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## How does intensification and mobile rearrangement affect employee commitment

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*Wirtschaftswissenschaftliche Fakultät*

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**Betriebswirtschaftliche Reihe**

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Es wird gebeten, sich mit Anregungen und Kritik direkt an den Autor zu wenden.

# **How does intensification and mobile rearrangement affect employee commitment?**

Stephen Jeffrey, Heike Diller & Marina Fiedler

## **Abstract**

As mobile devices can support an employee's information and networking needs, we propose that they help employees develop a sense of involvement and identification, and thus commitment. We especially want to disentangle the positive and negative effects of three different types of ICT devices on commitment. We contribute to the literature in the following ways. First, we quantify the dual aspects of mobile technology: increased flexibility versus increased overload. Second, we synthesize the literature to understand when and why authors focus more on the positive or negative aspects of ICT usage. For this, we develop literature that examines ICT intensification, i.e., the increased use of technology, and mobile rearrangement, i.e., the increased use of mobile versus non-mobile technology. Third, we provide results in a more contemporary setting, whereas most previous results date back to 2006 or even earlier. Fourth, using media synchronicity theory, we explore mediums other than the dominant theme of e-mail. Regarding the pure intensification aspect, e-mail use is associated with a preferred working style but also with overload, and the same applies to telephone and messaging. In terms of rearrangement, mobile telephone use does not lead to techno-overload, but diminishes flexibility due to higher synchronicity. Both intensification and rearrangement lead to similar results regarding commitment, highlighting a more dominant role of rearrangement in producing commitment changes. Corporate policies should focus especially on rearranged telephone use, rather than limiting themselves to the intensification aspect, and should take the differences between media into account.

**Keywords:** Mobile devices; rearrangement; intensification; e-mail; telephone; messaging; techno-overload, preferred working style; commitment; media synchronicity theory.

## Introduction

Two developments in information & communication technologies (ICT) use reflect the current zeitgeist: first, people generally intensify their ICT use. Secondly, they rearrange their previous way of working from non-mobile to mobile use. We focus on these two aspects, intensification per se and rearrangement as a part of this intensified ICT use, and examine in what way intensified and rearranged device use influences employee's commitment.

According to recent studies by Accenture (2013), two billion people access the internet on their mobile devices. This also implies that for the first time ever, the number of mobile device users has surpassed the number of conventional desktop users. As shown by a plethora of studies dealing with computer-human interaction, the impact of devices (both mobile and stationary) on employees' working behavior is gaining in importance in practice as well as in theory (Venkatesh & Speier, 2000; Barkuus & Polichar, 2010). However, the effect of mobile devices on organizational life is a relatively new research area (Derks & Bakker, 2010) and we are unaware of other research that has quantitatively explored this relationship in more detail. Therefore, we not only support the large body of literature on qualitative studies but can also reveal new insights. Existing qualitative studies have provided many examples and explanations of the mobile technology paradoxes such as independence versus dependence (Jarvenpaa & Lang, 2005), but are currently lacking in size effects. Therefore, research on mobile devices is almost solely qualitative in design (Middleton & Cukier, 2006). The importance of mobile devices in general is highlighted in the study by Mazmanian, Orlikowski & Yates (2013), where respondents downplay the negative consequences or are hardly aware of them at all. Overall, it is not clear whether mobile devices, especially, have a greater effect and if that effect is overall positive or just better than that of general ICT use. We also address different media and their capabilities in this context.

Whereas some scholars point out that the benefits outweigh the drawbacks (Allen & Shoard, 2005; Cavazotte, Heliosa Lemos & Villadsen, 2014), others highlight the greater negative effects (Turel, Serenko & Bontis, 2011). Our position in this empirical research project is that we want to gain a better understanding of the intensification level regarding various types of ICT. In this context, the impact of ICT on employees' overload and autonomy-commitment perception is the second major point we want to explore. Within

this framework we also examine the ongoing change process from non-mobile use to mobile device use with a special focus on e-mail, telephone, and messaging.

It is not clear whether the key benefits and consequences of ICT use stem from intensified ICT use or rearrangement. We have established that both intensification and rearrangement can have positive and negative consequences, and thus it is of interest to quantitatively explore their relative impact, especially with regard to rearrangement. We can explore whether, as the literature states, the negative consequences stem from increased work per se, and whether the positive benefits result from what the literature identifies as rearrangement. With our study we wish to contribute in three ways.

First, no general consistent statement has been made regarding mobile ICT usage so far. A controversial discussion between the authors of qualitative studies is ongoing, with doubts raised about their research results. Cavazotte et al. (2014) write that Mazmanian et al. (2013) and Middleton (2007) ‘assert’ (p. 75) relationships, where in fact there may be none. We think that further insights could be obtained by quantitatively examining the double-edged nature of mobile communications and are currently unaware of similar studies. Moreover, while Mazmanian et al. (2013) as well as Middleton (2007) address smartphone usage in general, our aim is to look in more detail at users’ switching behavior between various types of media such as e-mail, telephone and messaging.

Second, by focusing on increased mobile ICT use, research makes no distinction between the genuine benefit of mobile technology and its unintended use. We therefore differentiate between the impact of ICT use per se and specifically the switching from non-mobile to mobile ICT use. Although solely looking at the rearrangement aspect may weaken the negative and strengthen the positive outcomes, we believe that taking rearrangement into account will deliver greater insights into the significance of flexibility and overload than just looking at increased mobile ICT use in general.

Third, given that even current research is based on old datasets, we want to refresh the data but also add new findings. Previous research such as Barley et al. (2011) use data from 2001/2002, Mazmanian et al. (2013) focus on 2005/06, and MacCormick, Dery & Kolb (2012) use older data too. Today, BlackBerry devices are less common, learning curve effects have led to individual knowledge gains on how to use devices, and there is greater preference for e-mail used on mobile devices despite widespread coverage of the negative effects of e-mail use. Just one recent study by Tarafdar, Pullins and Ragu-Nathan

(2015) is of a quantitative nature and specifically addresses technostress and its effect on sales performance. We thus believe that it is about time to reevaluate the (qualitative) results.

