Communicating in a Multi-Role, Multi-Device, Multi-Channel World: How Knowledge Workers Manage Work-Home Boundaries

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DECLARATION

I, Marta Elizabeth Cecchinato, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Abstract

Technology keeps us connected through multiple devices, on several communication channels, and with our many daily roles. Being able to better manage one's availability and thus have more control over work-home boundaries can potentially reduce interferences and ultimately stress. However, little is known about the practical implications of communication technologies and their role in boundary and availability management.

Taking a bottom-up approach, we conducted four exploratory qualitative studies to understand how current communication technologies support and challenge work-home boundaries for knowledge workers. First, we compared email practices across accounts and devices, finding differences based on professional and personal preferences. Secondly, with wearables such as smartwatches becoming more popular, findings from our autoethnography and interview study show how device ecologies can be used to moderate notifications and one's sense of availability. Thirdly, moving beyond just email to include multiple communication channels, our diary study and focus group showed how awareness and availability are managed and interpreted differently between senders and receivers. Together, these studies portray how current communication technologies challenge boundary management and how users rely on strategies – that we define as *microboundaries* – to mitigate boundary cross-overs, boundary interruptions, and expectations of availability. Finally, to understand the extent to which microboundaries can be useful boundary management strategies, we took a multiple-case study approach to evaluate how they are used over time and found that, although context-dependent, microboundaries help increase participants' boundary control and reduce stress.

This thesis' primary contribution is a taxonomy of microboundary strategies that deepens our current understanding of boundary management in the digital age. By feeling in control, users experience fewer unwanted boundary cross-overs and ultimately feel less stressed. This work leads to our secondary contribution to individual and organisational practice. Finally, we draw a set of implications for the design of interactions and cross-device experiences.

Acknowledgements

Impact Statement

The work presented in this thesis and its contributions have had measurable impact both inside and outside of academia in several ways. A complete list of outputs from the work presented in this thesis is shown in the following section.

Within academia, this thesis makes a number of direct contributions to human-computer interaction (HCI) on how communication technologies can challenge and support work-home boundary management. The insights gained from our findings have been published and presented several times at top-tier venues for HCI, as well as at the multi-disciplinary ESRC Ways of Being in the Digital Age conference in Liverpool, in October 2017. Beyond publications, findings from this thesis have also been presented through a number of invited talks in other universities (University of Edinburgh in October 2016, Portsmouth University in December 2016, and University of Southampton Solent in January 2017) and presentations at conferences (e.g. BSC London Hopper Colloquium in June 2016 and Always Connected Oxford Internet Institute conference in June 2017). The methodology used in Chapter 7 is currently being applied in a separate project (https://iwards.wordpress.com/) investigating how technology can support resilience strategies in junior doctors. This new project is funded by UCL Grand Challenges.

Outside of academia, the work presented in this thesis has been featured in different media outlets, such as scientific magazines (e.g. New Scientist in August 2017 and The Conversation in April 2016), podcasts (e.g. Changing Academic Life in March 2017 and Digital Mindfulness in September 2017), and self-help blogs (e.g. UCL Student Support and Wellbeing blog). I have also been involved in disseminating this work through public engagement activities, performing in two stand-up comedy sets through UCL Bright Club in July 2014 and January 2015. The study presented in Chapter 4 has been included in the Athena Swan application of UCL Psychology and Language Sciences (PALS) department, and workshops similar to those presented in Chapter 7 will be offered to PALS staff as part of the Athena Swan activities to support better work-life balance. Finally, the booklet of microboundary strategies used in Chapter 7 has been made publicly available online and has been downloaded almost 500 times across the world in the last year (January 2017-January 2018).

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Publications

The work presented in this thesis has been disseminated through the publications listed below. Starting from Chapter 2, for each relevant chapter we list publication(s) to which that chapter has contributed. A number of papers have also been written in relation to the topic and work presented here, but have not been incorporated into this thesis.

Contributing Publications

- **Cecchinato, M.E.** (2017). Always Connected = Always Available? The Role of Microboundaries. Poster presented at Connected Life 2017 conference organised by Oxford Internet Institute, University of Oxford.

- **Cecchinato, M.E.**, & Cox, A. L. (2017a). Smartwatches: Digital Handcuffs or Magic Bracelets? *Computer*, *50*(4), 106-109.

- **Cecchinato, M.E.**, & Cox, A.L. (2017b). Work-Home Boundaries and Communication Technologies. *ESRC Conference on Ways of Being in the Digital Age.*

- **Cecchinato, M.E.**, Cox, A.L., & Bird, J. (2017). Always On(line)? User Experience of Smartwatches and their Role within Multi-Device Ecologies. *Proceedings of the SIGCHI Conference on Human Factors in Computing systems*, 3557-3568.

- **Cecchinato, M.E.**, Cox, A.L., & Bird, J. (2015a). Working 9-5? Professional Differences in Email and Boundary Management Practices. In *Proceedings of the SIGCHI Conference on Human Factors in Computing systems,* 3989-3998.

- **Cecchinato, M.E.**, Cox, A.L., & Bird, J. (2015b). Smartwatches: the Good, the Bad and the Ugly? In *Proceedings of the 33rd Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems,* 2133-2138.

- **Cecchinato, M.E.**, Fleck, R., Bird, J., & Cox, A.L. (2015c). Online vs. Offline: Implications for Work Identity. *Workshop on Between the Lines: Re-evaluating the Online/Offline Binary, CHI 2015*.

- **Cecchinato, M.E.**, Cox, A.L., & Bird, J. (2014). "I check my emails on the toilet": Email Practices and Work-Home Boundary Management. *Workshop on Socio-Technical Systems and Work-Home Boundaries, MobileHCI 2014.*

Related Publications

- **Cecchinato, M.E.**, Sellen, A., Shokouhi, M., & Smyth, G. (2016). Finding email in a multi-device, multi-account world. *Proceedings of the SIGCHI Conference on Human Factors in Computing systems*, 1200-1210. <u>Best Paper Award</u>.

- Cox, A.L., Gould, S., **Cecchinato, M.E.**, Iacovides, I., Renfree, I. (2016). Design Frictions for Mindful Interactions: The Case for Microboundaries. *Proceedings CHI '16 Extended Abstracts on Human Factors in Computing Systems,* 1389-1397*.*

- **Cecchinato, M.E.**, Cox, A.L., Bird, J. (2016). Work-Life Balance through Tangibles and the Internet of Things. *Workshop on Tangibles4Health, CHI 2016.*

- **Cecchinato, M.E.** (2014). Email management and work-home boundaries. In Proceedings of the 16th international conference on Human-computer interaction with mobile devices & services, 403-404.

- **Cecchinato, M.E.**, Bird, J., & Cox, A.L. (2014) Personalised Email Tools: A Solution to Email Overload? *Workshop on Personalised Behaviour Change Technologies Workshop, CHI 2014.*

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Acronyms

BC	Boundary Control
CMC	Computer-Mediated Communication
FI	Family Identity
HCI	Human-Computer Interaction
IM	Instant Messaging
NWIW	Non-Work Interrupting Work
PSS	Perceived Stress Scale
SW	Smartwatch
UX	User Experience
WHB	Work-Home Boundaries
WI	Work Identity
WINW	Work Interrupting Non-Work
WLB	Work Life Balance
WLI	Work-Life Indicator (scale)
XDI	Cross-Device Interaction

A Day in the Life of a Modern Woman

Thursday. Sophie slowly rises from her slumber and reaches for her phone: it's 7.39am and she has several notifications. Her eyes are drawn to the Twitter mentions by her PhD supervisor, Laura, and another colleague, who were discussing work and joking about work-life balance. She replies to the tweets and then quickly gets up as a busy day of meetings awaits her. Forty-five minutes later, she finds a seat on the train to London Kings Cross; she pulls out the stack of papers she needs to review and takes advantage of the journey and lack of Wi-Fi to get some work done. Before getting off the train, Sophie checks her work email on her phone to make sure no urgent email had arrived and to double check the location of the first meeting. The calendar for the day shows back-to-back meetings with students and small gaps of time here and there. By the time she reaches the office, she has a few minutes before the first meeting to catch up on more emails. When she checks the time, it is 10:28. As usual, she is running late. She closes her laptop without logging out of email, Facebook, Slack, Skype or Couple and rushes to her first meeting. These channels, used for either work or personal reasons, are usually constantly open on her laptop, primarily out of laziness. The only exception is Couple, a messaging system she uses with her boyfriend Mark. When at work, because it's a personal channel, she will often only use it on her phone, especially on days with lots of meetings. Those days she might even turn off all notifications on her phone, so that Couple messages don't appear on her smartwatch. However, on busy days she is too occupied to remember to log in or out of applications and unfortunately today was one of those days.

Mark hasn't heard from his girlfriend Sophie in a while and is wondering how her day is going. That morning she had left in a rush to catch the train in order to be in time for her first meeting, and they hadn't had a time to chat. During the day he had an opportunity to phone her but knew she had a very busy schedule so decided not to. After lunch he chooses instead to send her a message, so opens Couple and sees that it says "online on laptop" next to her name. However, realising that she might be in a meeting, he decides to send a less personal message than he might have done otherwise and types "How's your day going?"

Sophie is chatting to one of her students, when the message from Mark appears on her laptop. Although it isn't a strictly personal message, the notification pops up with a preview of the message (a new feature on the app) and she feels

uncomfortable, as it isn't very professional and shows her students a side of her life she wants to keep private.

Later that evening Sophie arrives home, tired and hungry. While cooking dinner, she chats with a flatmate about going out that weekend. As she is trying out a new recipe, the laptop is open on the kitchen table with online instructions. After the last meeting with students she had to run to catch the train, so again, she hadn't bother logging out of any work-related channels (e.g. Slack).

