence, and coordination. We theorize two pathways from job demands to BC-RMWs' occupational well-being. The "basic premise" (Muller et al., 2017) of our study, as supported by the literature, is that these job demands lead to low organizational well-being in the absence of any action to tackle them (e.g., Xanthopoulou et al., 2007; ter Hoeven et al., 2016). For example, respondents in both organizations mentioned they found the job demand of traceability to be "annoying" or stressful since was like "Big Brother looking down on you all the time" without employing any actions to effectively deal with the job demands.

However, there is a pathway, the *ICT-enabled job crafting pathway*, through which BC-RMWs can increase their occupational well-being. This pathway applied to those BC-RMWs who had a high level of ICT use in their core tasks. They tackled their high job demands by increasing the job resources they needed for their work through their ICT job crafting practices, as shown in the top pathway (Figure 1). In essence, when they engaged in ICT job crafting practices, their job resources increased so that they were adequate, or more, for meeting the job demands. This was the condition of a high-ICT-mediated match between job demands and job resources (i.e., high job demands, high job resources), resulting in higher occupational well-being. In a second pathway, the *work practices pathway*, BC-RMWs did not use ICT heavily in their core tasks. Rather, they engaged in other work practices to respond to job demands. They were not able to increase their job resources through ICT job crafting practices. This was the condition of a low-ICT-mediated match between job demands and job resources (i.e., high job demands, low job resources), leading to low occupational well-being.

7.1.1 ICT-Enabled Job Crafting

In the ICT-enabled job crafting pathway, BC-RMWs engaged in ICT use practices in their core tasks to respond to their job demands. Through these practices, they changed three key aspects of their job (see Table C4)—*task* (e.g., type of job tasks), *relational* (e.g., interaction with colleagues), and *cognitive* (e.g., information and knowledge used). *Job crafting* embodies work practices on part of employees to shape these very same aspects of the job (Wrzesniewski & Dutton, 2001). Considered in this light, ICT use practices can be seen as practices that enabled the BC-RMW to perform job crafting using ICT for their core tasks. For example, the ICT use practices of *self-selecting tasks* and *self-prioritizing tasks* helped BC-RMWs choose their tasks, thus changing the task aspect of their job. The ICT use practices of *demarcating devices*, *seeking social support*, and *recording information processing trails* influenced BC-RMWs' interactions with colleagues, thus changing the relational aspect of their work. The ICT use practices of *self-training* and *seeking technical support* provided BC-RMWs with the necessary knowledge to do more difficult tasks, thus changing the cognitive aspects of their work. Therefore, we theorize that the BC-RMWs' ICT use practices embody a specific type of job crafting, which we conceptualize and name *ICT-enabled job crafting*. More generally, we define ICT-enabled job crafting as the use of ICT to shape the task, relational, and cognitive aspects of work. We conceptualize the corresponding ICT use practices as *ICT job crafting practices*. In our study, we find that particular practices shaped specific aspects (Table C4 and Figure D2). In the general sense, various ICT job crafting practices can shape these three aspects of the job, thus materializing ICT-enabled job crafting.

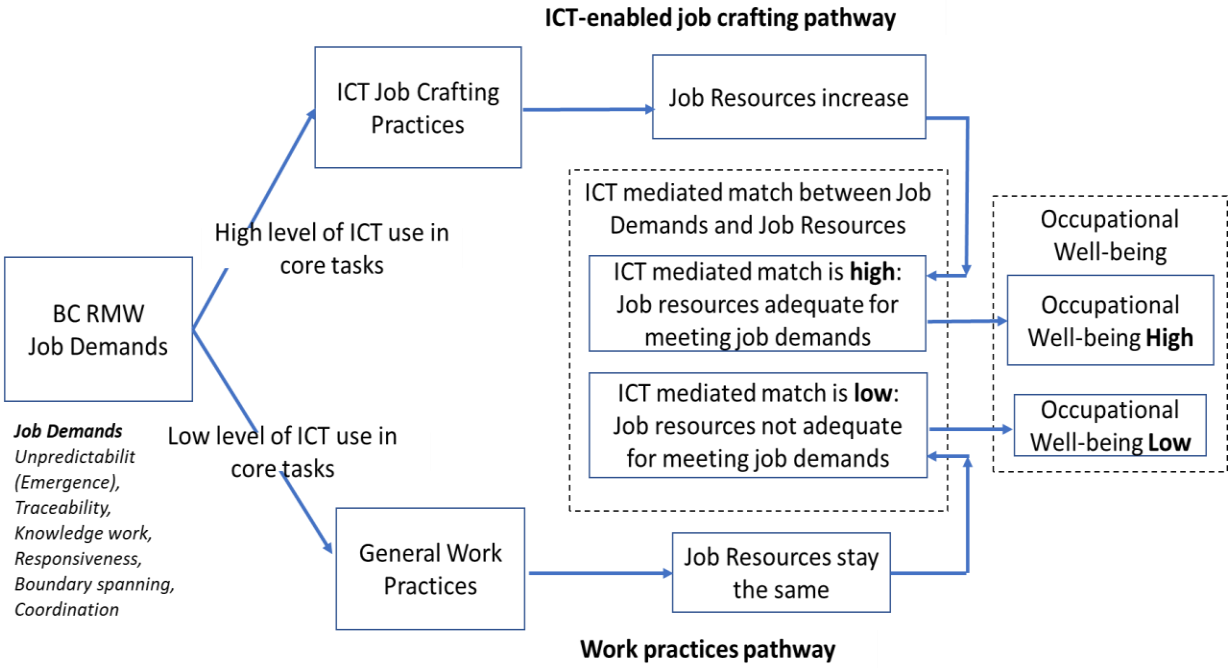

Figure 1. ICT-Enabled Job Crafting to Enhance Occupational Well-Being

7.1.2 Increasing Job Resources through ICT-Enabled Job Crafting

BC-RMWs changed the task, relational, and cognitive aspects of their job through ICT-enabled job crafting. Changing the task aspect implied that they could choose which tasks to execute and when, which increased the resources of both job latitude and time control. Changing the relational aspect meant that they could interact with colleagues in ways (i.e., with the devices, at the times, and regarding the topics) that they wanted to, which increased their social support and cognitive resources. Changing the cognitive aspect implied that BC-RMWs were able to acquire the information and knowledge needed to execute their (cognitively demanding and complex) tasks, which increased their cognitive resources. Using these general arguments and examples, we theorize that ICT-enabled job crafting can increase job resources by changing the task, relational, and cognitive aspects of their jobs. In our study, this is instantiated and illustrated in Table 2, that is, we find that particular ICT-enabled job crafting practices increase specific job resources, as we explain next.