## **Theoretical Framework**

Our conceptual research model of how the different types of media are related to commitment is shown in Figure 1. In order to develop and quantitatively test our model, we consider the following points. We reflect the current literature and theory while making it empirically testable. We incorporate the duality aspect with ICT use. We explore how (mobile) technology is related to flexibility and overload and in a second stage, also commitment. Particularly important is the work of Mazmanian et al. (2013) and Mazmanian (2012). We want to understand employees' "capacity to perform as professionals" (p. 1338, Mazmanian et al., 2013) and their identification and involvement (Mazmanian, 2012) with mobile devices.

With reference to the autonomy paradox, Mazmanian et al. (2013) describe a situation involving increased mobile e-mail use, which leads to greater flexibility but also results in a collective escalation of engagement and techno-overload. This escalation itself diminishes flexibility. Other research highlights decreased autonomy from bureaucratic, concertive, cultural, market, or technological mechanisms (Barker, 1993; Evans, Kunda & Barley, 2004; Barley, Meyerson & Grodal, 2011; Barley & Kunda, 1992; Murray & Rostis, 2007; Perlow, 1998, Prasopoulou, Pouloudi & Panteli, 2006). This autonomy reduction therefore comes from the demands imposed by others, i.e., an overload. Thus we develop our model with overload affecting flexibility.

### ***Mobile Rearrangement → Commitment***

In Figure 1, we relate mobile rearrangement, i.e., switching from non-mobile to mobile devices, to the positive and negative outcomes that have been highlighted in the literature: flexibility and overload. According to Barley et al. (2011), e-mail is the key driver of the so-called double-edged sword of technology use and is even more powerful on mobile devices. Therefore the perception of overload is intensified due to the rearrangement aspect. However, at the same time, rearrangement may allow a higher level of autonomy and flexibility concerning when and where to complete one's work, but this also goes hand in hand with a higher availability after office hours or on weekends.

We relate overload to flexibility in response to Mazmanian et al. (2013), which is in turn related to commitment, and moreover integrate telephone and messaging use in our model to obtain a more differentiated and comprehensive picture.

There are grounds to believe that several mechanisms exist that can explain the link between mobile communication and commitment. Mobile technology literature suggests a trade-off between flexibility and overload. Intensification involves the increased use of both mobile and stationary devices, either from increased use per se or involving a switch from non-mobile devices. In contrast, mobile rearrangement involves the increased use of mobile devices, but as the sole result of switching from non-mobile to mobile devices. This classification helps us to distinguish between a larger number of positive and negative consequences of ICT use.

Communication technology offers greater flexibility and control over work (Hill, Hawkins, Ferris & Weitzman, 2001; Valcour & Hunter, 2005). When research focuses on more positive aspects, it highlights mobile rearrangement. Its increased portability, 24/7 accessibility, and accuracy are highly valued not only by “IT road warriors” (Ahuja, Chudoba, Kacmar, McKnight & George, 2007, p. 2). The obvious key difference between mobile and non-mobile technology is that the former allows users to work anytime and anywhere. Two new ways of operating arise due to mobile rearrangement: time slicing and time shifting (Govindaraju & Sward, 2005). Time slicing involves using time more efficiently, e.g., “convert smaller and smaller portions into valuable work time” (Govindaraju & Sward, 2005, p. 349), while time shifting involves distributing work around other obligations, such as family commitments. Cavazotte et al. (2014, p. 79) also refer to time shifting as “a relocation of tasks to new time slots and places”, but discuss the negative side in terms of missing boundaries as well. Allen and Shoard (2005) further highlight time slicing, using commuting time to work more efficiently, and conclude that more distributed work enables workers to “spread the load” (p. 12) and “ease some of the pressures created by information overload” (p. 1)

Most research on mobile devices almost exclusively focuses on increased e-mail use without specifying the switching aspect and neglecting other types of media such as telephone and messaging. Looking at non-mobile devices, Barley et al. (2011) find that employees prefer telephone communication. In both Allen and Shoard (2005) and Mazmanian et al. (2013), respondents report their preference for e-mail over telephone



communication. Generally speaking, the asynchronous properties of e-mail allow employees more flexibility as individuals can distance themselves from the mobile device impact (Mazmanian, 2012) by employing strategies such as queuing, approximation, multi-parallel processing, and escaping (Allen & Shoard, 2005). However, with switching to mobile devices the asynchronous properties are increasingly lost and with them the benefits of e-mail use. It is not intensification per se that causes this loss, but rather rearrangement. In terms of telephone use working anytime and anywhere is not always possible. It is harder to time slice and time shift. Rather than being able to multitask, during a meeting one may look at e-mails or the messaging but it is far harder to use the mobile phone. However, telephones, even in case of asynchronous use, should nevertheless be answered straight away. Employees want to satisfy the expectations and act as professionals, but quick responses can be wrong, false impressions and wrong decisions can occur rapidly. The former benefit of using telephones asynchronously and therefore having time to make decisions is diminished by the implicit need for the high synchronicity that comes along with rearrangement and is typically imposed by organizations.

Mobile devices can also lead to negative outcomes. They are thought to bring about overload as they increase one's workload, either by allowing work to spill over into other domains or because of the technology and its material features and properties (Barley, 2011; Boswell & Olson-Buchanan, 2007), e.g., e-mail allows for more work to be sent or interrupts employees' concentration. As Barley et al. (2011) put it, "The common denominator that cuts across the two foregoing bodies of research is that e-mail and other communication technologies induce stress by extending the time that people work, but the explanations differ" (p. 889).

However, it is not clear whether all these effects stem solely from extending employees' working hours. Although work can more easily spillover into the family domain, mobile technology can also be thought as a work-family balance device. Employees can finish work early and continue working later at home. It is not necessarily the case that extra working hours are always piled on top and that work is not purely time shifted. Alternatively, e-mail is said to create distractions or be used as a task scheduler. In this case, it may actually reduce overall working time as these distractions may be more important; or taking a break from one's actual work may help to solve other problems. Additionally, using e-mail to schedule work may actually decrease working time as things

run more smoothly. The same is true for (mobile) telephone and messaging use. Employees receiving a messaging note or a call on their mobile device do not automatically work more. They can use their commute to respond to messages or make quick calls that would take more time to complete in the office. Overall, we question the importance of working hours increasing due to mobile technology and also search for other factors.