Laura gets home from a busy day at work and chats to her partner and children over dinner. After putting her kids to bed, she opens her computer again. Despite having already worked a long day, she has a huge backlog of tasks that are overdue and needs to get a few more completed before the day is over. She looks at her inbox and task list. One item sticks out - it is an email from Sophie who was asking when she'd get feedback on her writing. 'Ok' Laura thinks, 'now is as good a time as any for reading this thesis and it will be more interesting than marking those MSc reports'. As she makes comments, she starts to compose an email to Sophie with feedback. Writing the email would require some careful thought in order to make sure that Sophie isn't unduly upset by the feedback. It would be so much easier just to have a conversation about it. She clicks on Slack. Laura is used to receiving emails from Sophie in the early hours of the morning and at weekends so knows that Sophie works a flexible schedule, just like she does. The unpredictability of Sophie's work schedule isn't a problem for Laura, though sometimes it is difficult to work out whether she is currently in work mode or not. Laura noticed that most colleagues log out of Slack in the evenings but tonight Sophie has a green dot next to her name indicating that she is online. Laura wonders whether that means that Sophie is working right now – if she is then maybe they could have a quick Slack chat and she can explain the important aspects of the feedback more easily than if she had to write a well-structured email about it. Cautiously she types "hey" half expecting that Sophie isn't actually there to respond.

Ping! Sophie notices the message appear in Slack. Although she hadn't been planning to work tonight she feels as though she can't just ignore the message so turns to her computer to respond. Laura says she sent her an email with some feedback. Sophie had learnt to ignore most late-night work emails, but because this one is preceded by a direct message, she feels she should look now. She clicks on the email and scans through it. The two of them have an online meeting discussing how the report could be improved. Needless to say, Sophie's flatmate lets her get on with work and Sophie is left thinking about her thesis for much of the rest of the evening.

Finally, at 11.10pm Sophie is ready to settle down and watch an episode of The Good Wife on Netflix. Right before clicking on full screen mode (in which notifications do not appear), she gets an email from a student wanting to rearrange a meeting the next morning. Sophie is frustrated because she usually does not reply to emails late in the evening, especially to students. Although she works a flexible schedule, she likes to maintain an impression of somewhat rigid boundaries between work and personal life, especially in the evenings. However, given that the meeting was scheduled for 10am and she has no way of postponing it to later in the day, she feels she needs to make an exception and reply. She types a quick response and hits send. Now, back to Netflix and full screen mode.

Chapter 1

Introduction

1.1 Motivation

In recent times, it has become easy to be constantly connected: connected through our *multiple devices* (desktop and laptop computers, tablets, smartphones and now even wearables like smartwatches), connected on a *multitude of communication channels and accounts*, and connected with the *many daily roles* that fall in either work or personal life domains. The scenario "A Day in the Life of a Modern Woman", described in the previous pages through Sophie's eyes and the people she interacts with, gives a real-world feel of this and presents some of the challenges one may experience as a consequence.

Just like Sophie, we all embody different life roles throughout the day (e.g. parent, employer, friend, etc.), each representing different facets of our existence and requiring varying levels of attention. How integrated or separate we attempt to keep these life roles and facets determines where we position ourselves along an integration/segmentation continuum conceptualised in boundary theory (Ashforth, Kreiner, & Fugate, 2000; Clark, 2000; Nippert-Eng, 1996). While the two extremes may seem just this, extreme, most people sit somewhere in the middle, and not always in a regimented manner: some people constantly switch their inclination towards segmentation or integration. Regardless of where we position ourselves on this continuum, boundary theory suggests that those with less perceived control over their boundary strategies experience more challenging consequences (Kossek, Lautsch, & Eaton, 2006). These consequences come in different forms, one example might be having to deal with emails outside of working hours, and as a result feeling

overwhelmed and compelled to reply. It is when perceived boundary control is lacking that spill-overs are more likely to occur, causing those inopportune interruptions that can distract us, make us less productive (Jackson, Dawson, & Wilson, 2001, 2003) and ultimately more stressed (Kossek, Ruderman, Braddy, & Hannum, 2012).

Work-related stress is a major health problem in the work environment, costing over £5 billion a year just in the UK (HSE, 2017). As a result, governments and companies have started to take measures to deal with it. In April 2014 officials from the Swedish city Gothenburg launched a trial by adopting six-hour working days, expecting the mental and physical state of their employees to improve and their productivity to increase (Crew, 2015; Gee, 2014). The experiment lasted two years and ended in early 2017: the positive results of employees feeling healthier and more productive, however, were met with some scalability concerns by the government (Alderman, 2017). Other European countries have considered similar measures. For example, Germany's labour minister has been considering an 'anti-stress' law as a measure to reduce mental health issues connected to the constantly available paradigm (i.e. checking emails after working hours) and commissioned an investigation to determine binding thresholds (Stuart, 2014). More recently, the French government introduced a law on the 'right to disconnect' at the beginning of 2017, whereby employers should negotiate with employees how to reduce work intruding in their personal life, sanctioning companies who fail to clearly state what is expected of employees out of hours (Agence France - Presse, 2016). However, these suggestions assume a one-size fits all solution.

Boundary management strategies have been studied particularly in telecommuters (who lack physical boundaries between work and personal life) and knowledge workers (e.g. (Boswell & Olson-Buchanan, 2007)), whose work flexibility adds an extra level of complexity to individual practices. However, given this flexibility, it is difficult to establish the boundary management practices of others and little is known about how these practices are interpreted between co-workers, if at all. Creating awareness in others of one's own boundary strategies could help mitigate stress, clear up misunderstandings and perhaps foster more work-family enrichment (Greenhaus & Powell, 2006).

While technology can help achieve a desired level of integration and work-life balance (Kreiner, Hollensbe, & Sheep, 2009), multi-device interaction also exacerbates work-home boundary spill-overs and interruptions (Boswell & Olson-Buchanan, 2007; White & Thatcher, 2015). The number of communication devices we own is also growing, with the majority of Americans owning a desktop or laptop computer (78%) and a smartphone (77%), and more than half of them owning a tablet (51%) (Pew Research, 2018). More recently, smartwatches have been gaining popularity (Beaver, 2016), with market forecasters predicting the success of these wearable devices, thanks to communication features (e.g. notifying users of incoming calls or messages, and allowing for quick 'canned' or voice replies) (Gartner, 2014). Multi-device interaction is a relatively new interest within human-computer interaction (HCI), where work has mostly focused on computational capabilities and only recently has started to analyse its user experience. Research in the latter area primarily covers the wide range of

activities that can be carried out across devices (e.g. (Matthews, Pierce, Road, Jose, & Tang, 2009; Santosa & Wigdor, 2013)), but, albeit exceptions in media multitasking (e.g. (Rigby, Brumby, Gould, & Cox, 2017)), little work has uncovered specific communication practices across devices (e.g. (Karlson, Meyers, Jacobs, Johns, & Kane, 2009)).

The 'always online' culture we have presented here has a two-fold effect. On one hand, people are always reachable across multiple devices, through calls, emails, social networks, or other instant messaging systems. This makes it easier to keep in contact remotely, with friends, family or colleagues. Work-wise, its implications include enabling people to have more flexibility and control over their working hours and locations according to their needs (Grauers & Wall, 2012), rather than being tethered to a desk. However, on the other hand, ubiquitous technology has changed the way we work, allowing the usual 9-to-5 working hours to potentially spread throughout the whole day (Towers, Duxbury, & Thomas, 2005) and transforming the workplace from a physical location to a spatial-temporal flexible environment (Kreiner et al., 2009).

Email was one of the first computer-mediated communication (CMC) tools and its popularity has increased over the last four decades, with both the numbers of messages exchanged daily and the number of accounts per user growing, (Radicati Group, 2015a). Over decades, email has gained incredible popularity thanks to several benefits and today it is used for almost all aspects of our lives (for work, for personal, and for social reasons). However, it also comes with drawbacks, primarily grounded in its overloaded nature: the overloaded number of messages exchanged and the need to deal with them (Fisher, Brush, Gleave, & Smith, 2006), the overloaded range of functionalities that email covers (as an information, a task and a time management tool) (Mackay, 1988; Whittaker & Sidner, 1996), and the overloaded types of messages in the inbox (ranging from personal to work related) (Grevet, Choi, Kumar, & Gilbert, 2014). Mobile technology has made email and its affinity to both our work and personal domains more pervasive. How work and personal facets of email differ is less understood in academic research and very little has been done to understand how current email practices are changing across domains and devices, especially compared to other, newer, CMC channels. Understanding how email is used in reference to boundaries and availability management can help shed some light on today's communication practices across devices, domains and roles.

People's use of CMC tools is indicative of the self-portrait they wish to convey to others (e.g. checking emails only once a day). While some initial work has linked the presentation of self in an online/offline binary paradigm, most of the work has focussed on identity and social media use (Hogan, 2010; Zhao, Salehi, & Naranjit, 2013), and less on negotiation of availability and boundaries around CMC channels using awareness cues (e.g. online statuses such as "last seen online at 14:45") (Oulasvirta, Petit, Raento, & Sauli, 2007). How we present ourselves is linked to the notion of interactional availability, or simply availability (i.e. when are we available to communicate?) and the ability of others to correctly interpret awareness cues to determine our availability. The use of awareness cues has been studied particularly in instant messaging (IM) or mobile messaging

platforms (e.g. (O'Hara, Massimi, Harper, Rubens, & Morris, 2014; Oulasvirta et al., 2007)), but no work has looked at how they can be misunderstood and thus cause work-home conflict.

Consequently, it is important to update our understanding of how users – in particular those with flexible working practices – manage their work-home boundaries through communication technologies. Work-home conflict and spill-overs have been associated with negative consequences, such as stress (Kossek et al., 2012). With new devices such as smartwatches being released, that allow us to be even more connected, it is plausible to think that work-home conflict could be further exacerbated. In addition, having multiple CMC tools to choose from could help curate personal and work communications more, but it might also lead to misinterpreting awareness cues, e.g. thinking that one is available because they appear online, when instead he or she simply forgot to log out of a channel. Therefore, several questions remain unanswered around how communication practices are evolving in today's ecosystem of CMC channels and impacting our work-home boundaries, and opportunities for further research arise as the technology becomes more embedded in our everyday life.