BC-RMWs increased their job resources through ICT-enabled job crafting. Through the ICT job crafting practices of self-selecting and self-prioritizing tasks, the BC-RMWs increased their job latitude by choosing their own tasks and the order in which they executed them. They also increased their time control because they were able to decide the most appropriate time and order of their tasks. By demarcating devices for receiving particular types of work communication, they increased job latitude and time control by choosing how and when to respond. Through clever demarcation of ICT devices and by using ICT to seek social support, they increased the workplace social support available to them. The ICT job crafting practice of self-training enabled them to increase their individual cognitive resources and seeking technical support from colleagues enabled them to pool their collective cognitive resources. Using ICT to create visible and recorded information trails provided the BC-RMWs with the information and knowledge base they needed to do their work, enabling them to pool their cognitive resources. It also increased their control over their time because they did not have to wait for critical information. These examples illustrate that the BC-RMWs' ICT job crafting practices increased and enhanced the job resources of job latitude, social support, time control, and cognitive resources.

7.1.3 Tackling Job Demands with Increased Job Resources—High Level of Match between Job Demands and Job Resources

The increased resources resulting from ICT-enabled job crafting helped create a high level of match between the BC-RMWs' job demands and job resources and thus helped them meet their high job demands. Greater time control enabled BC-RMWs to decide which jobs to do when. It helped them respond to the job demand of emergence because when something unexpected came up, they could decide to focus on that instead of taking on additional tasks.

Table 2. Job Demands, Practices of ICT Use, and Occupational Well-Being

	ICT use practices (*aspect of job changed*)	**Self-selecting tasks *(task cognitive)***	**Self-prioritizing tasks *(task)***	**Demarcating devices (*task relational)***	**Self - training *(cognitive)***	**Seeking technical support *(task cognitive)***	**Seeking social support *(relational)***	**Recording information processing trails *(task, relational, cognitive)***
Job demands								
Traceability		X		X			X	
Responsiveness			X	X		X		X
Knowledge work					X	X	X	
Boundary spanning								
Emergent work		X	X	X				
Coordination		X	X	X			X	X
Job resources								
Job latitude		X	X	X				
Social support				X			X	
Time control		X	X	X				X
Cognitive resources					X	X (pooled resources)		X (pooled resources
Occupational well-being outcomes								
Job satisfaction		X					X	
Work engagement		X	X					
Positive job attitude		X	X		X		X	X
Positive workplace relationships						X		
Sense of job accomplishment								X
Less stress				X				X
Less exhaustion				X				
Less frustration				X				

It further helped BC-RMWs deal with the job demand of responsiveness by enabling them to keep their sequence of tasks flexible so that they could choose to not take up a new task if they thought they would not be able to finish it by the deadline because of current tasks or choose to add new tasks to the list of current tasks if an important task came up. They also could choose a task that was located proximally to an existing one to minimize the travel time and get it done quickly.

Typically, decisions concerning task choice required coordination with colleagues to ensure that colleagues could pick up tasks that they would not be able to do or that were more proximal to someone else, which assumed that everyone's whereabouts were known (i.e., because of job demand traceability). Increased job latitude provided BC-RMWs with work autonomy regarding which tasks to do, which helped them tackle the job demands of responsiveness, coordination, and emergence. Enhanced individual and pooled cognitive resources enabled a better understanding of task-related requirements and of how task-related problems could be resolved. They helped BC-RMWs respond to the job demand of knowledge work by assisting with technical difficulties and, when feasible, facilitated the reassignment of jobs if a BC-RMW did not have the requisite knowledge to successfully complete a job. Pooled cognitive resources further helped BC-RMWs figure out problems on the fly, for example, by allowing them to ask colleagues questions, enabling BC-RMWs to get timely access to critical technical or troubleshooting information that they might need at the point of executing their tasks so they could complete their work on time.

This helped them tackle the job demand of responsiveness. Increased social support provided a work environment that enabled BC-RMWs to ask for help regarding technical problems and discuss solutions with their colleagues in order to better respond to the demand of knowledge work. It also strengthened BC-RMWs' professional relationships over time, enabling them to discuss technical problems and solutions with their colleagues and respond to the demand of knowledge work. Increased social support further enabled BC-RMWs to respond to the demand of traceability since they were able to see their colleagues' locations. As illustrated in these examples, we found that BC-RMWs were able to tackle the job demands that they faced by increasing their resources through ICT-enabled job crafting.

7.1.4 Achieving Higher Occupational Well-Being through ICT-Enabled Job Crafting that Creates a High Level of Match between Job Demands and Job Resources

ICT-enabled job crafting increased BC-RMWs' job resources, to create a high level of match with the job demands they faced. We theorize that this high level of match between job demands and job resources reflects a situation of fit in which high job demands are met with high job resources (Xanthopoulou et al., 2007). In our study, this meant that the enhanced job resources that BC-RMWs were able to access through ICT-enabled job crafting were sufficient to meet the high job demands they faced. A high level of match, in general, results in positive work-related outcomes (Bakker & Demerouti, 2007). In our case, it enabled BC-RMWs to tackle the job demands they faced. This helped them achieve higher occupational well-being in the form of greater job satisfaction; more positive job attitudes; less stress, frustration, and exhaustion; greater work engagement and job-related accomplishments; and rewarding social relationships. This is the ICT-enabled job crafting pathway. It mitigates the potential for low occupational well-being of BC-RMWs due to job demands as implied by our basic premise. BC-RMWs engage in ICT-enabled job crafting to enhance job resources. The provision of resources motivates them to tackle their job demands (Bakker & Demerouti, 2007; ter Hoeven et al., 2016) and thus improve their occupational well-being. Consequently, despite high job demands, BC-RMWs can experience high occupational well-being through ICT-enabled job crafting.

While we did not design our study in this way, we discovered that some BC-RMWs in the construction company did not use ICT to do their core tasks. This allowed us to observe the contrast between the top and bottom pathways. In particular, it helped us recognize the work practices pathway journeyed by BC-RMWs who did not use ICT for their core tasks. These BC-RMWs created their own work practices because of personal preferences, limited technological training, organizational policies (i.e., company practices that strongly advised against phone use at work sites), and/or culture (i.e., management did not put pressure on them to complete communications during regular work hours). For example, most site supervisors at the construction company admitted that they had limited technological training. Instead of using their phone at the remote work site to tether their laptop to write emails and check the status of their work, several of these site supervisors mentioned going into their offices situated near the remote work sites early or working at home after work hours to complete these tasks. They may not have needed this extra time if they had used ICT at the remote work site. On the other hand, a computer-proficient site supervisor at this company sent emails and checked work status at his remote work site, which saved considerable time and kept him better apprised of emerging issues. He did not mention going into the office early to complete his work or working at home.

Unlike the ICT-enabled job crafting pathway, the work practices employed on the bottom pathway did not lead to increased job resources. For example, for site supervisors, physically going from site to site for meetings and coordination with site co-workers and vendors was time consuming. Fixed meeting schedules were also not helpful in this regard because they interfered with taking care of emergent tasks. While these practices did entail the use of ICT such as email for communication and spreadsheets for keeping track of meetings, projects, and other administrative needs, they clearly did not involve ICT job crafting practices and thus did not increase job resources, resulting in a low level of match between job demands and job resources. With one exception,[3] these practices also did not enhance occupational well-being. This pathway helps explain the adverse effects of ICT use on well-being that we note in Table 1.