Even within mobile rearrangement, negative outcomes can ensue, although if it is truly unproductive time or spare time, this can reflect a better use of time. Commuting may be dead time as nothing really gets done, but it can also be used to relax, which may be seen as time to recuperate. However, in this context it may also cause problems associated with disconnecting, relaxing, and multitasking. Although employees do the same amount of work, they may feel more stressed due to not being able to disconnect, relax or deal with all situations at once. Having the feeling of being constantly connected may in fact be worse than to actually be constantly connected. Being available 24/7 and actually working 24/7 are two different matters. This growing multi-modal connectivity offers various ways to be more flexible in terms of when and where to complete one's tasks, but simultaneously requires employees to allow a constant ICT companion to invade their personal space. As a consequence, employees often "feel simply inundated with information and forced to work faster to cope with increased processing requirements" (Tu, Tarafdar, Ragu-Nathan & Ragu-Nathan, 2008, p. 2). One important aspect in this discussion is the role of synchronous versus asynchronous devices. We therefore further this understanding through media synchronicity theory (MST; Dennis, Fuller & Valacich, 2008). Rather than considering ICT use per se, it is necessary to examine the underlying media capabilities provided in more detail in the following paragraph.

According to Dennis et al. (2008), media capabilities are defined as features that impact on how individuals transmit and process information. There are five media capabilities that lead to synchronicity and therefore foster conveyance and convergence communication processes: transmission velocity, parallelism, rehearsability, reprocessability, and symbol sets. While telephone generally is a highly synchronous medium, e-mail is a weakly synchronous medium. Messaging can be used either asynchronously or synchronously depending on their users. We discuss how the media capabilities of telephone, e-mail and messaging facilitate or reduce synchronicity as well as employees' way of working.

Transmission velocity, i.e., the speed at which a medium can transmit a message to recipients, is slightly lower for messaging and e-mail than for telephone. The faster velocity of telephone allows quicker response times and enables a continuous exchange, which improves conveyance, allows for quicker feedback, and facilitates a ‘normal’ conversation (Goffman, 1967; Rogers, 1986; Schegloff, 1987). This allows for better coordination as well as a shared focus. Nonetheless, it is important to keep in mind that e-mail could be used, and in fact is already used, with high velocity due to the “push function”.

Parallelism, the extent to which signals from more than one sender can be delivered by the medium simultaneously, is greater for e-mail and messaging than for telephone and therefore “reduces the interactional coherence of the discussion and impairs the ability of the users to develop a shared focus” (Dennis et al., 2008, p. 585). Thus, a high level of parallelism helps to send messages to and receive messages from various users simultaneously which leads to multidirectional information transmission, but in the same time reduces synchronicity as it limits a shared focus.

Rehearsability, the extent to which media allows the sender to fine-tune a message during encoding before transmitting to the recipient, is greater for e-mail and messaging than telephone. With greater rehearsability, senders can carefully craft a message so it conveys the intended meaning and enhances recipients’ decoding and information processing. Hereby the convergence communication process benefits from a high level of rehearsability. However, this can create delays in transmission as it takes longer to compose the message. This has a negative effect on the shared focus and therefore reduces synchronicity.

Reprocessability can help both sender and recipient to include prior messages in the information transmission process. The feasibility of re-reading or re-considering prior messages is greater for e-mail and messaging than for telephone as both sender and recipient can follow the progress of the communication, which of course can again cause delays and therefore increase convergence but diminish synchronicity.

Symbol sets demonstrate the various ways a medium allows information to be transmitted. Possible symbols include handshakes but also verbal or written communication. Some symbols are easily comprehensible, while others are difficult to encode and decode and therefore could lead to delays. Generally speaking, it is easier and

faster to encode a verbal message (by telephone) than a written message by e-mail or messaging, but as for decoding, it's easier to read than to listen (Williams, 1977). Essentially, the use of verbal or visual symbols accelerates the transmission process, resulting in a shared focus and therefore higher synchronicity than the use of written symbols such as e-mails or the messaging.

In a nutshell, although e-mail can be used more and more synchronously, it is less suited to synchronous use than the telephone. Consequently, we can argue that better communication performance may result if an individual uses the telephone to generate agreement on a plan of action (higher synchronicity matched with a convergence communication process), but if the individual is concerned that his/her arguments may be stated poorly, communication performance may actually be improved if he/she uses e-mail or write a message instead, as both of these media allow the sender to rehearse and reprocess his/her arguments before presenting them. This applies to both, mobile and stationary devices. The last aspect addresses the specific nature of mobile devices and refers to the level of urgency. Authors of qualitative studies involving interviews have found that communication via mobile devices is perceived as more urgent than non-mobile. Accordingly, communication by conventional telephone is regarded as less urgent than that by mobile device. Generally speaking, the perceived urgency of mobile communication increases the "norm of responsiveness."

However, one question remains concerning the effect of mobile devices. Do these devices foster the positive or the negative aspects of communication compared to non-mobile devices?

Overall, when comparing e-mail, messaging and telephone use, e-mail and messaging can slow down the conversation as they offer lower transmission velocity, greater rehearsability and reprocessability, and fewer symbol sets. This slows down information transmission and increases information processing, resulting in an improved preferred working style. However, e-mail and messaging can also lengthen conversations unnecessarily through parallelism, with the propagation effect of more CC messaging and in turn, more information received inertly (McMurtry, 2014) because more employees are involved in an e-mail conversation than is actually necessary (Allen & Shoard, 2005), resulting in perceived techno-overload. This applies to mobile e-mail and messaging use

as well, which is accompanied by an increased norm of responsiveness and urgency and therefore increased synchronicity due to rearrangement.

Yet as employees become increasingly mobile they do not have to use e-mail and messaging asynchronously. According to the line of reasoning above, we expect that mobile telephone communication likely has more negative effects: less preferred working style and more overload given its high level of synchronicity.