We have identified a potential link between three bodies of literature, namely (i) boundary theory belonging to organisational psychology and use of communication technologies as part of HCI, which we divide into (ii) computer-mediated communication channels, used for both work and personal reasons, and (iii) multi-device interaction, intended as experiences around device ecologies (Bødker & Klokmose, 2012). Ultimately, we create a better understanding of how users manage work and personal boundaries as a result of being part of a constantly connected society. To do so, we present results from a series of explorative qualitative studies that help unpack intrinsic problems with managing work-home boundaries and availability through communication technologies, as well as propose solutions in the form of what we will define as *microboundary strategies* (see section 8.2).

1.2 Research question and thesis contributions

Based on the literature briefly outlined above and discussed in more detail in Chapters 2 and 3, this thesis aims to answer the following research question:

> *How do current communication technologies (i.e. devices and channels) support*
> *and challenge boundary management in knowledge workers?*

In order to answer this question, we have set a series of objectives that the studies presented in this thesis will address:

- Update our understanding of current email practices across devices and work-personal domains (Chapter 4).

- Explore how, compared to other devices, smartwatches – which can potentially blur work-home boundaries even more given their wearable nature – are used as notification devices and how they help or disrupt boundary and availability management (Chapter 5).

- Understand how multiple communication channels are used for work and personal reasons, and what is the role of awareness cues across multiple channels for availability and awareness management, in both the sender and the receiver (Chapter 6).

- Investigate how user-generated strategies to manage work-home boundaries and availability (identified in the previous three chapters) are used and whether they help increase participants' sense of boundary control (Chapter 7).

Ultimately, this thesis creates a better understanding of how today's communication occurs across devices, communication channels and life roles. To do so, we investigate how work-home boundaries and availability are managed by knowledge workers, via the use of modern CMC channels and multiple devices, with respect to those with whom they interact.

Overall, we make three contributions, which apply to knowledge, practice, and design. The primary contribution of this thesis is a taxonomy of boundary management strategies (see section 8.2) that apply to communication technologies, which we characterise as *microboundaries* (see sections 4.4.4 and 8.2.1 for the definition). The taxonomy is constructed from the microboundary strategies uncovered in our studies (see Chapters 4-7) and deepens existing taxonomies which often do not take into account the role of technology.

The second contribution, in the form of actionable knowledge, is a resource of strategies for individuals and organisations who want to improve boundary management across devices and channels. We show how microboundaries help participants feel in control of their boundaries, leading them to experience fewer unwanted boundary cross-overs and ultimately feel less stressed. In addition, we demonstrate how there are individual and professional differences that should be taken into account by organisations, who in turn – we argue – should provide training to supplement guidelines and policies.

Finally, the third contribution is a series of implications for interaction design at large. By understanding the kinds of strategies and their attributes that participants came up with to manage boundaries, we demonstrate how seamless interactions are not always necessarily ideal, especially if they challenge users' values such as autonomy and control. Designing friction into the interaction can help users stop and think about their behaviour and make sure it aligns with their intentions, values, and beliefs. In addition, by looking at how boundaries are managed across multiple roles, channels, and devices, we demonstrate how cross-device interactions should be designed to be activity-centric, rather than device-centric where devices are considered in silos of interaction.

The reader might have noticed that the subject used in sentences throughout this thesis is "we". Under the guidance of her supervisors, the author of this thesis has carried out all of the work presented here, identifying the research area and research question, designing studies and creating materials (unless otherwise stated), collecting and analysing data, and writing.

1.3 Research scope and approach

To scope this thesis, we focus in particular on communication technologies and knowledge workers. By communication technologies we intend any computer-mediated communication channel and the devices they are used on, as reported by our participants. As far as knowledge workers, despite decades of research around them, there is no one common definition for them (Pyöriä, 2005). In terms of output, a knowledge worker produces "*human mental work performed to generate useful information and knowledge*" (Davis, 2002, p. 68). Researchers have identified recognisable characteristics of knowledge workers, which Erikson and Jarrahi summarise as: "*1) producing and transmitting knowledge, 2) involving intellectual skill and manipulation of abstractions, 3) requiring problem solving tied to creativity, or 4) necessitating theoretical and technical knowledge, formal education and continuous on-the job learning*" (Erickson & Jarrahi, 2016, p. 1324). Knowledge workers have more flexibility in organising their work and personal time as well as work location, compared to manual workers for example. In addition, they are heavy users of communication technologies, which as described earlier, can challenge work-home boundaries through notifications and interruptions. Examples of knowledge workers include, but are not limited to: academics, engineers, scientists, design thinkers, architects, and physicians.

We have taken a bottom-up approach that focuses on understanding the challenges of individual knowledge workers and what strategies can empower them to feel more in control. This is motivated by the fact that while there are several studies investigating top-down work-home boundary management solutions which come primarily from governments and companies (e.g. (Boswell, Olson-Buchanan, Butts, & Becker, 2016; Kossek, Baltes, & Matthews, 2011)), researchers have called for further work looking at how strategies are created by individuals (e.g. (A. Chen & Karahanna, 2014; Morganson, Rotch, & Christie, 2015)). Taking a bottom-up approach has allowed us to create a more nuanced picture of the situated use of technology and its impact on work-home boundaries. In particular, we emphasise the importance of considering boundary management as a social construction between individuals, especially when it revolves around communication. How users interact with others affects how they construct and manage their boundaries. As such, we subscribe to a social constructivist view of technology (Kalman, 2016), where technology is not seen as inherently good or bad, but it is how it is used and experienced that defines its positive or negative connotations.

Throughout the thesis, we combine different qualitative methods (interviews, an autoethnography, a diary study, a focus group, and creative workshops) and, where relevant, we supplement them with

online surveys and standardised questionnaires to explore and situate boundary management practices around communication technologies. In each of the corresponding chapters, we detail the methods' benefits and discuss the motivation behind our choice. Statistical analysis was used to analyse the standardised surveys, while qualitative data was analysed using thematic analysis (Braun & Clarke, 2006, 2013).

According to Braun and Clarke (Braun & Clarke, 2006), thematic analysis is an accessible and theoretically flexible approach to analysing qualitative data. They define it as "*a method for identifying, analysing, and reporting patterns (themes) within data*" (Braun & Clarke, 2006, p. 79) and is comprised of six stages: (i) familiarising oneself with the data; (ii) generating initial codes; (iii) searching for themes; (iv) reviewing themes; (v) defining and naming the themes; and (vi) finally producing the report. It is important to note that these stages should be treated as guidelines and as such are not meant to be followed in a linear manner. Doing thematic analysis involves a recursive process, moving back and forth between stages.

Combining methods for each study allowed us to triangulate findings and overcome any possible inconsistencies between datasets. While it is easier to quantify behaviours reported in surveys (e.g. how many participants used a particular channel), it is not as easy to do so for interview data. Using semi-structured interviews means that each participant is not necessarily asked the same questions, as new information emerges which can be further probed with subsequent participants (Silverman, 2013). As a result, it is not always possible to quantify how common a certain behaviour was. However, we have taken a number of measures to ensure validity of our findings, such as referring back to similar behaviours we have witnessed across our studies. In addition, to ensure further validity we combined both inductive and deductive thematic analysis, whereby the former is "*a process of coding the data without trying to fit it into a pre-existing coding frame*" (Braun & Clarke, 2006, p. 83) and the latter "*would tend to be driven by the researcher's theoretical or analytic interest in the area and is thus more explicitly analyst driven*" (Braun & Clarke, 2006, p. 84). As a result, our top-down inductive analysis was informed by relevant literature and, where possible, results from our findings. Codes were then organised into categories and later developed into themes. Developing codes in this way allowed us to compare findings from our different studies and thus deepen the understanding of boundary management across roles, channels, and devices, and overall create a more coherent narrative. In addition, although Braun and Clarke do not call for multiple independent coders to agree on a set of codes or themes, the author of this thesis did discuss codes and themes with other researchers as an additional way to iterate the analysis.

1.4 Thesis structure

This thesis consists of nine chapters organised into three parts: background, data collection, and synopsis. In the first part, *Background*, **Chapter Two** starts by reviewing work-home boundary literature, presenting principal aspects of boundary theory such as boundary crossing and

uncovering the role of communication technologies on boundary management. We then introduce multi-device interaction literature and discuss how mobile technology in particular exacerbates the issues around boundary crossing and impacts feelings of constant availability. By presenting computer-mediated communication, we later move onto unfolding how users communicate today for work and personal reasons, the role of self-presentation and identity when deciding how, when and where to communicate, and the importance of awareness cues to establish availability to communicate.

Chapter Three. As the most popular example of CMC channels, this chapter focuses on email literature highlighting current understanding of practices and knowledge gaps such as differences of use across devices and accounts. Particular focus is given to email because along with its many benefits, it has the potential to interfere with both professional and personal environments, blurring the boundaries and making it difficult to establish availability due to its asynchronous nature.

Chapter Four. At the start of part II, *Data Collection*, we present our first study which frames current email practices across accounts and devices around work-home boundary strategies and compares them between different professional groups. The aim of the study was to explore professional differences in knowledge workers within the same organisation. Findings presented are based on contextual interviews and Work-Life Indicator survey (Kossek et al., 2012) with 16 knowledge workers (academics and professional services staff) from the same university to investigate the role and use of email across devices and the impact on participants' work-home boundaries. Our main findings show how practices of work-home boundaries around email as a communication channel are the result of personal preferences (with other CMC channels being preferred for personal communications), and professional context. The results also highlight a diversified use of notifications based on the device, with academics in particular disabling notifications on 'always-on' mobile devices. The findings show how academics are more at risk than professional services staff of being constantly interrupted and having to shift between roles due to their use of communication technologies. We also find how cross-overs and boundary interruptions are mitigated by the individual through the use of what we characterise as *microboundary strategies*, which can occur via accounts, devices and software.