8 Contributions, Future Research, and Implications for Practice

This paper develops a Type 2 theory (Gregor, 2006) to explain how blue-collar remote and mobile workers can use ICT to craft their jobs to enhance their occupational well-being. Our theory explains how BC-RMWs can enhance their occupational well-being through ICT-enabled job crafting. In the previous

[3] It is likely that this one exception did not experience marked changes in occupational well-being because the increased time control (a job resource) was likely not enough to reduce job demands (responsiveness).

section, we discussed our theory's key elements that constitute this explanation: namely (1) ICT-enabled job crafting increases job resources, which (2) helps to bring about a high level of match between job demands and job resources, and (3) helps BC-RMWs to respond to their job demands, thereby (4) leading to high occupational well-being. BC-RMWs who did not use ICT-enabled job crafting did not manifest similar effects. We next describe the study's contributions to theory and practice.

8.1 Theoretical Contributions

8.1.1 Shining a Light on BC-RMWs' ICT Use

We examine the workplace use of ICTs by BC-RMWs, who represent a large but relatively understudied, segment of the workforce. The literature comments extensively on their low occupational well-being (e.g., Vartiainen & Hyrkkänen, 2010). We extend the literature in a new direction by theorizing how ICTs can enhance well-being. Our theorizing explains how BC-RMWs can improve well-being by engaging in ICT-enabled job crafting to increase job resources in order to meet the demands of their jobs and thus enhance their occupational well-being. Even though the BC-RMWs in our study faced high levels of job demands, they were able to leverage their latitude over ICT use to proactively shape key aspects of their job, such as what tasks they undertook, how they prioritized those tasks, and how they interacted with their colleagues. Faced with conditions of low work autonomy (i.e., low latitude in terms of tasks and work timing) and low occupational well-being, ICT-enabled job crafting is something that is within the agency of BC-RMWs that can enable them to enhance their job resources, as we show through the ICT-enabled job crafting pathway. Blue-collar workers, in general, have received little attention in the IS literature, which mostly considers the effects of ICT on the well-being of the more typical white-collar workers. Yet blue-collar remote and mobile work forms an important context because of its prevalence and distinctive work conditions (See Table 1). We extend the conceptual and contextual range of the literature by shining a light on how BC-RMWs use ICT to enhance their occupational well-being.

8.1.2 Conceptualizing ICT-Enabled Job Crafting

We introduce the concept of ICT-enabled job crafting. Job crafting is a theoretical concept that encapsulates how individuals can proactively shape the task, relational, and cognitive aspects of their work. Studies acknowledge that ICT can be used in emergent and unplanned ways (Sun, 2012). We show how flexible and adaptable ICT use can be applied to increase job resources to respond to job demands by proactively changing key aspects of the job. In so doing, we theorize about this concept (Weick, 1995) and thus move this notion conceptually forward by connecting ICT use to the concept of job crafting and by introducing the notion of IT-enabled job crafting. Given the recent rise in the adoption of workplace ICTs that are flexible and configurable, such as enterprise social media and smartphone/tablets, it is expected that individuals will find it beneficial to engage in ICT-enabled job crafting to tackle various workplace demands. Our conceptual integration of ICT use and job crafting into a theoretical explanation thus paves the way for future theoretical developments, especially since the notion of job crafting has not yet been examined in the IS literature, even though some studies (e.g., ter Hoeven et al., 2016) have suggested that job crafting might serve as a helpful approach to understanding the relationship between communication technology use and employee well-being. Future research could expand on our findings and examine other ways of job crafting vis-à-vis other kinds of jobs and thus develop a potentially new stream of literature in the domain of the post-adoption use of ICT. The shift from a manufacturing to a service-oriented economy in many countries has brought with it flexible work arrangements, greater time sensitivity in terms of deadlines, and cognitively complex work. A "one-size-fits-all" approach where top-down job design is the primary driver of job content is thus no longer sufficient (Grant & Parker, 2009; Oldham & Hackman, 2010). At the same time, the role of ICT has become dramatically more important in service jobs because it allows for flexibility regarding communication and coordination. Under these circumstances, employees are more predisposed to shape their jobs (Wrzesniewski & Dutton, 2001).

Injecting the notion of the use of ICT as a way to develop job crafting practices constitutes a first step toward providing a way to theoretically integrate the notions of ICT use with job crafting, which the job crafting literature has so far not considered (Rudolph et al., 2017). It creates the potential for cross-disciplinary development (Tarafdar & Davison, 2018) of both the post-adoptive ICT use and job crafting literatures and offers an opportunity for continued theorizing about job crafting using ICT.

8.1.3 Toward Well-Being-Oriented Use of ICT

We contribute to the understanding of how ICT use can increase occupational well-being for remote and mobile workers. Different types of remote and mobile workers have different work conditions (Table 1) in terms of latitude concerning tasks, work timing and ICT use, and the extent of monitoring. One would expect that for WC-RMWs who, unlike BC-RMWs, have high work

autonomy (i.e., high latitude regarding tasks, work timing, and ICT use) and low monitoring, the use of ICT would be primarily associated with high occupational well-being. However, this is not the case; the literature reports a slew of negative outcomes such as burnout, exhaustion (Barber & Santuzzi, 2011), and stress (Gajendran & Harrison, 2007; Tarafdar et al., 2015). Our study suggests that this is because their use of ICT *increases job demands* by, for example, facilitating constant availability and rapid responses to clients. This is all the more so because WC-RMWs tend to have long-standing client relationships and ambitious work targets toward which they direct their use of ICT. Indeed, they make themselves constantly available (e.g., through round-the-clock email), even though this decreases their work timing latitude because they believe that the former enhances their professional competence and helps them achieve targets. Thus, even though they have high levels of latitude regarding tasks and ICT use and are not monitored, they suffer from the "autonomy paradox" (Mazmanian et al., 2011). BC-RMWs, on the other hand, are closely monitored: they can be traced at any time and asked to respond to emergencies and comply with tight deadlines, often without adequate job resources. They thus can improve their occupational well-being only by leveraging the one form of latitude they do have (e.g., latitude regarding their ICT use) to *increase their job resources* through ICT-enabled job crafting. Further, even though the literature in Table 1 tells us that they have lower levels of job resources in terms of task latitude and work-timing latitude than do WC-RMWs, our study shows that they increase these resources to adequate levels to combat their job demands by using ICT-enabled job crafting practices such as self-selecting tasks, self-prioritizing tasks, and demarcating devices.