Hypothesis 1 reflects our assumption that low synchronicity maintains the benefits of mobile device use such as improved preferred working style and therefore higher flexibility. Hypothesis 2 is based on our assumption that synchronicity makes overload more severe. According to Allen and Shoard (2005, p. 3) 'it is not technology that causes information overload, but rather its use'. We thus expect synchronicity, together with the underlying media capability levels, to be the key driver of perceived techno-overload.

*Hypothesis 1. The lower the mobile medium's synchronicity, the greater the effect of mobile rearrangement on preferred working style.*

*Hypothesis 2. The greater the mobile medium's synchronicity, the greater the effect of mobile rearrangement on overload.*

With reference to the previous discussion it is not surprising that research has highlighted the tensions, dualities, and paradoxes evoked by ICT. In recent years mobile technology research has explored many tensions. The earliest detailed description of eight tensions (Jarvenpaa & Lang, 2005), which were further examined in later literature, covered empowerment versus enslavement, independence versus dependence, fulfillment of needs versus creation of needs, competence versus incompetence, planning versus improvisation, engagement versus disengagement, public versus privacy, and illusion versus disillusion. Further tensions have been explored such as functional versus dysfunctional uses (Middleton & Cukier, 2006), anywhere and anytime versus all-the-time and everywhere, empowering versus enslaving, and liberation versus addition (Middleton, 2007) as well as flexibility versus control (Mazmanian et al., 2013). So far it is not clear which effect is stronger for which medium.

On top of this, in a meta-analysis Meyer, Stanley, Herscovitch and Topolnytsky (2002) find that work experience variables are more strongly related to affective commitment than personal characteristics, and that perceived organizational support has the strongest

positive correlation with affective commitment. Other studies have shown that enriched jobs are likely to yield higher commitment (Mathieu & Zajac, 1990; Steers, 1977), a finding that has since been empirically validated. Therefore, we expect that both overload and flexibility mediate the relationship between ICT use, both intensification and mobile rearrangement, and commitment.

This is particularly interesting for several reasons. First, the literature focuses on more direct outcomes of mobile use, especially flexibility and overload. Although some literature highlights the capacity of mobile devices to help employees reach their aspirations (Mazmanian et al., 2013) and of e-mail to create stress (Barley et al., 2011), we believe the link to commitment shows the entire dimension of mobile device use and thus rearrangement influencing employees' way of work. This linkage is especially true when one considers the further consequences of commitment. Organizational commitment is of central importance to a wide range of organizational outcomes (Mathieu & Zajac, 1990; Randall, 1990), such as absenteeism, turnover, intention to search for other jobs or leave the organization (e.g. Allen & Meyer, 1996; Meyer et al., 2002; Somers & Casal, 1994; Tett & Meyer, 1993), performance measures (e.g. Larson & Fukami, 1984; but see Meyer & Allen, 1997; Randall, Fedor & Longenecker, 1990; Meyer et al., 2002; Carmeli & Freund, 2004), organizational citizenship behaviors (Ilies, Scott & Judge, 2006). Committed employees are more likely to encounter better opportunities for promotion, increase their rate of pay, and develop their competence levels (McClean & Collins, 2011; Park, Yang & Lehto, 2007). Committed employees are also highly related to positive organizational outcomes such as low drop-out rates (Arnold & Davey, 1999; Arthur, 1994; Cohen & Hudecek, 1993; Somers & Bimbaum, 2000), more dependable employees (Angle & Lawson, 1994), better performance by employees (Suliman & Iles, 2000), higher productivity levels (Tjosvold, Sasaki & Moy, 1998) and higher levels of employee involvement (Brett & Stroh, 1997). As mobile devices affect employees' organizational commitment, in a broader context they could also affect the organizational outcomes listed above.

We seek to understand how and which (mobile) devices can lead to more committed employees. Commitment literature defines affective commitment as "the employee's emotional attachment to, identification with, and involvement in the organization" (Allen & Meyer, 1990, p.67; 1996; see also Meyer & Allen, 1988; 1997; Reichers, 1985). It

represents a psychological bond through which employees align their values and goals to those of the organization (e.g., Allen & Meyer, 1990, O'Reilly & Chatman, 1986).

By contrast, mobile technology literature has established that mobile technology enables employees to work anytime and anywhere, giving them greater access to information and colleagues, at work or in other domains. According to Perry, O'Hara, Sellen, Brown and Harper (2001, p. 9), "anytime" can mean "'dead" time, "travel" time, "spare" time or "wasted" time". "Anytime" can mean first thing in the morning, during meals, commuting, when others are present such as at family meetings, with friends or in meetings, or just before going to sleep. "Anywhere" can mean in bed, in restaurants, in cars, buses, on planes, etc., in social settings, or on holiday. It is thus not surprising that through greater communication, either at work or outside of work, for instance being constantly available, as well as through better information and relationship-building, mobile devices can create greater commitment to, identification with, and involvement in the organization. However, there are no studies that have addressed commitment in a comprehensive manner. Prior research has looked at job satisfaction (Diaz et al., 2012), aspirations and marginally commitment (Mazmanian et al., 2012). Commitment, i.e. identification and involvement, along with its many consequences, seems more ideal.

Early literature focuses on intensification, respectively a direct relationship between computer-mediated communication and commitment, highlighting better access to information and more active participation (Huff, Sproull & Kiesler, 1989; Wiesenfeld, Raghuram & Garud, 1998). Other research has found communication to be an important antecedent of commitment (Foy, 1994; Katz & Kahn, 1978; Mathieu & Zajac, 1990; Meyer & Allen, 1997). However, this is not always the case (e.g. Boswell & Olson-Buchanan, 2007). As discussed previously, we believe that through overload and preferred working style, mobile communication can also lead to commitment, but only if accompanied by a low synchronicity level.

*Hypothesis 3. The lower the mobile medium's synchronicity, the greater the effect of mobile rearrangement on affective commitment.*

Intensification not just means increased work time from using ICT, such as when it spills into the family domain, it also refers to its increased use from switching from other forms of engagement, such as face-to-face interaction, or on other devices, such as non-mobile

devices. If we look at the general use of e-mail, telephone and messaging, we capture the intensification of ICT use as a whole, mobile as well as stationary.