Chapter Five. Extending the results of the first study to go beyond just email use across smartphones and laptops, in this chapter we investigate behaviours of those using the most recent channels (e.g. WhatsApp, email, Facebook messenger, etc.) and devices (not just computers and smartphones, but smartwatches too). We report on a qualitative study with existing users on their everyday use of smartwatches to understand both the added value and the challenges of being constantly connected at the wrist. We find that response rates after viewing a notification on a smartwatch change based on the other devices available: laptops prompt quicker replies than smartphones. Moreover, our findings show that early adopters see a large benefit in receiving notifications on their wrist, especially in terms of helping them manage expectations of availability

through use of awareness cues. We therefore extend our understanding of *microboundaries* to include social, temporal, and notification-based strategies.

Chapter Six. Being connected anytime and anywhere can be challenging for boundary and availability management. Whilst in the previous chapter we found that smartwatches can help manage availability and support boundaries by not automatically sending awareness cues, these devices are still not as widespread as other mobile devices such as smartphones. In this chapter we took a mixed methods approach to understand how senders and receivers explicitly and implicitly negotiate availability and boundaries through the use of CMCs. In doing so, we confirmed and extended a number of previous findings from the literature. We have seen how having multiple communication channels to choose from can help create more defined boundaries by specializing how each channel is used. However, the norms around how a channel should be used are not always shared. In addition, awareness and contextual cues are used by senders to bypass boundaries and gain access on the whereabouts or current status of another person, as well as increase expectations of quick replies. In response, receivers intentionally misled others using awareness cues to regain control and create 'perceived boundaries'. Our findings have allowed us to strengthen our own definition of *microboundaries* and enrich our current understanding of boundary theory.

Chapter Seven. In Chapters 4, 5 and 6 we uncovered a series of *microboundary practices* created by users to manage work-home boundaries. In order to better understand the extent to which microboundaries can be a useful resource to manage work-home boundaries around communication technology, in this chapter we report on a multiple-case study where we asked participants to adopt microboundaries over the course of two months. This is the first study to evaluate an intervention around use of boundary strategies and measure boundary control over time. Findings show that microboundaries are flexible context-dependent strategies that help increase boundary control, and reduce stress and work interruptions during non-work time. By overcoming initial barriers, participants adopted and adapted microboundaries to suit their needs and preferences, which sometimes required introducing an interactional friction or deciding whether a manual or an automatic strategy was to be preferred. Despite encountering barriers prior to adopting a strategy, we found that participants were not afraid to make them work for them, try new things, discard and change strategies. Strategies chosen introduced friction in the interaction whenever participants wanted to discourage a particular behaviour or were friction-*less* when they wanted to encourage an outcome. We also distinguish between strategies that have to be manually set every time, and others that work automatically after the initial setup. Ultimately, findings presented here show how microboundaries are flexible strategies that can take into account personal differences and should be treated by users as a 'work-in-progress' that need to be revisited as contextual factors change.

Chapter Eight. At the start of the final part, *Synopsis*, we present the general discussion of this thesis, by summarising the key findings, highlighting our three contributions to knowledge, to

practice, and to design, and concluding with directions future work can take. The thesis ends with a summary of the research as a whole in the concluding **Chapter Nine**.

Part I

Background

Chapter 2

Work-Home Boundaries and Communication Technologies

*[Parts of this chapter have been published in
(Cecchinato, Cox, & Bird, 2014, 2017, 2015a, 2015b)].*

This chapter starts by covering the literature around boundary theory and the integration-segmentation continuum; the benefits and the issues of boundary crossing; and the role of communication technologies on boundary management as a source of interruptions. We then move on to multi-device interaction literature and examine what it means to interact with multiple devices; the use of communication technologies across devices, particularly mobile ones; and the impact of mobile devices on boundaries. In particular, we look at computer-mediated communication tools and how they impact one's sense of availability through the use of awareness cues. Work reviewed in this chapter highlights emerging practices and issues, and the gaps in the literature, which this thesis aims to address. Our conclusion from this review is that established theories provide useful concepts that need to be better linked with emerging theories to explain how communication technologies and their use impact work-home boundaries, both in terms of management and negotiation. Ultimately, this chapter will show how the three research areas (computer-mediated communication, boundary theory, and multi-device interaction) can be combined and how the intersection of the three is still an under-explored area that this thesis aims to study (Figure 1).
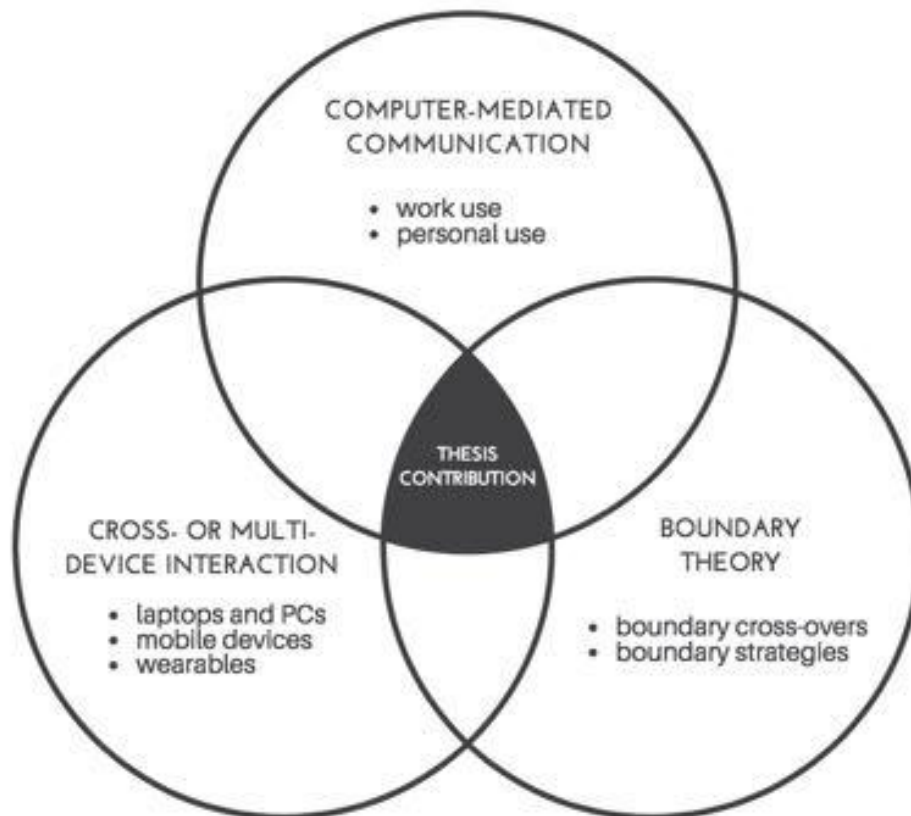
Figure 1 Venn diagram of where this thesis contribution sits compared to the relevant literature.

2.1 Work-home boundaries

In the past 20 years, there has been much talk and a growing interest in popular media around the search for 'work-life balance', as an ideal equilibrium of wellbeing in all aspects of one's life (Kreiner et al., 2009). The idea of balance is rooted in balance theory, as first described by Fritz Heider (Heider, 1946) and according to whom when people perceive important aspects of their life as being part of a system, then they are inclined to maintain a state of balance among these elements. Roche (Roche, 2015) provides an interesting historical reconstruction of balance research and uses Emslie and Hunt's (Emslie & Hunt, 2009) metaphor to point out how this balance is often referred to as "*a juggling act*", where "*some balls (roles) are larger (more demanding), some weigh more than others*" (Roche, 2015, p. 18). How we juggle all these roles depends on many factors, some of which can have a positive impact on work-life balance (e.g. job satisfaction, telework), while others can impact negatively (e.g. work overload and job demands).

Work and family roles and their intersection have been recognised as an important area of research within industrial and organisational psychology for several decades now (Allen, 2013). As this field grows, there are several new aspects to be considered such as the role that technology plays in defining and challenging life roles. Before we move on to a critical review of role management within the boundary theory framework and later analyse the role that technology has in all this, we want to clarify some of the terminology in this area.

As the reader might have noticed, both work/family and work/life constructs have been used in the previous paragraphs, and other juxtapositions exist in the literature, such as work/non-work, work/home, and work/personal. As Allen (Allen, 2013) points out, some researchers make a point of distinguishing between work vs. family and work vs. life (e.g. (Chang, McDonald, & Burton, 2010)), while others use them interchangeably to cover the variety of life roles (e.g. (Allen, 2013)). We agree that, regardless of the terminology used, these are constructs that cover the wide range of roles we embody every day. A deeper discussion around this terminology is outside the scope of the thesis, and we would like to point the reader to Moen (Moen, 2011) for a more detailed understanding. Given these premises, in this thesis we side with the idea that all these terms are interchangeable in a way and we choose to use the umbrella expression 'work-home boundaries' and juxtapose work vs. personal to broadly differentiate between life roles. There is a careful decision not to use the word *balance* (with the exception of Chapter 7; see section 7.3.1 for an explanation)*,* as it implies some sort of equity between different life domains and carries the assumption that it is the result of better management of boundaries. In terms of the juxtaposing *work vs. home,* and *work vs. personal* terms, this is an arbitrary choice to highlight different domains of one's life.