In this regard, we make a theoretical contribution in three ways. First, we look at the interrelationships among job demands and job resources and their impact on occupational well-being. The literature on remote and mobile workers has largely examined the effects of ICT use separately regarding job demands and job resources. A few studies link the two by examining paradoxes where the same ICT can potentially increase both job demands and job resources. By unpacking the interrelationships among job demands, job resources, and use of ICT we suggest that BC-RMWs' ICT-enabled job crafting to increase job resources provides a conceptually novel theoretical anchor to examine the well-being-oriented use of ICT for other types of remote and mobile workers. Second, the notion that the relationship between job demands and occupational well-being is not always negative, but rather can also be positive, is still nascent and understudied but nevertheless significant (Tarafdar et al., 2019). There are a few empirical studies but not any on remote and mobile workers (e.g., Ter Hoeven et al., 2016); these studies hint at *what* job resources can accrue from ICT use but not *how*. Our investigation of the specific context of BC-RMWs enabled us to unveil how ICT-enabled job crafting by individuals can enhance occupational well-being by increasing job resources to effectively tackle job demands. We examine a positive role for the use of ICT in the relationship between job demands and occupational well-being. We provide theoretical framing and empirical context regarding this positive turn, which we hope future studies will build on. Third, through the concept of ICT-enabled job crafting, we establish a theoretically novel linkage—that of workers tackling job demands by increasing job resources. Our theorization focuses on the agency of the ICT user.

8.2 Future Research

The call to bring "back" (Barley & Kunda, 2001) the nature of work and what workers do seems even more relevant today as scholars try to understand the changing nature of work in the digital age. The ongoing pandemic has forcefully underlined that working remotely is indispensable. Even before the pandemic hit, studies reported that more than two thirds of people around the world work away from the office at least once a week. In the USA, for example, the number of workers who work remotely four to five days a week rose from 24% to 31% between 2012 and 2016, and the percentage of people who work remotely for at least some time rose from 39% to 43% during the same period, according to studies conducted by Gallup. We are living in times that are characterized both by new work structures (e.g., arrangements that facilitate remote work) and by new ways of working (e.g., things that workers do differently). The use of ICT is indispensable to both. However, studies that connect the characteristics of work to workers' well-being are scarce (Vartiainen & Hyrkkänen, 2010). The boundaries of our theorizing can be extended beyond BC-RMWs to inform research on other types of mobile work, such as gig workers working on digital platforms who, like BC-RMWs, have low task latitude, high monitoring, and little human contact, and who suffer low occupational well-being (Page et al., 2017). It is worth exploring whether they might also benefit from ICT-enabled job crafting practices. Seen in this light, while our results arise from the context of blue-collar remote and mobile work, they may well have implications for how control over ICT use can offset the difficult demands that emerge from these other types of mobile work. Another topic for future research would be the study of factors and processes that encourage and enhance ICT-enabled job crafting.

8.3 Implications for Practice

Finally, our study has practical implications for the future of work and work design, especially as organizations emerge from the current pandemic into a situation entailing higher levels of digitally enabled

remote work. The pervasive use of ICT forms the workflow backbone of such work. We offer a few points worth considering. First, organizations that employ remote workers should understand the job demands that such workers face and acknowledge the potential of ICT-enabled job crafting for tackling these demands. Thus, work designs should accommodate flexibility and autonomy in their use of ICT such that ICT-enabled job crafting can be accomplished. Second, job crafting is a behavior that is increasingly coming to the fore because many jobs are growing in complexity in terms of content. Work is becoming more varied in terms of networking structures, which implies a larger number of people with whom individuals interact. Knowledge-based work has also increased with the rise of the service industry. As a practical notion, ICT-enabled job crafting could become a potentially important aspect of workplaces that offer flexible work practices. Our study suggests that organizations should establish guidelines that encourage linking the use of ICT with job crafting to help remote workers effectively tackle their job demands. In particular, we argue that organizations should empower workers to craft their jobs through worker-shaped practices of ICT use, in contrast with the more Taylorian approach of structured and top-down use that is prone to greater prevalence in the current age of algorithmic management.

8.4 Limitations and Conclusion

It is important here to note the limitations of our study. Our research was conducted with participants from two organizations from two service industries in the UK, which suggests caution in transferring our findings and theorization to other types of industries or in other countries. It is possible that plausible relationships did not show up in our data, such as other job resources that could buffer the negative impact of job demands on occupational well-being or other relationships between particular ICT job crafting practices and job resources. Further, while the data was collected at the particular mobile sites to enhance locational immediacy with the actual work that our participants did, participants still might have had recall errors. Interviews with the participants' office-based managers could have provided triangulation.

To conclude, this paper investigates how BC-RMW workers, an understudied segment of the workforce, can use ICT to elevate their own workplace occupational well-being. By theoretically integrating the concepts of job crafting and ICT use, we introduce the concept of ICT-enabled job crafting. We develop theorizing that shows how BC-RMWs can engage in ICT-enabled job crafting to enhance and develop their job resources to tackle the distinctive job demands that face them, thus elevating their occupational well-being. We hope that future research will find our study helpful in examining questions that seek to further the understanding of how ICT can be used to enhance occupational well-being.

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Appendix A

Table A1. Study Respondents

	Role	Remote working site	Pseudonym	Sector	Use of ICT for core tasks
1	Civil Engineer	1 - Work site	Harry	Construction	Low
2	Assistant Civil Engineer	1 - Work site	George	Construction	High
3	Site Supervisor	1 - Work site	Noah	Construction	Low
4	Site Supervisor	1 - Work site	Jack	Construction	Low
5	Site Supervisor	1 - Work site	Jacob	Construction	Low
6	Site Supervisor	1 - Work site	Leo	Construction	High
7	Site Worker - Traffic	1 - Work site	Oscar	Construction	Low
8	Site Worker - Traffic	1 - Work site	Charlie	Construction	Low
9	Site Civil Engineer	2 - Work depot	Freddie	Construction	Low
10	Site Supervisor Contracts	2 - Work depot	Logan	Construction	High
11	Site Supervisor Contracts	2 - Work depot	Archie	Construction	High
12	Site Supervisor	2 - Work depot	Theo	Construction	Low
13	Transport supervisor	3 - Work depot	Edward	Construction	High
14	Transport supervisor	3 - Work depot	Joseph	Construction	High
15	Equipment/build engineer	4 - Equipment site	Thomas	Telecom	High
16	Equipment /maintenance engineer	4 - Equipment site	Max	Telecom	High
17	Equipment /maintenance engineer	4 - Equipment site	Joshua	Telecom	High
18	Field Engineer/Supervisor	5 - Equipment site	Henry	Telecom	High
19	Equipment/ maintenance engineer	6 - Equipment site	William	Telecom	High
20	Equipment/build engineer	7 - Equipment site	Arthur	Telecom	High
21	Equipment/build engineer	7 - Equipment site	Mason	Telecom	High
22	Equipment/ maintenance engineer	8 - Equipment site	Ethan	Telecom	High
23	Equipment maintenance/ engineer	9 - Equipment site	Lucas	Telecom	High
24	Equipment/build engineer	10 - Equipment site	Alex	Telecom	High
25	Equipment /maintenance engineer	11 - Equipment site	Riley	Telecom	High
26	Equipment /maintenance engineer	12 - Equipment site	Samuel	Telecom	High
27	Equipment / maintenance engineer	13 - Equipment site	Dylan	Telecom	High
28	Power/maintenance engineer	14 - Equipment site	Robert	Telecom	High

Appendix B

Interview Schedule

1. Describe the typical work tasks that you do
2. How do your work tasks challenge you?
3. How do conditions in your work environment—work policies, norms, other resources, etc., help you in handling the challenges?
4. What are some of the actions/things you do to handle these challenges?
5. Under what conditions do you feel unable to meet/overwhelmed by the challenges?
6. How do you feel when you are unable to meet them?
7. How do the challenges affect your satisfaction and engagement at work?
8. How do the challenges influence your work performance?
9. Do you find the use of IT—smartphones, applications such as office email, other applications that you use - motivating or challenging in a good way or stressful and negative way? When and why?
10. Describe how you use IT (e.g., smartphones, laptops, tablets, and the applications on them) for work
11. Does using IT (e.g., smartphones, laptops, tablets, and the applications on them) help you in addressing work challenges? If so, how?
12. Do you feel as your work gets hampered—e.g., poor quality of work, less time to work, hassled, overloaded—because of IT? Why and How?