Intensification is said to be the main cause of negative effects. If we hold working time as well as overall e-mail, telephone and messaging use constant, we would thus expect that rearrangement is related neither to overload nor to preferred working style. However, mobile ICTs demand simultaneous and hence immediate action due to the increased synchronicity. This synchronicity leads to a “norm of responsiveness” and constant connection that links employees to their organizations.

We therefore expect:

*Hypothesis 4. Rearrangement use represents the largest effect on affective commitment.*

## **Method**

### **Sample and Procedure**

Using a database from a German recruitment company specializing in information and communication technology, we contacted respondents by personal e-mail in June 2013. We sent a personalized direct link to our online questionnaire, which we had pre-tested in April 2013 with 37 participants to prevent any misinterpretations or irritations at the final stage. The survey was conducted over a two-week period. We removed questionnaires with large amounts of missing data. In total we received 877 responses, with 479 respondents fully completing the questionnaire. 29.6% ( $n = 142$ ) of respondents were female, 71.4% ( $n = 342$ ) were male. The average age was 45.42 ( $SD = 9.97$ ) years. 37% of participants worked in the ICT industry, 19.6% were referees or clerks, 37.8% were heads of department, 24% were managers or directors and 7.5% were board members. 63.5% used a company smartphone and 18.4% used their own personal devices. Asked about the general impact of telephone, 75.6% of the participants stated that the telephone impacted their work life at least to a fair extent. 88.1% rated e-mail as having at least a fair impact. 27.8% rated text messages as having at least a fair impact on their lives. 15.7% considered messaging services such as ICQ or Skype to have at least a fair impact on their lives, while only 7.8% stated that video conferencing played a major role in their life.



## Measures

We used a seven-point Likert scale from 1 to 7.

**Mobile e-mail use.** We measure this variable by asking how often respondents use mobile devices for the specific telephone, e-mail and messaging functions, with responses given on a scale of 1 (never) to 7 (very often), which is typically measured by single items for example, the amount of time spent and the frequency of use (Anakwe, Igbaria & Anandarajan, 2000; Igbaria & Greenhaus, 1992). This variable captures the use of e-mail, messaging and telephone use on a mobile device, but does not separate increased work from work rearranged from use on a non-mobile device.

**Mobile rearrangement.** To capture this aspect, we have to control for general use. Regression coefficients are interpreted holding other controlled variables constant. For example, an increase in mobile e-mail use, holding general e-mail use and working hours constant, represents a rearrangement. Without these controls, our mobile communication use reflects an increase in mobile use rather than switching. By doing this, we can better explain mobile rearrangement, which represents a relative decrease in non-mobile use and no change in working hours as these are both held constant, and thus can better measure mobile rearrangement.

**Intensification.** We measure the general ICT use by asking respondents ‘On a regular day, how often do you use e-mail/telephone/messaging?’ with responses given on a scale of 1 to 7. We also control for actual working hours. The results with or without working hours are similar. Telephone and messaging use is measured analogically.

**Techno-overload.** To measure this variable we used the five-item subscale of Tarafdar et al.’s (2007) validated techno-stress scale. This construct, which measures the negative effects of mobile use, focuses on overload from technology expressed as working faster and more. A sample item is “Due to this technology, I am forced to work much faster”. To measure the positive effect of mobile use, we use the following variable.

**Preferred working style.** This variable is measured by Karahanna, Agarwal & Angst’s (2006) four-item scale. Similar to autonomy, it reflects the capacity of technology to enable a preferred way of working. A sample item is “Due to this technology, I can work in the way I prefer”. We adapt both scales to have similar wordings and also to highlight the ordering, i.e., technology use happens first which makes individuals work faster or work in the way they prefer.

**Affective commitment.** We use the short version by Allen and Meyer (1990), using four items. A sample item is “I do not feel emotionally attached to this organization” (reversed coded). Affective organizational commitment captures identification with and emotional attachment to an organization but also involves general commitment (Solinger, van Olffen & Roe, 2008). All items were measured on a scale of 1 (strongly disagree) to 7 (strongly agree). Table 1 presents scales, means, standard deviations and intercorrelations for the included variables.

**Control variables.** We include supplemental controls such as gender, ICT expertise, and marital status.

## **Data Analysis**

To perform our analyses, we use structural equation modeling (SEM). We decided to use structural equation modeling as this method allows us to test our hypothesized relationships simultaneously and also to estimate the goodness-of-fit of the data to our hypothesized model. The goodness-of-fit indices are in an acceptable range. According to Bagozzi and Yi (1988), composite reliability (CR) should have a value exceeding 0.6. We use the average variance extracted (AVE) which is above 0.5 to measure convergent validity. The composite reliability exceeds AVE (Fornell & Larcker, 1981). In order to take discriminant validity into account, we control for the maximum shared variance as well as the average shared square variance to be less than AVE. One concern is the strong correlation between mobile e-mail use and mobile telephone use. To check whether multicollinearity is an issue, we calculate the variance inflation factor (VIF) in separate regressions within our model (Bowen & Guo, 2011). The largest VIF is less than two, which is in line with Diamantopoulos, Riefler & Roth (2008). Further, we also run our models focusing on either e-mail, messaging, or telephone variables, and find similar conclusions and results. We therefore believe multicollinearity to be a minor issue.

## **Results**

Table 1 shows the mean, standard deviations and intercorrelations of the variables. We also perform a confirmatory factor analysis (CFA) to take the factor structure of the variables into account. Items loaded on the correct construct above .5 and no cross-loadings above .4 were present. We therefore have unidimensionality and discriminant validity across factors. There was one exception. One item on the affective commitment

scale, “I do not feel a strong sense of belonging to my organization”, loaded under .4 and was dropped from the subsequent analyses.