The typical individual embodies several roles throughout the day, such as parent, colleague, friend, employee, etc., none of which exist in a vacuum. According to social identity theory, the self is the result of an organised set of identities, ordered by salience (Burke & Reitzes, 1991). George Mead, one of the founders of social psychology, talked about a *social self*, referring to the idea that one's own self is the result of social interactions (Mead, 1913). This thesis adopts a social constructivist perspective to explain how users experience the world and their use of technology (Kalman, 2016), as a result of interactions that define the experiences. Similarly, individuals co-construct, manage and negotiate boundaries around their roles through social interactions and, as Kreiner et al. (Kreiner et al., 2009) point out, boundary theory offers an ideal lens to study work-home boundaries within the social-constructivist approach. In the following paragraphs we will discuss boundary theory and management strategies identified in the literature, and later discuss how technology may affect these boundaries.

2.1.1 Boundary theory

In general, boundaries are delimitations of an area, which can refer to a physical space (e.g. a country, a home), or a more abstract domain (e.g. a role). When referred to work and home domains, boundaries can be physical, temporal or psychological (Clark, 2000). *Physical boundaries* for example can be the walls of an office, or a dedicated desk in the home of a telecommuter. *Temporal boundaries* refer to the stricter schedules, like a nine to five job, and/or firm transitions between working time and family time, such as using the commute to shift and detach from one role to another. Finally, *psychological boundaries* are the series of rules self-created to establish which behaviours and attitudes belong to which domain.

Boundaries can be conceptualised along an integration-segmentation continuum (Nippert-Eng, 1996) (Figure 2). At one end of the continuum are individuals who tend to have work and home domains fully integrated, where 'home' and 'work' are "*one giant category of social existence, for no conceptual boundary separates its contents or meaning*" (Nippert-Eng, 1996, p. 567). At the other end are those for whom work and home are perceived as two completely separated worlds. These two positions constitute extremes and people are typically somewhere in between. As a result, repeated shifts occur between the different roles one has in different domains, each having *different* responsibilities and resources (e.g. employee and parent). These small, frequent shifts are known as a "micro-role transitions" (Ashforth et al., 2000) and happen, for example, when a parent receives a phone call or email from their child's school whilst at work. Ashforth, Kreiner and Fugate (Ashforth et al., 2000) distinguish them from "macro-role transitions", where these shifts are less frequent and occur more generally within the same domain from an old role to a new role, which comes with *new* responsibilities and resources (e.g. moving from being a PhD student to becoming a Lecturer).

Figure 2 Adaptation of the role segmentation-role integration continuum from (Ashforth et al., 2000)

The nature of the boundaries (physical, temporal or psychological) and the degree of permeability to which they allow cross-overs is subject to contextual factors (i.e. norms and expectations dictated by the workplace or family), but there is also a degree of autonomous proactivity in the individual when defining these boundaries.

2.1.2 Boundary crossing and work-home conflict

As Clark (Clark, 2000, p. 751) stated,

> "*people are border-crossers who make daily transitions between these two settings, often tailoring their focus, their goals, and their interpersonal style to fit the unique demands of each. Though many aspects of work and home are difficult to alter, individuals can shape to some degree the nature of the work and home domains, and the borders and bridges between them, in order to create a desired balance*".

Each role of an individual comes with its own expectations of time, attention, and resources. However, these many roles may often conflict with each other. "*Work-life conflict occurs when the role demands in one domain interfere with meeting the demands of a role in another domain*" (Olson-Buchanan & Boswell, 2006, p. 436). Such conflict has been linked to several undesirable outcomes, such as burnout, absenteeism, and stress (Amstad, Meier, Fasel, Elfering, & Semmer, 2011; Greenhaus & Powell, 2006; Kreiner et al., 2009).

Just like different roles have different expectations, also different environments like work and home have strong (but often contrasting) expectations around rules, behaviours, and attitudes (Clark, 2000). The tensions, the interactions, and the management strategies thus created around the role/environment border are an interesting area of investigation.

2.1.2.1 Directionality of conflict

When Ashforth et al. (Ashforth et al., 2000) discussed the idea of integration-segmentation continuum, their focus was in relation to identity roles, and contrary to Nippert-Eng (Nippert-Eng, 1996) who focused on boundary management, they were more interested in understanding boundary transitions. They argued that both ends of the continuum are associated with costs and benefits of creating, maintaining and crossing boundaries.

> "*Because the cost of segmentation (high role contrast) is the benefit of integration (low contrast), and the benefit of segmentation (low role blurring) is the cost of integration (high blurring), there is an on-going tension between segmentation and integration that necessitates on-going boundary and transition work*" (Ashforth et al., 2000, p. 482).

Researchers (Ashforth et al., 2000; Hall & Richter, 1988) have suggested that larger integration of work and home can lead to negative consequences. For example, the permeability of an integrated role allows interruptions, which in turn leads to increased confusion as to what role to adopt. This implies that individuals with higher integration have more difficulty disengaging from different roles when in a specific domain, causing negative affect and less task enjoyment. This is especially true if we think about ubiquitous technology that, for example, allows work communication to interrupt family time on a Sunday evening, or personal emails to be sent to a work account while in the office. Those who sit on the integration end of the continuum might be more likely to respond to a work email received out of office hours, interrupting their personal life, and the opposite scenario is just as likely (Ashforth et al., 2000).

Interruptions can also challenge those who have more segmented boundaries and roles. As Olson-Buchanan and Boswell (Olson-Buchanan & Boswell, 2006) point out, those with segmented roles have a more negative reaction, feel more strained, and experience more inter-role conflict when an interruption occurs, compared to individuals with more integrated roles. Let's take the case of a self-

employed person who works from home and on any given day could be juggling between being an entrepreneur dealing with clients, a neighbour offering help, and a parent having to pick up their child from school early. The example makes it easier to see now how role-referencing may be associated with strain-based work-home conflict, as a result of mental preoccupation with another role (Olson-Buchanan & Boswell, 2006).

While it is important to understand that cross-role interruptions and spill-overs can occur in both integrators and separators, it is even more important to remember that these conflicts have a bi-directional nature, meaning work can interrupt non-work and non-work can equally disrupt work, depending on which role one choses to engage in (Greenhaus & Powell, 2006; Kossek et al., 2012; Kreiner et al., 2009). As a result, recent policies and government precautions, such as the French "right-to-disconnect" legislation, have been put in place, as seen in the Introduction (Chapter 1). These build upon family-friendly programs (e.g. shared parent leave, etc.) and manifest an acknowledgement on the institutions' side of personal life values, to help lessen the effects of role conflict.

2.1.2.2 Work-home enrichment

Not all role-referencing and spill-overs have a negative effect. Greenhaus and Powell (Greenhaus & Powell, 2006) propose a model of Work-Family Enrichment. In the model, work and family are allies and the enrichment comes from "*the extent to which experience in one role improve the quality of life in the other role*" (Greenhaus & Powell, 2006, p. 73). While the terms 'work-family' are used, the authors acknowledge the idea that the model could be extended to include 'work-life' in a broader sense. In their paper, the authors offer an extensive review on prior work measuring work-family enrichment and identify: (i) *five resources* that can promote work-family enrichment (skills and perspectives; psychological and physical resources; social-capital resources; flexibility; and material resources); (ii) *two mechanisms* through which resources promote enrichment (performance and affect); and (iii) *several moderators* that determine conditions for resources in one role to enrich another role (salience of role, perceived relevance of resources, consistency of resources with norms and requirements). Just like for work-home conflict, work-home enrichment also has a bi-directional nature.

We would like to draw the attention in particular to one of the five resources, namely flexibility. According to the authors, flexibility is the ability to determine location, timing, and pace with which role requirements are met. What is lacking from the model is any consideration of the role of communication technologies in ensuring or challenging work-family enrichment, particularly given their ability to amplify this flexibility.

2.1.3 Boundary management

2.1.3.1 Boundary work and permeability

Christena Nippert-Eng (Nippert-Eng, 1996) defines the act of creating, maintaining and managing these boundaries as 'boundary work'. She identified interesting behaviours and artefacts used for such purpose, like having separate calendars or key chains for work and personal reasons. At the time of her work, calendars and key chains were the kind of analogue artefacts that people used to define boundary work, and as such technology was not considered. More than ten years later, Kreiner et al. (Kreiner et al., 2009) extended her work and identified boundary work tactics pertinent to behavioural, temporal, physical and communicative aspects. Table 1 shows a summary of tactics identified for each aspect, with examples. Of particular interest are the communicative tactics, identified as 'setting expectations' and 'confronting violations'. Although Kreiner et al. do not mention it, the latter can also be set through the use of communication technologies, for example when setting out-of-office email replies to clearly state when work and personal time occurs. One behavioural tactic is also very relevant to this thesis: 'leveraging technology'. The authors define this in very broad terms with "*using technology to facilitate boundary work*" but a lot of work is needed to unpack such statement and a more detailed discussion around boundaries and technology can be found in section 2.1.5. We will discuss Kreiner et al.'s tactics more in detail at the end of this thesis, in section 8.2.2, when we articulate our primary contribution and argue how this thesis addresses the role of technology in boundary management.

Aspect	Tactic	Descriptions and Example
Behavioural tactics	Using other people	Utilising skills and availability of other individuals who can help with work-home boundary (e.g. a secretary screening calls).
	Leveraging technology	Using technology to facilitate boundary work (e.g. voicemail, caller ID, email).
	Invoking triage	Prioritising seemingly urgent and important work and home demands (e.g. childcare emergency).
	Allowing differential permeability	Choosing which aspect of work-home life will or will not be permeable.
Temporal tactics	Controlling work time	Manipulating one's regular or sporadic plans (e.g. deciding when to do various aspects of work).
	Finding respite	Removing oneself from work-home domains for a significant amount of time (e.g. holiday).
Physical tactics	Adapting physical boundaries	Erecting or dismantling physical borders or barriers between work and home domains.
	Manipulating physical space	Creating or reducing a physical distance between work and home.
	Managing physical space	Using tangible items such as calendars, keys and mail to separate or blend aspects of each domain.
Communicative tactics	Setting expectations	Managing expectation in advance of a work-home boundary violation (e.g. stating preference to family time ahead).
	Confronting violators	Telling violators of work-home boundaries either during or after the violation (e.g. telling someone to stop calling at home after a certain hour).