Appendix C

Table C1. Summary of Coding Activities

Pass	Activities [a]	Methodological guidance	Result
1	Open and axial coding by first author	Corbin and Strauss (2015)	Main categories: Job demands (6 subcategories), job resources (4 subcategories), ICT use practices (6 subcategories), occupational well-being (2 subcategories)
2	Open and axial coding by second author	Corbin and Strauss (2015)	Main categories: Job demands (5 subcategories), Job resources (4 subcategories), ICT use practices (7 subcategories), management practices (2 subcategories), level of ICT use on the job (2 subcategories), occupational well-being (2 subcategories)
3	Reconciling of coding of two co-authors		Main categories: Job demands (6 subcategories), job resources (4 subcategories), ICT use practices (7 subcategories), level of ICT use on the job (2 subcategories), occupational well-being (2 subcategories)
4	Open and axial coding to analyze how ICT use on the job and ICT use practices influenced the work of BC-RMWs Selective coding for identification of core category: Job crafting with ICT	Corbin and Strauss (2015) Strauss and Corbin (1998), Corbin and Strauss (1990)	Core category: Job crafting with ICT, coding reflecting fit with job crafting concepts
5	5.1. Open and axial coding to examine job demands, job resources, and ICT use practices with each category of occupational well-being, by level of ICT use on the job	Corbin and Strauss (2015)	Refinement of occupational well-being by adding third level subcategories; links among job demands, job resources, ICT use practices, and occupational well-being
	5.2. Selective coding based on the core category to understand how ICT use practices responded to the demands and the relationship of that to each category of occupational well-being, and to link all categories together 5.3. Open and axial coding to analyze how non-ICT use work practices affected category of occupational well-being	Strauss and Corbin (1998), Corbin and Strauss (1990)	Understanding how ICT use practices enhanced BC-RMW occupational well-being by enabling them to respond to job demands Coding reflecting fit with job crafting and increased/enhanced resources

[a] Constant comparison and analytical/theoretical memo-ing were used throughout the iterative coding process.

Table C2. Job Demands

Category: Job demand	Subcategory	Illustrative text
Job demands of blue-collar remote and mobile work **Definition:** *Workplace requirements perceived by individuals to be necessary to undertake their work tasks*	**Traceability:** The requirement of knowing the location of co-workers and making one's own location known to them	*We need to know which other of our colleagues are where. Like today they rang me to say, "we've got an important fault in [location A]." I said to them, "Well, give Gordon a ring, because he's near that site and can get there before I can," because I happened to know where he was.*
	Responsiveness: The requirement of reacting to situations within tight deadlines	*I have to get to a job at [location A] which is a fault that could affect probably no more than 100 or so customers. But if before that I get another notification that there is a fault in which thousands of customers may be affected, I will have to go there.*
	Knowledge work: The requirement of executing tasks that require significant levels of technical skill, such as troubleshooting, repairing, installation, technical analysis	*When I'm changing a router or a switch or hub, we have a big array of different leads and cords and things. So, quite a few times I've got to do something I've never done before and I say we'll just fire it in, log into it and try this and that … they don't tell you what to do, it's just up to you.*
	Boundary spanning: The requirement of interacting with entities outside the organization such as clients and suppliers	*Yeah, there's been the occasion where the client has had a deadline for information they wanted and left it very late to ask for that information and it's meant quite a lot of [last minute] work involved producing documentation for the [client] meeting.*
	Emergent work: The requirement of executing tasks that cannot be predicted beforehand	*I'm generally reactive work so most of my day I'm reacting to faults and going and doing it.*
	Coordination: The requirement of gathering information from many different sources in order to execute a task	*Now I've got all the materials, but the rubble and soil have to be shifted. My biggest hindrance is not having enough wagon time. I need a wagon constantly and, unfortunately, that is been split between jobs. So, if I can't get the rubble off-site then I've got people standing around doing nothing.*

Table C3. Job Resources

Category: Job resources	Subcategory	Illustrative text
Job resources of blue collar - remote and mobile work **Definition:** *Aspects of the workplace that BC-RMWs need to achieve work tasks*	**Job Latitude:** Latitude in job selection in terms of task selection.	*We don't have absolute power, obviously there's faults and things come in and sometimes you'll be thinking it's getting towards the end of day, I'll be wanting to go home shortly and then a fault will … a high priority fault will drop in that's miles in the opposite direction, and you're the nearest man and you don't really want to go but you think "I've got to. It's not going to get fixed otherwise.*"
	Social Support: Interaction with colleagues in times of need.	*No, I wouldn't see anybody. I've seen nobody today. Isolating as well, completely isolating. Even when you're ill, it's isolating. You don't speak to anybody, you ring a number with an option. So, like, option one is flu, option two is a headache, option three is a bad back.*
	Time control: Ability to organize and plan time to complete a job.	*We work to customer completion dates. The workflow management [system] that we use … that manages the input of work, which is obviously demanding, demands driven by customer input and customers. A lot of the work [from customers], that gets injected at short notice, and [company name] can suffer penalties if they don't get [the] connectivity it requires*
	Cognitive Resources: Technical ability, skills, experience, and training.	*You need to be skilled. I was a qualified electrician before I joined [company name] but your average electrician couldn't do this job because are working with generators and DC power systems, a lot of specialized equipment that your bog standard electrical engineer wouldn't deal with. We're also qualified refrigeration engineers because of the cooling equipment to keep the exchange temperatures down … So, there's refrigeration systems we need to deal with, generator systems, DC power systems, a huge amount of different equipment. It's quite a skilled job.*