Table 1. Means, standard deviations and intercorrelations

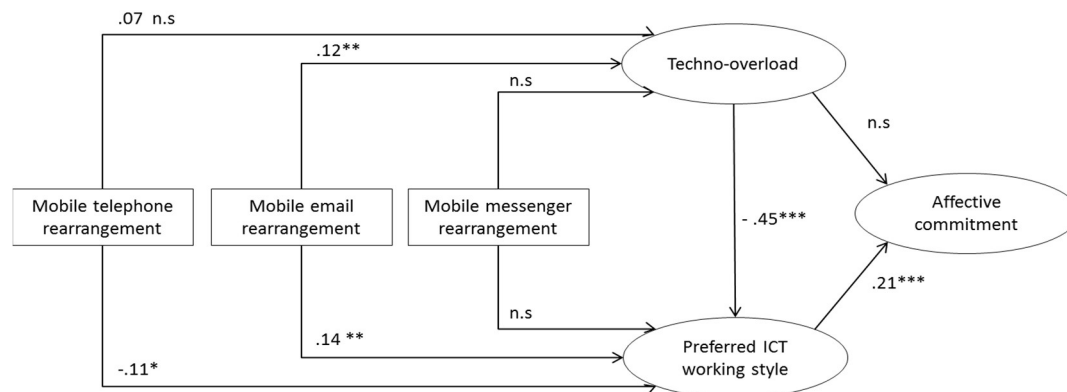
Construct	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Mobile E-mail	4.76	2.11								
(2) Mobile Telephone	4.79	1.84	.65**							
(3) Mobile Messaging	2.73	1.79	.38**	.27**						
(4) General E-mail	6.81	0.51	.19**	.18**	.11*					
(5) General Telephone	6.08	1.16	.13**	.36**	.07	.34**				
(6) General Messaging	2.55	1.57	.17**	.17**	.61**	.11*	.06			
(7) Techno-overload	3.89	1.61	.21**	.22**	.12**	.19**	.21**	.13**		
(8) Working style	4.36	0.58	-.00	-.06	-.04	.09*	.06	.07	.37**	
(9) Commitment	4.99	0.89	.02	.08	.02	.01	.08	-.03	-.13**	.16**

\*\*\* =  $p < .001$  sig.; \*\* =  $p < .05$  sig.; \* =  $p < .1$  sig; n.s. = not significant

## Model Overview and Assessment

The structural equation model is estimated as shown in Figure 1 and 2.

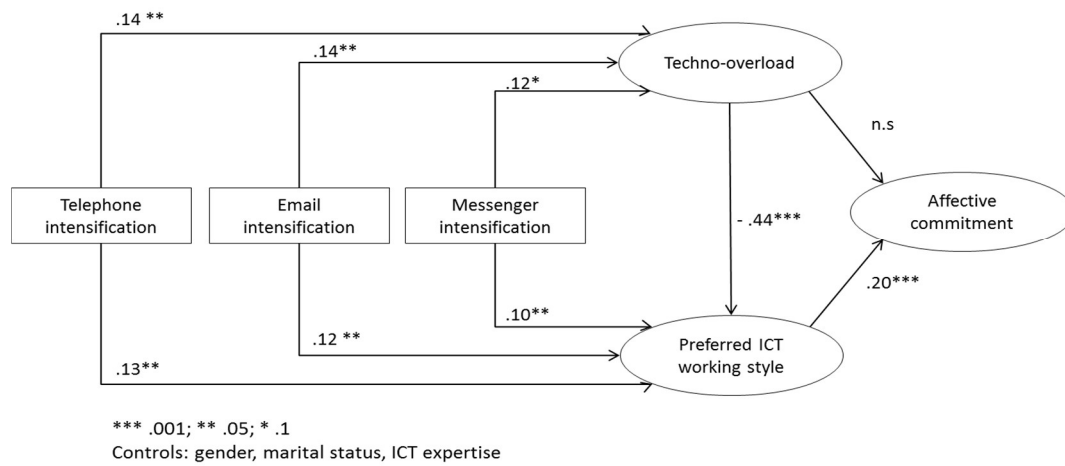
Figure 1. Research model rearrangement



\*\*\* .001; \*\* .05; \* .1

Controls: gender, marital status, ICT expertise

Figure 2. *Research model intensification*



We include several supplemental controls in our model to control for the impact of gender, marital status, and ICT expertise. We exclude these variables from the figures for the sake of clarity. Besides, these variables are treated like the other exogenous variables. The model fit statistics of the models are all in the satisfactory range. Our chi square/df ratio for rearrangement of 3.188 lies between 1 and 5 (Kline, 2005),  $p < .001$ . Regarding intensification we obtain a chi square/df ratio of 2.522. Although the root mean squared error of approximation (RMSEA) of .068 for our rearrangement model is slightly above the general consensus of .06 (Hu & Bentler, 1999), the strict upper limit of .07 (Steiger, 2007) is not exceeded. In terms of intensification RMSEA is .056. The comparative fit index (CFI) for our rearrangement model is .91, for the intensification model it is .94 and the Tucker-Lewis index (TLI) is .88 versus .92, where values greater than or equal to .90 are indications of good fit (Baumgartner & Homburg, 1996). Therefore, both CFA and SEM seem to fit the data well. The fit indices are given in Table 2 and a graphical depiction is given in Figures 1 and 2. The detailed model is shown in Table 3 (Appendix).

Table 2. *Fit Indices for Model Comparison (AMOS)*

<i>Model</i>	$\chi^2$	<i>df</i>	CFI	TLI (NNFI)	RMSEA	$\Delta\chi^2$	$\Delta df$
Model 1 Rearrangement	580.31	182	.91	0.88	.068		
Model 2 Intensification	383.33	152	.94	0.92	.056	196.98	30

Note.  $df$  = degrees of freedom; CFI = comparative fit index; TLI (NNFI) = Tucker-Lewis index; RMSEA = Root mean square error;  $\Delta \chi^2$  = change in chi-square;  $\Delta df$  = change in degrees of freedom.

## Hypothesized Relationships

To test Hypothesis 1, namely that mobile rearrangement improves preferred working style with increasing asynchronicity, we compare the effects of the three following types of rearrangement: mobile e-mail, mobile messaging, and mobile telephone. We evaluate the modification of the variable mobile e-mail use, holding working hours and overall e-mail use constant. From Table 3 and Figure 1, we see that the coefficient on preferred working style is negative for mobile telephone use ( $-.11$ ,  $SE = .05$ ,  $t = 1.92$ ,  $p < .1$ ), positive for mobile e-mail use ( $.14$ ,  $SE = .04$ ,  $t = 2.43$ ,  $p < .05$ ) and insignificant for messaging use ( $.08$ ,  $SE = .05$ ,  $t = .228$ ,  $p > .1$ , n.s.). Hence, we find significant differences in the effect of mobile rearrangement on preferred working style. This positive effect increases with more asynchronous mediums. Therefore, we find support for Hypothesis 1.