Table 1 Work-Home Boundary Work Tactics adapted from (Kreiner et al., 2009).

Boundary tactics (or strategies) are used to construct one's boundary style (Kossek & Lautsch, 2008), which in turn is how one enacts their boundary preference for integration or segmentation. According to Kossek, Ruderman, Braddy and Hannum (Kossek et al., 2012), there are three main boundary styles that extend the integration/segmentation continuum paradigm, and include: *separators*, *volleyers*, and *integrators*. While integrators and separators reflect behaviours of those at the two extremes of Ashforth's continuum, volleyers are people who rely on both styles and switch between them periodically. How they switch depends on the permeability of their boundaries, which in turn, has been attributed as the result of: identity centrality, perceived sense of control (Kossek et al., 2012), the importance of work and family norms (Park, Fritz, & Jex, 2011), and management style (Kossek et al., 2012). We will now discuss each of these factors, and expand the three clusters (separators, volleyers, and integrators) when discussing boundary management styles.

Identity Centrality. Grounded in identity theory, identity or role centrality is an indication of the value that an individual puts on each of his or her roles and reflects the time and energy invested in a role. Identity centrality can be of four types: work, family, dual or other. For example, if a person has a stronger *work identity centrality*, he or she will see themselves primarily as an academic, a lawyer, a

doctor, etc. Likewise, *family identity centrality* reflects the degree one sees themselves as a parent, partner, sibling, etc. To note, the term 'family' is used in a comprehensive way, meaning any non-work relationship and they explain how "*nearly all employees including single people perceive themselves as having family identities (relations with nonwork persons with strong kin-like attachments)*" (Kossek et al., 2012, p. 112). *Dual-centricity* represents equal degrees of value in the work and family realms, where an individual sees both their work and family identity as highly salient. *Other-centric* instead refers to individuals who perceive other roles as more salient, such as those related to hobbies.

Perceived Boundary Control. This refers to a sense of control over how permeable boundaries are and it is a psychological interpretation rather than a personal trait. Perceived boundary control can be high or low. People with *high boundary control* feel they are in control of when, how often and in which direction boundary crossings occur, based on their role demands and centrality. Contrarily, people with *lower boundary control* perceive lower agency around boundary spill-overs and are more likely to incur in work-family conflict. Kossek et al. (Kossek et al., 2012) found that boundary control is negatively correlated with role conflict and stress and suggest that regardless of one's preference for integration or segmentation, what makes the difference in boundary management satisfaction is a sense of boundary control.

Work and Family Norms. Because of its basis in social-constructivism, an individual's integration/segmentation behaviour tends to be consistent with segmenting norms in their workplace (Park et al., 2011). That is to say, if a person experiences high segmentation in their organisation, he or she will be more likely to adopt a more segmented boundary style and for example, not check work emails outside of working hours. Similarly, there may be a certain expectation of how one might integrate or segment, sometimes accompanied by company policies or guidelines. An example of this includes the case of Daimler AG, the German car manufacturer, who in 2014 allowed its employees to delete any emails received during holidays ("Should holiday email be deleted? - BBC News," 2014).

2.1.3.2 Boundary management styles

The three clusters identified by Kossek and Lautsch (Kossek & Lautsch, 2008) in the previous section (integrators, separators, volleyers) were later further broken down by Kossek et al. (Kossek et al., 2012) into six clusters, based on role salience, direction of interruptions, and perceived boundary control. The clusters are: Work Warriors, Overwhelmed Reactors, Family Guardians, Fusion Lovers, Dividers, and Nonwork-eclectics (**Table 2**).

Cluster Name	Boundary control (BC)		Identity centrality				Interruptions		
	Low	High	Work Identity (WI)	Family Identity (FI)	Dual Centrality	Other-centric	Symmetry	Work Interrupting Non-Work (WINW)	Non-Work Interrupting Work (NWIW)
1 **Work Warriors** (partial-integrators)	x		x					x	
2 **Overwhelmed Reactors** (integrators)	x				x		x		
3 **Family Guardians** (partial-integrators)		x		x					x
4 **Fusion Lovers** (integrators)		x			x		x		
5 **Dividers** (separators)		x			x		x		
6 **Nonwork-eclectics** (integrators)		x				x	x		

Table 2 Description of boundary management clusters adapted from (Kossek et al., 2012).

People who have low boundary control belong to either the Work Warrior or Overwhelmed Reactors clusters. In Kossek et al. (Kossek et al., 2012) these two groups were found to have higher work-family conflict compared to others, with *Work Warriors* being work-centric individuals who almost exclusively allow work to interrupt non-work time. *Overwhelmed reactors* instead identify with both their job and family in an equal manner (dual identity centricity) and allow symmetrical interferences between work and non-work. Both clusters report higher levels of stress.

The remaining four clusters are all distinguished by high boundary control. *Family Guardians* favour family identity and allow asymmetrical interruption only from non-work interrupting work. This cluster was found to have lower work-family conflict than any other cluster. *Fusion Lovers* are dual-centric integrators with symmetrical interruptions, while *Dividers* are dual-centric separators with symmetrical but low interruptions. Finally, *Nonwork-eclectics* identify more strongly with other life roles that are not pertinent to work or family and have symmetrical cross-role interruptions.

Kossek et al. (Kossek et al., 2012) found that by including the direction of interruption a more fine-grained view on how people integrate and segment can be made. They found that people not only differ in types of cross-role interruption behaviours but also in terms of symmetry and direction. Moreover, individuals with low boundary control were not necessarily happy about the boundary management style they had adopted. Consistent with Ashforth et al. (Ashforth et al., 2000), and Hall and Richter (Hall & Richter, 1988), who point out that integration can lead to negative consequences, Kossek et al. (Kossek et al., 2006) found that segmentation is a strong predictor of wellbeing. Creating a sense of detachment from the two domains can help recover from work stress (Park et al., 2011), but as Ashforth et al. (Ashforth et al., 2000) point out, segmenting can be more demanding from a psychological point of view: it is not always easy to stop thinking or worrying about a personal matter at work for example, as it is to disable notifications.

2.1.4 Research opportunities

The studies presented so far generally consider a wide range of professional groups and the reason is because the authors want unbiased results. These professions can span from students (e.g. (Nippert-Eng, 1996)), through to managers (e.g. (Park et al., 2011)), and administrative staff (e.g. (Boswell & Olson-Buchanan, 2007)). While they all might seem very different categories, the majority of them include knowledge workers. There is however a category of professions that is more at risk of work-home conflict and we have mentioned them throughout the chapter, namely people with flexible working practices. These could be for example telecommuters (e.g. (Boell, Cecez-Kecmanovic, & Campbell, 2014; Kossek et al., 2006)), priests (e.g. (Kreiner et al., 2009)), and academics (e.g. (Bell, Rajendran, & Theiler, 2012)). As we will see in the next chapter, academics have been studied more in depth for their email practices, with some implications derived for boundary management.

So far, one of the richest explanations around practical implications of boundary theory is provided by Kossek et al. (Kossek et al., 2012), but, being a theory, it still remains fairly abstracted. More importantly, the theories presented so far do not consider a fundamental aspect: the prevalence of communication technologies and their role in boundary management and negotiation. There is a need to understand how technology, and particularly communication technologies, might impact work and home domains and their management. Up until now, our discussion has only hinted at the role of communication technology in a few examples. Although grounded in social-constructivism and the idea that boundaries can be negotiated, only one of the theories discussed so far considered practical aspects of how these boundaries are negotiated between individuals. We saw how Kreiner et al. (Kreiner et al., 2009) included it as one of the communicative tactics of boundary work, however they did not consider the role that communication technology might have in facilitating these negotiations. Some details of how the context influences them have been provided but none go beyond the idea of policies and guidelines in the workspace. Communication technologies can offer an up-to-date and more practical lens to understand how boundaries are managed today and add an additional dimension to the integration-segmentation dialectic (Golden & Geisler, 2007). A set of up-to-date applied strategies used to shape and negotiate boundaries is needed to create a richer understanding of what individuals and organisations can do to better manage boundaries, but also of how technology can be designed to support this. In the following section, we will discuss the role of technology in boundary management and what changes it has brought to society.

2.1.5 Work-home boundaries, communication technologies and social change

Communication technologies, such as smartphones, tablets, and laptops together with emails and cloud-storage systems, allow employees to access their work in any moment of their lives, for example when commuting, in the evenings or on weekends, potentially causing work-home conflict.

This workplace shift enabled by affordable mobile technologies has made it easier for employees to remain linked to work outside of office hours (Boswell & Olson-Buchanan, 2007). As a result of technology improvements, the way we work has changed, becoming more flexible and allowing an 'anytime-anywhere' work shift (Allen, 2013).

2.1.5.1 Work place and space shift

One of the main effects of this shift has to do with the workplace no longer being tied to a physical location and to specific hours. This shift is reminiscent of Harrison and Dourish's (S. Harrison & Dourish, 1996) much discussed paper on space and place, where the former is defined as a physical location and the latter prescribes behaviours for a specific space. More simply, spaces become places through the social interactions that happen in them. For workers with flexible working patterns technology has made it more complicated to distinguish between different places. In the earlier example of the self-employed person who works from home, the same space or locale (e.g. the living room with a desk) becomes populated with different places (e.g. an office space to work, but also a lounging area to relax). Such places have temporal properties: "*the same space can be different places at different times*" (S. Harrison & Dourish, 1996, p. 7). What is not discussed in the paper though, and is an interesting question to pose for this thesis, is what happens when those different times are not clearly defined or overlap?