Table C4: Practices of ICT Use

Category: Practices of ICT use	**Subcategories**	**Illustrative text**
Proactive and self-shaped ways of using ICT for executing tasks, in order to change the task, relational, and cognitive aspects of the job	**Self-selecting tasks:** The practice of using ICT to decide which tasks to carry out. Aspect of job changed**:** Task and cognitive	*It's a judgment call every day. You decide which job you want to pick and pin them to yourself and then using the [application]. It's basically a list of jobs out there and we can go in and we can decide … we can pick any job we want and go and do it.*
	Self-prioritizing tasks: The practice of using ICT to prioritize the order in which to execute tasks. Aspect of job changed: Task	*You need to during the day … because faults can come in at anytime we need to ... you need to keep clocking in whenever you can, keep having a look back, update the list and see if there's any new jobs come in.*
	Demarcating Devices: The practice of using particular applications on different devices and at specific times. Aspect of job changed: Task and Relational	*They only carry their phone on-site [which doesn't have email]. It is not important or imperative that I needed an answer there then I would use email. If I wanted an answer there and then I would use either Skype or call somebody off the mobile.*
	Seeking technical support: The practice of using ICT to seek technical support from co-workers. Aspect of job changed: Task and cognitive	*It makes one feel more confident, I think, that if I have a problem, I can ring someone up and they can email me or text me some information that's helpful. I could send them a photograph and say, "what do you think of that?" and they could message back and say, "you need to do A, B or C to it." So, it is definitely helpful and gives one more confidence I think.*
	Seeking social support: The practice of using ICT to seek social support from co-workers. Aspect of job changed**:** Relational	*We tend to be quite close-knit. We talk to each other and if we have any problems we'll speak to each other … it's never an email. It will maybe start off as an email but always ends up with a conversation over the phone.*
	Recording information processing trails: The practice of using ICT to create visible trails of task-related information processing. Aspect of job changed: Task, relational, and cognitive	*A phone call's no good, something has to be backed up [by an email], especially with suppliers and clients to ensure that everything's there.*
	Self-training: The practice of using ICT for online learning, to acquire necessary skills and knowledge to complete the job. Aspect of job changed: Cognitive	*Quite a few times I've got to something I've never done before and I say, we'll just fire it in, log into it, and do this. Then you have to, they don't tell you what to do, it's just up to you to do that.*

Appendix D

Codes and memos

Many pages of code and memo illustrations (e.g., interview texts, notes and diagrams) for the coding passes were reviewed by the reviewers and senior editor during the peer-review process. In the interests of keeping the paper to a reasonable length, we have provided examples below. The full set is available from the authors on request.

Table D1. Codes for the Five Main Categories: Job Demands, Job Resources, ICT Use Practices, Level of ICT Use, and Occupational Well-Being (Pass 3)

	Category	Code	Memo
1	Job demands	*But yeah, I've got to be available through the day to (a) monitor the work stack as it were; and then (b) work out between me and the other couple of guys who's going to go and do that job, who's best placed to do it.* *Sometimes it depends. Sometimes I can get a phone call in the morning to say that they need a lane closure or something like that and then I've got to react to that and get the equipment and then go and close it off.* *We also need to know who … which other of our colleagues are … where they are as well because if I … say they ring me, like they did today, and say "Dave we've got an important fault in Leyland." I might have just spoken to one of my colleagues who happens to be going that way or nearby and I might say to them "well give Gary a ring, because he'll probably be able to get there before I can."*	Shaded words denote demand/requirement to do something
2	Job resources	*We don't have absolute power, obviously there's faults and things come in and sometimes you'll be thinking it's getting towards the end of day, I'll be wanting to go home shortly and then a fault will… a high priority fault will drop in that's miles in the opposite direction, and you're the nearest man and you don't really want to go but you think "I've got to. It's not going to get fixed otherwise".* *No, I wouldn't see anybody. I've seen nobody today. Isolating as well, completely isolating. We just start from home, so you get your job and go wherever from there.*	Common theme among the categories is the notion of not having enough of something that is needed to do the work
3	ICT use practices	*I'll look on this two or three times throughout the job, and I'm looking to see if there's any more jobs come in. And I'll look and see, "right, that job at Workington wasn't alive yesterday, but it is today, so add that to the list." Quite often, you can't get—I can't do all the jobs that are there. "Mark, can you do one of these next week when I'm off on Friday but this job's in?" And Mark will go and do it or whoever.* *Well, I just have a look at the laptop, see which work's in, which priority work. If there's no high priority faults or anything then you start picking some routine tasks that you can plan in the priority list of what you've got to do* *Well, I have a laptop in the office which I say on the site, my phone in my pocket. I always pick up my emails on my phone and then if it's a short email I'll just use my phone to write back but if it's a longer email or I need to sort of get information from the laptop, i.e. drawings or quotations and stuff I'll go onto my laptop and use that* *anged around. And so you have to start delving into it and solve your problems*	The shaded words denote the use of ICT in a voluntary and autonomous manner, to get something or toward certain ends
4	Level of ICT use for core tasks	*Because down on-site you can't use a computer unless I plug my phone into it anyway. So, it's quite hard for me to use the computer.* *I use my laptop to access information on the server, to produce programs, too; I use diaries to set up meetings; I also use my mobile to deal with emails if I'm away from my laptop, look at documentation, download documentation. So probably quite a bit of technology involved, to be honest.*	The shaded words denote high or low level of use of ICT for core tasks

		The laptop is probably the main tool that I use day to day for reprogramming things or doing switch-type faults. It's all through the laptop, so it's pretty essential to what I do. *Technology has passed me by.*	
5	Occupational well-being	*Well, because you're under pressure to get things done at certain times and so you're rushing and you've got to still make sure the work is to a high standard, especially in the town centers. But yeah, it's quite rewarding as well, when you finish a certain point it's quite rewarding.* *Yeah certainly, I tend to every two to three weeks I'll go and do a random site visit as well, just to ensure that vehicles and plant are being used correctly on-site. I do that anonymously, I don't give them any warning that I'm going to turn up and it's good to just have a feel as well as to what's going on on-site because you spend a lot of time in the office it's good to be involved as to the requirements that are on-site as well* *thing. I feel like that's a responsible way of working really. I quite like that*	The theme running through the text (shaded) is some aspect of occupational well-being such as performance, empowerment, stress, negative impacts on health

Table D2a. Open and Axial Codes for Subcategories (Pass 3)
Category: Job Demands (Example: Traceability)

	Subcategory	**Open coding (for each subcategory)**	**Axial coding (dimensions of each subcategory with example codes)**	**Memos**
1	Traceability	*But yeah, I've got to be available through the day to (a) monitor the work stack as it were; and then (b) work out between me and the other couple of guys who's going to go and do that job, who's best placed to do it*	***Dimension of traceability*** *We also need to know who… which other of our colleagues are… where they are as well because if I… say they ring me, like they did today, and say "Dave we've got an important fault in Leyland." I might have just spoken to one of my colleagues who happens to be going that way or nearby and I might say to them "well give Gary a ring, because he'll probably be able to get there before I can."*	Everyone's location should be known to others Mobility made it difficult to find people

Table D2b. Open and Axial Codes for Subcategories (Pass 3)
Category: Job Resources (Example: Job Latitude)

	Subcategory	**Open coding (for each subcategory)**	**Axial coding (subsequent codes for each subcategory)**	**Memos**
1	Job Latitude	*We don't have absolute power, obviously there's faults and things come in and sometimes you'll be thinking it's getting towards the end of day, I'll be wanting to go home shortly and then a fault will… a high priority fault will drop in that's miles in the opposite direction, and you're the nearest man and you don't really want to go but you think "I've got to. It's not going to get fixed otherwise."*	***Dimension of job latitude*** *When you're trying, you set up your day, you think about your day in your head the night before, thinking oh what have we got going forward next time. And you're getting phone calls left right and center and you just think my whole day's changed because I keep answering phone calls and getting more and more jobs. So, you have to prioritize, and things have to go back again. But yeah, your phone's a big hindrance as well as being a great tool because yeah…*	BC-RMWs cannot choose their tasks, but it would be helpful if they could do that