To test Hypothesis 2, namely that mobile rearrangement increases overload with increasing technology synchronicity, we compare the effects of e-mail, messaging, and telephone rearrangement on techno-overload. Here, we find insignificant effects of telephone ( $.07$ ,  $SE = .06$ ,  $t = 1.18$ ,  $p > .1$ , n.s.) and messaging ( $.01$ ,  $SE = .07$ ,  $t = .21$ ,  $p > .1$ , n.s.), but an increasing effect from mobile e-mail use, i.e., mobile e-mail rearrangement ( $.12$ ,  $SE = .17$ ,  $t = 2.45$ ,  $p < .05$ ) on techno-overload. Therefore, we find no support for our hypothesis.

Hypothesis 3, which states that mobile rearrangement has a greater effect on commitment with more asynchronous media, can already be partially supported. As we find support for Hypothesis 1, we also expect that the effects on commitment to be greater. To test this, we bootstrap the effects of mobile rearrangement on commitment (Appendix Table 4). We find that telephone rearrangement has an indirect negative effect on commitment of  $-.033$  [ $p < .05$ , CI:  $b_{\text{lowerbound}} = -.082$ ;  $b_{\text{upperbound}} = -.00$ ], while mobile messaging rearrangement has an insignificant effect of  $.004$  [95% CI:  $b_{\text{lowerbound}} = -.024$ ;  $b_{\text{upperbound}} = .040$ ] and mobile e-mail rearrangement has an insignificant effect of  $.004$  [95% CI:  $b_{\text{lowerbound}} = -.034$ ;  $b_{\text{upperbound}} = .048$ ]. Therefore, although we reject different effects of rearrangement on techno-overload, the differing effects of the three types of mobile use

on preferred working style result in different effects on commitment. Thus we find support for Hypothesis 3.

For our final Hypothesis 4, namely that increased use due to rearrangement or switching has the largest effect on commitment, we compare our previous model with the new one. Now, e-mail use represents e-mail intensification and thus increased ICT use of e-mail, this time without overall e-mail use as observed variables. E-mail intensification therefore can represent increased work and increased e-mail use per se. In comparison to the previous model shown in Figure 1, we find a slight decrease in the effect of e-mail use on preferred working style (.14 to .12), a small increase in the effect of e-mail use on techno-overload (.12 to .14), a significant increase in the effect of telephone use on techno-overload (.07 to .14), and a major shift in the effect of telephone use on preferred working style (-.11 to .13). In terms of messaging use, intensification leads to an increase in the coefficient from .012 to .10 regarding preferred working style as well as an increase with respect to techno-overload from -.012 to .12. Thus, rearranged use represents a large proportion of the positive and negative effects of ICT use. In regard to telephone use, rearrangement has more negative effects on preferred working style, but slightly better effects on overload. The total effects on commitment are however very similar, for instance regarding the direct effect of telephone use (.106 versus .081). To summarize, we can conclude that rearrangement, unlike other factors in intensification, is a significant problem. This is specifically reflected in the major loss of preferred working style with reference to synchronous, rearranged telephone use. Therefore, we find support for Hypothesis 4.

## **Discussion**

In line with Barley et al. (2011) we find that mobile e-mail use is associated with enabling preferred working style and increasing overload. We go one step further and also analyze telephone and messaging use in this context, examining their effect on preferred working style and overload, which produces differentiated results. The majority of scholars conclude that the negative effect is stronger than the positive, although the respondents state that they perceive the negative effect as small (e.g., Mazmanian et al., 2013).

## **Theoretical Implications and Future Research**

We can partially explain why most of the literature focuses on tensions. We find that in fact, in many situations the positive effects are as strong as the negative. Although some respondents have downplayed the negative aspects in previous studies, either because they are not aware of them (Mazmanian et al., 2013) or because the positive aspects outweigh the negative ones (Cavazotte, 2014), we find that tensions are very similar across different device uses in terms of pure ICT use. Most employees perceive overload but at the same time higher flexibility.

Although we focus on mobile rearrangement, and thus assume away the negative aspects of mobile use, we still find dualities within mobile device use. This is in line with previous research, but takes away the explanation of increased working *per se* or the escalation of use as an explanation.

E-mail on mobile devices unfortunately minimizes the asynchronicity of e-mail communication due to the push function. Mobile telephone use strengthens the synchronicity of telephone, with less techno-overload but also with a negative effect on preferred working style. In effect, employees can now deal with the problems connected to changed working conditions, but not in the way they want. The different types of usage have both good and bad sides, and it is not possible to take just the positive or just the negative into account – both have to be dealt with.

We can further explain why e-mail is so ubiquitous and why employees are choosing e-mail over telephone. Employees are freer to choose how to work, which can create a sense of belonging and thus commitment.

To summarize, the analysis of whether ICT use in general is good or bad is not far reaching enough. It is therefore useful to take a multi-faceted approach as we have to deal with a complex entanglement between people and machines in this context. In line with Mazmanian (2013) and Venkatesh and Speier (2000), we state that for researchers it is necessary to have technological frames as an ongoing & interpretive process in mind as employees' perceptions regarding technology use determine their behavior. With this paper we want to deepen these insights regarding media synchronicity theory by focusing on different types (synchronous versus asynchronous and mobile versus non-mobile) and on the media capabilities of devices and their specific impact on employees. Regarding future research it may be interesting to control for types of conversation by telephone and e-mail as well as the number of calls and e-mails per day, as perception is always

subjective. While one employee may feel techno-overload if they handle ten e-mails or calls per day, another may handle 30 per day without feeling overloaded at all, whether they handle them on a mobile or non-mobile telephone.

Future research may also wish to focus on the importance of voice as an instrument to transmit information. As written communication lacks undertone, e-mails and messages via messaging could be misinterpreted, which requires time to clarify. This could be an issue especially with mobile e-mail communication as well as mobile messaging communication. Yet mobile telephone communication could also be affected due to poor reception and hurried calls, resulting in partial communication and a lack of time to discuss things properly.