Paul Dourish picked up the discussion around space and place ten years later in 2006 to couch it around mobility and technology (Dourish, 2006). He makes the point of a digital space being created through virtual communications, as well as technology allowing new ways of experiencing urban spaces. While the concept of space gains more depth, the notion of place remains intact in his analysis.

Fast-forwarding to today, more than another ten years later, in this thesis we question what happens when virtual spaces and physical spaces are collocated, and particularly when they define incongruent work and personal places with overlapping temporal properties. Multi-device interaction has in fact created distributed workspaces, defined as "*virtual area spanning multiple devices across all physical working locations*" (Santosa & Wigdor, 2013, p. 63). Let's take the case presented in our initial vignette "A Day in the Life of a Modern Woman", where Sophie is cooking dinner in her kitchen, following a recipe on her laptop, and chatting with flatmates, when her supervisor Laura sends her a series of messages on her computer improvising a meeting. Here the kitchen is a physical space defining a place to have dinner at home with friends, while Sophie's laptop is a digital space initially defining a virtual place congruent with the physical one (i.e. it is helping Sophie in her task of cooking dinner) and later becoming a working place, clashing with the physical relaxing place. The flexibility of CMC channels can impinge on the physical-spatial boundaries put in place by a user. A case like this might be especially challenging for those with flexible working practices and

who can interweave work and non-work with a certain discretion, both on a geographical and temporal level through mobility.

2.1.5.2 Mobility and connectedness

Cousins and collaborators define mobility as "*the user's potential to move freely across space and time while engaging with a mobile device*" (Cousins & Robey, 2015, p. 38), and this can be for travelling, wandering or visiting purposes. Mobility has been identified as an essential affordance of mobile technology (Axtell, Hislop, & Whittaker, 2008), that can shape and determine how for example teleworkers do their job (Brown & O'Hara, 2003). Joel Fischer (Fischer, 2011) discusses extensively the implications of mobility experience from a philosophical and socio-technical point of view, drawing on Dourish's idea that different kinds of mobility depend on an individual's experience: for example, a taxi driver sees mobility as his or her job, a homeless person sees it as a way to avoid encounters with authority, and a commuter may see it as a means to reach the office or home (Dourish, 2006).

Other work has focused more specifically on mobility and technology for work. Oulasvirta, Petit, Raento and Tiitta (Oulasvirta et al., 2007) described mobility as a context of use differentiating it from desktop use, which is more static. Similarly, Brown and O'Hara (Brown & O'Hara, 2003) consider mobility as a lived experience in mobile workers who have to move between different spaces. They explain how places are formed through mobility, as a way of making use and managing the physical space to support mobile computing activities. They bring the argument that mobility of work involves temporal changes and rely on Castell's notion of *timeless time* to discuss the gained importance of synchronicity when using communication technologies. Timeless time is just another way of describing the social shift where work and personal life can occur at any time or any place. Being able to work anytime and anywhere has transformed the use of communication technology into a tool to negotiate availability, despite the existence of synchronous communication channels. The notions of synchronicity (see section 2.3.1.3) and particularly of availability (see section 2.3.1.2) are key when trying to understand how people negotiate boundaries around work and home with the help of communication technologies, yet to the best of our knowledge, no one has investigated this.

Mobile and communication technologies have allowed work and life to be more integrated with each other, resulting in people not only being available for work but also more connected to their personal life. Therefore, other than mobility, connectedness – defined as "*the potential to engage with the mobile technology to establish communications*" (Cousins & Robey, 2015, p. 46) – is an affordance in mobile technology. On one hand, this idea of 'always available' or 'always online' empowers users to work where they feel is best; on the other hand, it facilitates the blurring of boundaries (Boswell & Olson-Buchanan, 2007), increasing vulnerability to work-home conflict. As a result, it is more difficult for employees to distance themselves from work during non-working time (Park et al., 2011).

However, we must remember that use of communication technologies also has a positive effect, increasing work satisfaction (Diaz, Chiaburu, Zimmerman, & Boswell, 2012).

2.1.5.3 Communication technologies changing boundaries

Diaz, Chiaburu, Zimmerman and Boswell (Diaz et al., 2012) found that how communication technology is used impacts work-home domains and in turn is influenced by one's integration-segmentation preference. As mentioned earlier and in the Introduction, one of the ways companies can influence people's boundary strategies is through their own policies. Additionally, companies that pay for employees' devices or allow for Bring Your Own Device (BYOD) policies are implicitly (or even explicitly in some cases) suggesting who is in control of boundary permeation (Grevet, 2014). In the first case, an employee may feel he or she is expected to work around the clock, in the second case they might feel legitimised to take personal communications while at work.

Olson-Buchanan and Boswell (Olson-Buchanan & Boswell, 2006) discuss how technology can be used to set appropriate boundaries. They found that when fewer boundaries around the use of communication technology during non-work time are set, more work interference on non-work occurs compared to when boundaries are put in place. Cousins and Robey (Cousins & Robey, 2015) identified a series of tactics that can be put in place to manage psychological boundaries, including (1) designating certain rules for technology (e.g. having one phone for personal use and one for work use), (2) setting permeating rules (e.g. logging out of IM channels when switching domain), or (3) creating connection/disconnection rules (e.g. turning off devices after a certain hour). However, in their paper there is no mention of if and how these tactics are communicated to others to make them aware of boundary strategies. While setting permeating rules and creating connection/disconnection rules have not been discussed elsewhere, associating devices to particular domains has been noted before. Golden and Geisler (Golden & Geisler, 2007) were among the first to study the use of a device as a boundary management strategy. They interviewed 42 users on their use of a PDA (Personal Digital Assistant) and found that participants used their devices to support their boundary style preference, that being integrating, segregating or transcending boundaries between work and home.

It is important to study communication technologies not only for their prevalence, but also because they are changing the nature of work and home domains (Boswell & Olson-Buchanan, 2007). We have seen how communication technology use is increasingly blurring physical, temporal, and psychological boundaries, creating more flexible and permeable ones. While boundary permeations are frequent today, it is still unclear how and to what extent these permeations facilitated by communication technologies and spill-overs can be considered a conflict or an enrichment. Therefore, as technology becomes more prevalent and offers more and more types of communications, research questions need to be updated.

In the following sections, we turn to HCI literature to analyse our current understanding of communication technologies use in more depth, starting with multi-device interaction and later moving on to computer-mediated communication literature. We then conclude with a major phenomenon that arises and that we have only mentioned so far: how the use of communication technologies is changing our availability as a result of being constantly connected and how users make use of awareness cues.

2.2 Multi-device interaction

Today, 77% of Americans own a smartphone and 51% own a tablet (Pew Research, 2018). Data in the UK for 2017 is very similar, with over two-thirds (85%) of the British population owning a smartphone, 78% owning a laptop, and 68% owning a tablet (Lee, Calugar-Pop, & Tarigoppula, 2017). More recently, new devices like smartwatches have entered the market, with 3% of the UK population owning them in 2015 (OfCom, 2015). Overall, these numbers seem to be growing on a yearly basis, and consequently understanding user interactions across multiple devices has become an active area of research especially in more recent years.

Multi-device, or cross-device, use is a fairly recent interest in HCI. While no common definition exists, Scharf et al. (Scharf, Wolters, Cassens, & Herczeg, 2013, p. 38) describe eight possible cross-device interaction (XDI) scenarios and define XDI as "*the type of interaction, where human users interact with multiple separate input and output devices, where input devices will be used to manipulate content on output devices within a perceived interaction space with immediate and explicit feedback*". The eight scenarios are based on examples they collected from the literature and include:

i. XDI as a solution when interacting with mobiles and multitouch tables.

ii. One device is used to control applications running on another device. For example, when a user answers or dismisses a phone call on his or her smartphone using his or her smartwatch.

iii. Spontaneous interactions that allow associating a user's device with another device in the environment. For example, when transferring files or objects between devices using Bluetooth.

iv. Using one input device to control an output device which are spatially separated. For example, using a smartphone as a remote control for the television.

v. Coupling several devices to create a unique large mixed device.

vi.   When two devices are used to complement each other in the execution of a task. For example, when a phone is used for instant messaging communication and menu option, while another device is used as a remote system.

vii.   Being able to access the same kind of information from multiple devices. For example, accessing emails or browser history from any device of a single individual.

viii.   Multiple individuals collaboratively interacting across mobile devices with a different display.

However, these scenarios provide a rather simplistic view of what cross-device interaction includes. As new devices are introduced, these device ecologies (Bødker & Klokmose, 2012) – intended as the multiplicity of devices that users have access to and make use of alone or in combination – are constantly changing and adapting to the environment and the user. More work should focus on specific activities, such as communication, and how these are handled within ecologies of devices.

2.2.1 Why and how we use different devices

It has been found that one's choice of device depends not only on the nature of the task, but also on the context of use (physical space, social environment, etc.) (Jokela, Box, Olsson, & Box, 2015; Kawsar & Brush, 2013), and the access and initialisation time vs. actual usage time (Matthews et al., 2009). That means, there is a trade-off between the time needed to boot a device and access an application, and the time expected to complete the task: the less time a task takes, the quicker and more accessible the device should be; and vice versa, the longer the task and the more willing is a user to wait for a laptop to boot and an application to open.