Table D2c. Open and Axial Codes for Subcategories (Pass 3)
Category: ICT Practices (Example: Self-selecting tasks)

	Subcategory	Open Coding (for each subcategory)	Axial Coding (dimensions of each subcategory with example codes)	Memos
1	Self-selecting tasks	*I'll look on this two or three times throughout the job, and I'm looking to see if there's any more jobs come in. And I'll look and see, "right, that job at Workington wasn't alive yesterday, but it is today; so add that to the list." Quite often, you can't get—I can't do all the jobs that are there. "Mark, can you do one of these next week when I'm off on Friday but this job's in?" And Mark will go and do it or whoever*	***Dimension of self-selecting tasks*** *Yeah, so I sign on at home. So, I literally sign on, onto this, I'll show you if you want. This is like our engineer.com software. At the moment, I've got a task in Keswick so I can choose to go on-site on that, I can complete it, put progress notes on. So, this is how we manage the tasks; but then to actually get the tasks we have another thing called Field Schedule. So, we can organize this.*	Choose the jobs one can do based either on skill or distance

Table D2d. Open and Axial Codes for Subcategories (Pass 3):
Category: Level of ICT Use (high for core tasks, and low for core tasks)

	Subcategory	Open Coding (for each subcategory)	Axial Coding (dimensions of each subcategory – with example codes)	Memos (As summary of Interview)
1	Low level of ICT use in core tasks	*Technology has passed me by.*	***Dimension of low level of use*** *I have a computer but I very rarely use it.*	Does not use technology; rarely uses a computer because it is hard to use (need to use phone anyway); he could use a computer to get plans—but he doesn't; he uses phone, emails (for plans, change events); technology doesn't hinder him because he doesn't use it.
2	High level of ICT use in core tasks	*I have a camera at this depot and one over in Stockport. And that allows me to see necessarily what vehicles are in the yard, if I'm not there I can see what my employee is doing. We have a workshop downstairs with my mechanic, so I can see his whereabouts if I'm not there at that depot. The main thing is one is for security, that's the main reason, but the second reason as well is to know what vehicles are in that depot if I can't get hold of somebody like that. Which it's, to be honest with you had that system improved about six months ago and it's just been a god send on that.*	***Dimension of high level of use*** *It's [technology's] helpful to be honest with you.*	He finds the technology helpful. … He uses tracking software, tachograph analysis made by another company, cameras … lots of monitoring to check on employees and equipment—sometimes for security. (The use of technology for monitoring and security is described in this quote.)

Table D2d. Open and Axial Codes for Subcategories (Pass 3)
Category: Occupational Well-Being (higher and low)

	Subcategory	Open Coding (for each subcategory)	Axial Coding (dimensions of each subcategory – with example codes)	Memos
1	Higher well-being	*I think that if I have a problem I can ring someone up and they can email me or text me some information that's helpful. So, it does make one feel a bit more confident really that you can actually contact somebody and rather than them trying to explain it over the phone they could just email me a document or text me or send a photograph or something. I could send them a photograph and say, "what do you think of that?" and they could reply and say, "you need to do A, B or C to it." So, it [use of ICT] is definitely helpful and gives one more confidence I think.*	***Dimension of higher well-being:*** *It [use of ICT] makes one feel more confident.*	He feels more confident because he can contact people for help or can send photographs over email. *Note: Confidence is a third level subcategory of higher well-being.*
2	Low well-being	*It does cause stress because in the back of your head it's like Big Brother looking down on you all the time, they know exactly where you are every minute of the day. It's trackers in the vans and they can tell from this where it is.*	***Dimension of low well-being*** *There's of course stress.*	The tracking system causes his stress. *Note: stress is a third-level subcategory of well-being.*

Table D3. Selective Codes for Change in Work Due to Use of ICT (Pass 4) (Example: ICT use practice = Self-selecting tasks)

ICT use practices: subcategory text	Selective code	Memo
Subcategory: Self-selecting tasks *I'll look on this two or three times throughout the job, and I'm looking to see if there's any more jobs come in. And I'll look and see, "right, that job at Workington wasn't alive yesterday, but it is today; so, add that to the list." Quite often, you can't get—I can't do all the jobs that are there. "Mark, can you do one of these next week when I'm off on Friday but this job's in?" And Mark will go and do it or whoever*	The work is changed and requires an assessment of ability to complete the tasks—task aspect	The BC-RMW does some tasks, allocates other tasks to someone else
Yes, if we're the closest to the job and say it's a switch fault, if we've got that skill we can go and have a look at it	The task is selected on the basis of what knowledge and skill is required of the BC-RMW, as well as on its proximity—cognitive aspect	The BC-RMW chooses the tasks he thinks/knows he has the skill to do

Table D4. Open and Axial Codes for Job Demand and ICT Use Practice in the Context of Occupational Well-Being (Pass 5)

Occupational well-being text	Occupational well-being code	Job demand code	ICT use practice code
Text #1 (Higher occupational well-being) *That we can look **at the work queues** and pin our own jobs and decide where we want to go - that flexibility allows you to sort of plan your day (although you never know when faults might drop in, but still…) I feel pretty positive about it. Generally speaking, most of the time we have the power to do what we want and make the right judgment calls and that is really good… I class that as a really good thing. Most days it's pretty good to come to work*	**Dark shading** Job satisfaction, positive job attitude (Higher well-being)	**Bold and underlined:** Job demand to respond to the work	**Light shading:** ICT use for self-selecting tasks
Memo for Text #1 When BC-RMWs use ICT to select their own tasks, they can tackle those jobs that they are qualified for (even if the jobs are complex). They can also respond to jobs as they emerge because they can select any time.			
Text #2 (Low occupational well-being) *I will say there's a tension there between **you having to be available all the time** because of the nature of what you're doing and also be on-site where the use of technology has to be carefully done.* *Because emails and phone calls during the day can be quite stressful with you know the job that you're doing because you're thinking all the time that you **need to get back for that person** as well as trying to do your job [on time and safely]*	**Dark shading:** They would be need to give a quick answer so they would not be stressed (Low well-being)	**Bold and underlined:** Job demand to Respond to colleagues and coordinate with them	**Light shading:** Demarcating devices for different times and forms of communication
Memo for Text #2: When different devices are demarcated for different kinds of communication, BC-RMWs can respond more promptly to urgent communication because they do not have to respond to all communication all the time. This reduces the stress of interruptions and the need to be constantly available. It would also enable them to work with colleagues to get their work done.			