## **Limitations**

We examine perceptions regarding ICT use employing personalized online questionnaires which were sent out via e-mail. This could result in a respondent bias, as respondents who are personally affected by the dominance of ICT in their working life are possibly eager to communicate their point of view. By contrast, employees who deal regularly with ICT in the shape of many calls and a large number of e-mails in their inbox etc. may have decided not to answer the questionnaire due to an ICT-induced lack of time. Scholars are still arguing whether surveys are an appropriate research design in this context, stating that common method bias may be an issue (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). We are aware of this and therefore carry out current tests to control for any bias. According to Harman's single-factor test, common method bias is a severe problem if a single factor accounts for the majority of the variance in the model. This is not the case in our study as the single factor, including all items used within the model, only explains 30.83% of the variance. The second test we conduct is the marker variable method (CLF) to explore the common variance. We also include a latent marker variable that is uncorrelated to the variables in the model and then connect it to all observed items in the model. We then add a common latent factor and examine the common variance shared between the factors integrated in the model as well as the unrelated factor. The common variance is under 1%, suggesting there is no common method bias.

Another point we want to address is causal ordering. We are aware that other researchers have dealt with this topic in several ways. Karahanna et al. (2006) argues another way around it, however that study involves modified variables and therefore a different



understanding of ordering. Boswell and Olson-Buchanan (2007) also approach the matter from the other side with commitment. Mazmanian et al. (2013) suggest a cyclical nature and Diaz (2012) looks at preferences (flexibility) before CT use. There are certainly several ways to debate ICT use in the workspace, yet all these studies seek to search for knowledge gain and to develop new ideas.

## **Practical Implications**

Our research question, namely the impact of changing usage behavior in terms of intensification and rearrangement, affects employees in their day-to-day working lives. A differentiation between the different technological features allows for a more detailed and nuanced understanding. According to our findings, e-mail use has almost the same effect on techno-overload and preferred working style. Preferred working style is improved in terms of rearrangement and increased ICT use. Therefore e-mail use is perceived positively by employees with regard to the intensification aspect and likewise in terms of the rearrangement aspect, but techno-overload is perceived as harmful in terms of e-mail intensification and rearrangement. Regarding telephone use it is interesting to see that telephone use increases techno-overload through intensification, but only affects preferred working style in a positive way in terms of intensification. Messaging use is very specific as this has significant effects only regarding intensification.

As a scientific finding we can state that the use of devices, whether mobile or non-mobile, does not follow any classic rule due to the media capabilities. Generally speaking, there is clearly no single solution. It is thus not possible to conclude that ICT intensification per se leads to more overload. There are single aspects of ICT use such as the switching from non-mobile to mobile devices that affects techno-overload and preferred working style perception. Organizations have no incentive to adopt policies to reduce overload, as this may cause more harm than good. But they should take mobile telephone rearrangement into account, as it has clearly negative effects in terms of preferred working style. Thus, increased synchronicity and its consequences for employees is an issue that has to be addressed.

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## Appendix

### TABLES

Table 3. *Structure equation modeling results (AMOS)*

Structural estimates	Model 1 (Rearrangement)	Model 2 (Intensification)
	$\chi^2/df = 3.188$	$\chi^2/df = 2.522$
	$\chi^2 = 580.31$	$\chi^2 = 383.33$
	$df = 182$	$df = 152$
	SRMR = .07	SRMR = .052
	TLI = .88	TLI = .92
	CFI = .91	CFI = .94
	RMSEA = .068	RMSEA = .056
Mobile telephone rearrangement → Techno-overload	.07 (1.18) n.s.	
Mobile telephone rearrangement → Preferred working style	-.11 (-1.92)*	
Mobile e-mail rearrangement → Techno-overload	.12 (1.95)*	
Mobile e-mail rearrangement → Preferred working style	.14 (2.43)**	
Mobile messaging rearrangement → Techno-overload	n.s.	
Mobile messaging rearrangement → Preferred working style	n.s.	
Techno-overload → Preferred working style	-.45 (-9.05)***	
Techno-overload → Commitment	n.s.	
Preferred working style → Commitment	.21 (3.30)***	
Telephone intensification → Techno-overload		.14 (2.93)**
Telephone intensification → Preferred working style		.13 (2.77)**
E-mail intensification → Techno- overload		.14 (2.95)**
E-mail intensification → Preferred working style		.12 (2.64)**

Messaging intensification → Techno-overload		.12 (2.67)**
Messaging intensification → Preferred working style		.10 (2.26)**
Techno-overload → Preferred working style		-.44 (-8.97)***
Techno-overload → Commitment		-.09 (-1.38) n.s.
Preferred working style → Commitment		.20 (3.31)***
$\Delta \chi^2$		196.98
$\Delta df$		30
<i>Control Variables</i>		
Gender	n.s.	n.s.
Marital status	n.s.	n.s.
ICT Expertise	n.s.	n.s.
Actual working hours → techno-overload	.13 (2.78)**	-
Actual working hours → preferred working style	n.s.	-
Overall e-mail use → Commitment	n.s.	n.s.
Overall telephone use → Commitment	n.s.	n.s.
Overall messaging use → Commitment	n.s.	n.s.

Note.  $df$  = degrees of freedom; SRMR = standardized root mean square residual; TLI (NNFI) = Tucker-Lewis index; CFI = comparative fit index; RMSEA = Root mean square error;  $\Delta \chi^2$  = change in chi-square;  $\Delta df$  = change in degrees of freedom; \*\*\* =  $p < .001$  sig.; \*\* =  $p < .05$  sig.; \* =  $p < .1$  sig; n.s. = not significant.

Table 4. Bootstrapping results

	Direct effect (→ Commitment)	Indirect effect (Mediation)
telephone	.08 *	-.033**
e-mail	-.03 (n.s.)	.004 (n.s.)
messaging	.04 (n.s.)	.004 (n.s.)

\*\* =  $p < .05$ ; \* =  $p < .01$ ; n.s. = not significant.

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