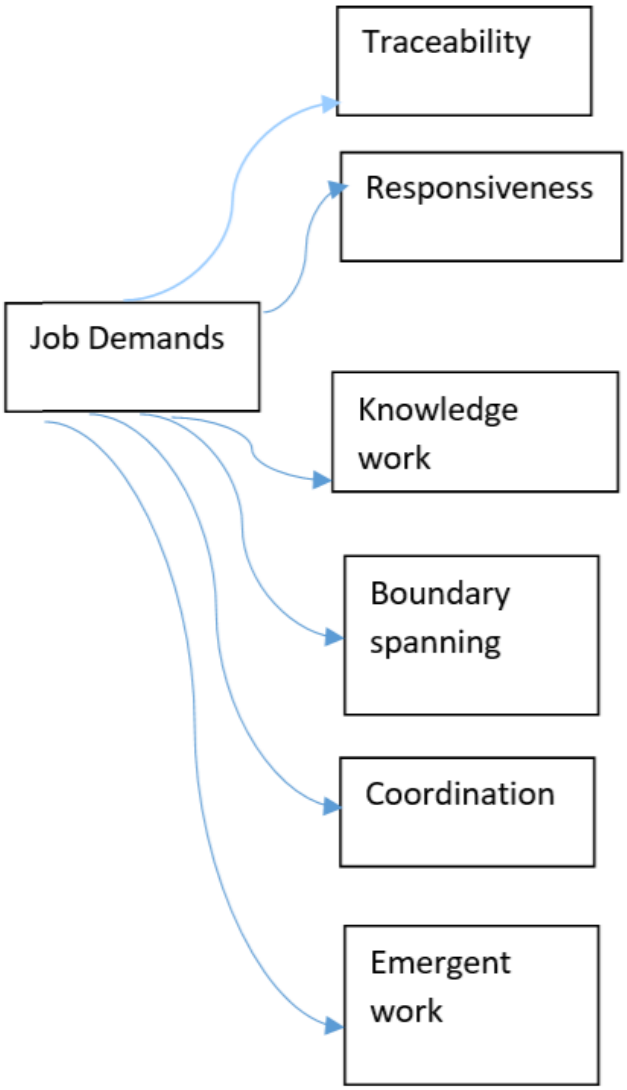

Figure D1. Memo: Example Diagrams for Category Subcategory Relationship

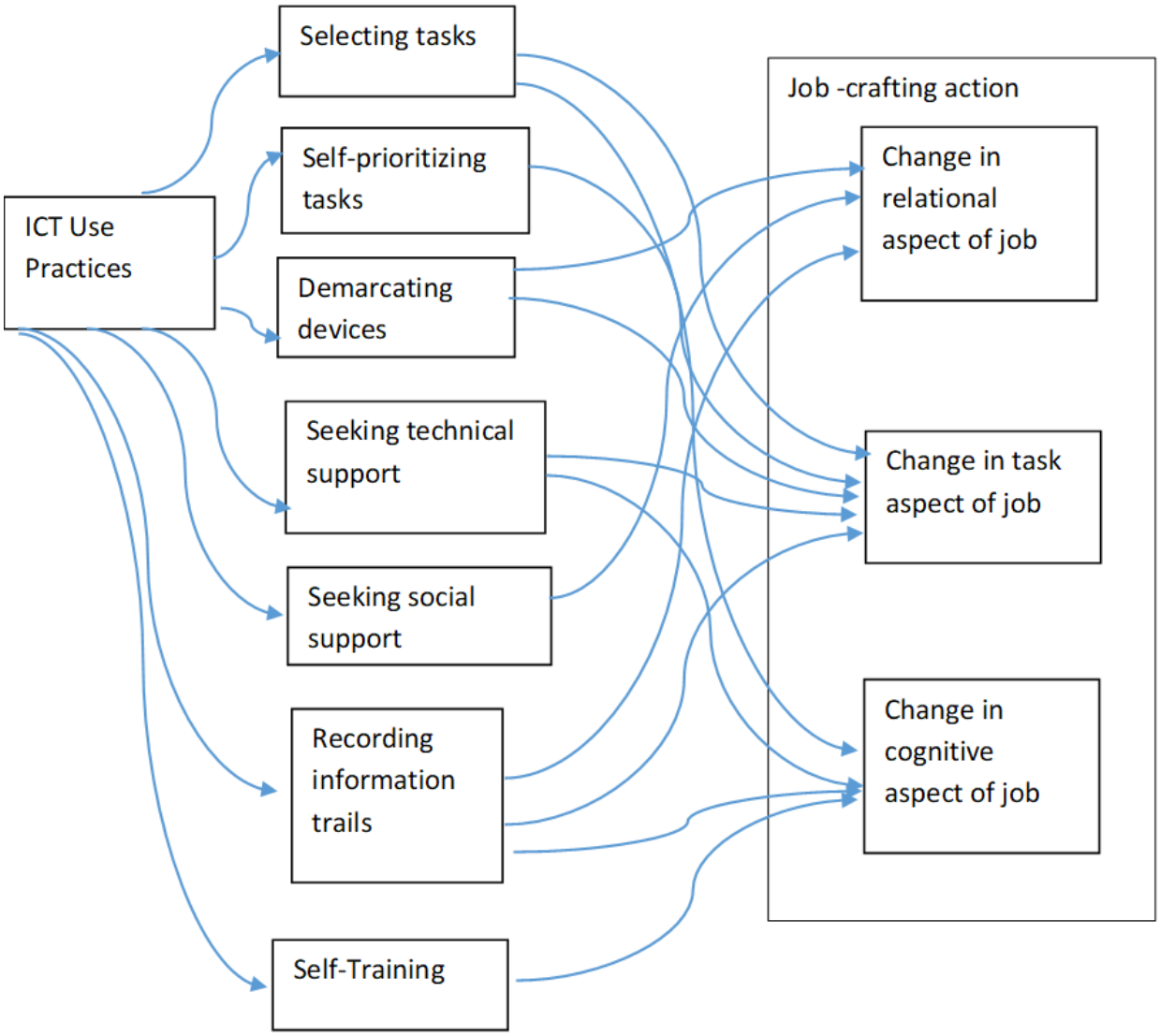

Figure D2. Memo: Diagrams for Core Category

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Carol Saunders is an Extraordinary Professor at the University of Pretoria and professor emerita at the University of Central Florida. Carol has received the LEO award in the information systems (IS) discipline and the Lifetime Achievement Award from the Organization Communication and Information Systems (OCIS) Division of the Academy of Management. She also is an Association for Information Systems (AIS) Fellow and a Schoeller Senior Fellow. She has served on a number of editorial boards, including a three-year term as editor-in-chief of *MIS Quarterly*. She was the general conference chair of ICIS 1999, program co-chair of AMCIS 2015, and AIS vice president of publications from 2016-2019. She helped found the OCIS division of the Academy of Management and served as its program chair and division chair. She was the Distinguished Fulbright Scholar at the Wirtschafts Universitaet—Wien (WU) in Austria and earlier held a Professional Fulbright with the Malaysian Agricultural Research and Development Institute. She has held research chairs in Germany, New Zealand, Singapore, and the Netherlands. Her research is published in top-ranked management, IS, computer science, and communication journals.