Jokela, Ojala and Olsson (Jokela et al., 2015) discuss how people use multiple devices, whether this happens sequentially or in parallel, in addition to understanding what triggers the decision to use one device as opposed to another. According to their analysis, parallel use can be divided into three sub-categories: *resource lending*, i.e. when the primary task is completed on one device, and a secondary device is used for complementing resources; *related parallel use*, i.e. when two devices are used for the same task; and *unrelated parallel use*, i.e. when different tasks are carried out on different devices, all at the same time. The authors found that while most commercial efforts around multi-device use target sequential use and resource lending, related parallel use is currently unsupported, despite being a common practice. They highlight issues and problems that people face when trying to access information or completing a task on different devices and found that participants often resorted to core functions such as email to "*work around interoperability problems*" (Jokela et al., 2015, p. 3911).
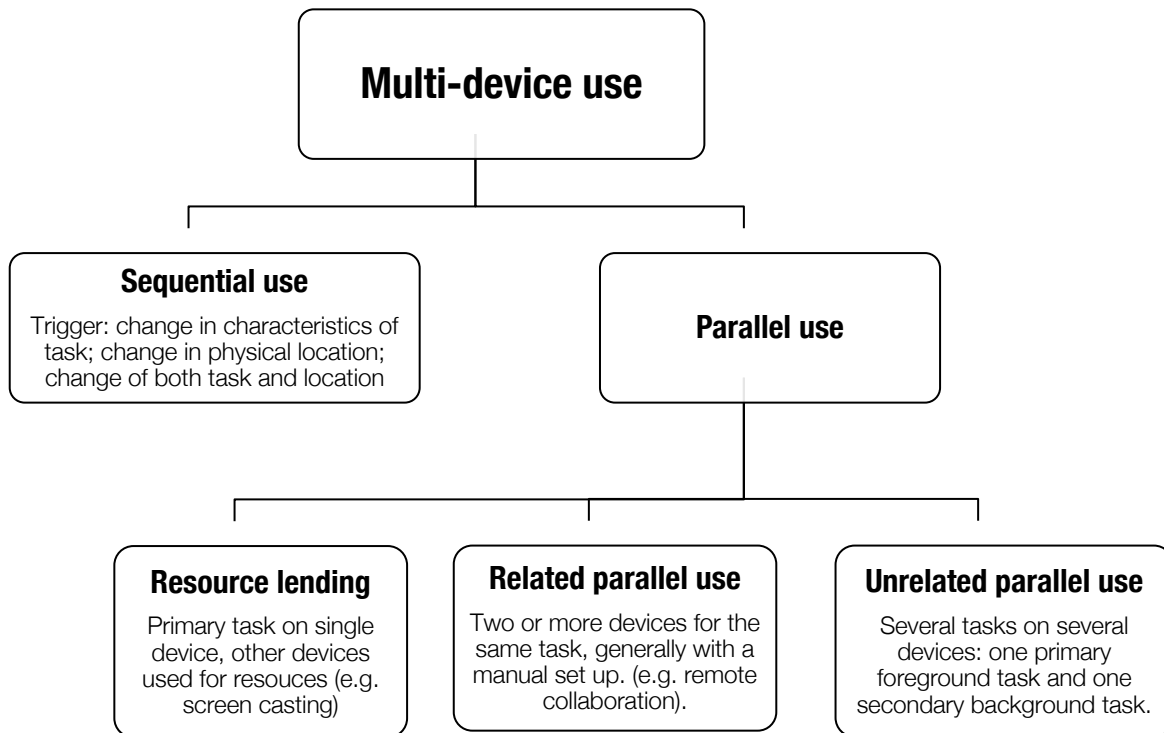
Figure 3 Multi-device use scenarios based on (Jokela et al., 2015).

2.2.1.1 Work and personal devices

While Figure 3 gives us an initial and rather general understanding of multi-device use, these interactions introduce new issues: how combinations of devices are chosen and used for specific purposes need to be understood, especially if this is different for work and for personal reasons, thus affecting boundary management.

Some work has started to classify use of devices depending on the domain they belong to, such as Golden and Geisler (Golden & Geisler, 2007) who studied how PDAs are used for either work reasons, personal reasons, or both. The same concept is distilled through multiple devices in Dearman and Pierce (Dearman & Pierce, 2008) and Fleck, Cox and Robison (Fleck, Cox, & Robison, 2015), showing how mobile devices (laptops and smartphones) constitute a bridge between the two domains, especially thanks to communication technologies.

Before mobile technology was introduced in our everyday lives, boundaries between work and home were more defined. When BlackBerries became widespread, work-related emails got pushed (i.e. new emails get actively transferred, or pushed, to a device, providing an always-online experience), contributing to the addictive effect email can have on mobile devices, where users are constantly checking for new messages (Turel & Serenko, 2010). Once smartphones, like the iPhone, became popular, Dery, Kolb and MacCormick (Dery, Kolb, & MacCormick, 2014) noticed that people use mobile phones mostly for personal use and associated BlackBerrys instead only with work. This

meant that many users relied on two devices to keep boundaries separate between home and work, as Cousins and Robey also identified (Cousins & Robey, 2015). This is one strategy that people may adopt to disconnect from work outside the office. We must consider that the longitudinal study discussed here involved employees of a research division in a financial service company and not members of other professions, and data refers to the years 2006 and 2011. Despite being published recently, a few years have gone by since and based on their results we can assume that mobile use for communication is still evolving as new mobile and wearable technology is put on the market (e.g. smartwatches). BlackBerrys for example are not widely common among members of professions other than white-collar workers. Arguably, most people own only one smartphone that is used for both personal and professional reasons and the tactic of having separate phones does not necessarily suit everyone. In fact, personal smartphones are nowadays also used for work-related emails, resulting in blurred boundaries between home and work.

Moving on, Karlson, Meyers, Jacobs, Johns and Kane (Karlson et al., 2009) looked specifically at multi-device use and the impact on boundaries and working time. They examined temporal patterns of mobile phone and PC usage patterns of 16 Windows users over a period of 5-30 days. Data logs and follow-up interviews showed that participants accessed work email outside working hours and relied on their phone whenever they did not have access to a PC. Among their sample, they found that people *preferred* to be constantly connected with work and life domains through their mobile phones and emails, as this connectedness gave participants a stronger sense of perceived control. These findings support Greenhaus and Powell's (Greenhaus & Powell, 2006) idea of work-family enrichment and the importance of perceived boundary control supported by Kossek et al. (Kossek et al., 2012).

Today's workspace is distributed across multiple artefacts and locations, which yield to trends in device specialisation, parallelism and fragmentation (Santosa & Wigdor, 2013). This device specialisation is not just limited to work spaces but involves also the home. Kawsar and Brush (Kawsar & Brush, 2013) looked at how multiple devices were used in the home, combining both logged data and follow up interviews with 18 households. In contrast with previous literature, their findings suggest a change in computing practices based on family practices such as contention for devices no longer being an issue given their prevalence in a home (i.e. fighting over who should use which device). They identified spatial and temporal habits of common Internet activities. In terms of location, activities such as social networking and video watching occurred primarily in the bathroom, and home working took place in the living room or kitchen, other than the designated home office. Web Communication was also popular in the home office and took place primarily in the morning and in the evening, consistently with working schedules and the desire to check emails before and after work. In their case, web communication included both synchronous (e.g. instant messaging tools) and asynchronous (e.g. email) communications and was logged being used on five of the seven devices investigated: laptops, tablets, smartphones, desktop PC, and iPod Touch (the remaining two devices were game consoles and IPTV). As an over-generalisation, more personal

activities (e.g. social networking) seem to take place in private spaces (e.g. the bathroom) where interruptions are less acceptable and less likely to happen. More public and shared spaces (e.g. kitchen) instead are used for work purposes, as well as personal reasons. Kawsar and Brush's insight on the use of communication technology is interesting and novel but not as discerning as it could have been, for example taking Dourish's (Dourish, 2006) distinction between space and place and our considerations on what happens when digital and physical places overlap and conflict.

Despite lots of research happening around this area, most of it focuses on technical issues, as noted in Scharf's eight scenarios (e.g. (X. Chen & Grossman, 2014; Houben & Marquardt, 2015)). Work in this area has in fact only started to scratch the surface and there are still many challenges to solve, given the interoperability issues due to a widespread of platforms and operating systems. Other issues specific to mobile devices include mobility, diversity of context of use, and rapid evolvement of the technology (Church, Banovic, Ferreira, & Lyons, 2015). As technology improves, it is not surprising that most effort goes to improving seamless interactions between devices. However, the user experience of multi-device use is still underexplored, and in particular, as these practices become more common, research should dig deeper in understanding specific behaviours, e.g. communicating or even just using email across multiple devices, and what impact they have, for example for boundary management. On top of this, findings need to be constantly updated as new devices enter the scene and become popular, such as the recent case of smartwatches.

2.2.1.2 The emerging case of smartwatches (SWs)

Wearable computers are defined as "*any body-worn computer that is designed to provide useful services while the user is performing other tasks*" (Starner, 2014, p. 10), and are expected to become the next big thing (Spence, 2014). Commercial wearable computers include wrist-worn devices such as activity trackers and smartwatches (SWs), along with health monitors.

In 2012 the Pebble Smartwatch was launched on a crowd-funding website (Kickstarter, 2012) and resulted in one of the most successful campaign at that point, raising over $10 million (Newman, 2012). As a result, since 2012 SWs have received growing attention from the popular media. Over the past two years more than 20 SWs have been released, with one of the latest being the Apple Watch. They all offer a variety of functions and sensors, ranging from being able to receive the notifications from its paired smartphone, going through voice interaction for web searches, to tracking steps and heart rate. Existing research reports on suggestions for SW hardware and software improvements. Yet, to date very little research has been done on the everyday use of these devices from a user's perspective and especially what are the implications for work-home boundaries. Therefore, smart wrist-worn devices introduce the opportunity to explore new research areas of mobile user experience because, unlike mobile devices, wearables are more discreet and allow minimal interference between the user and the task, as well as being always on the user.

Initial work on user experience of smartwatches has investigated specific use cases, such as the impact on drivers of notifications provided on a Pebble Smartwatch and a smartphone (Giang, Hoekstra-Atwood, & Donmez, 2014). Their findings show how participants preferred to engage with smartwatches rather than smartphones when driving but took longer to read notifications. This could be due to a novelty effect (i.e. participants were unfamiliar with smartwatches and had never used one before) (Brynjarsdottir et al., 2012), or the context of use (i.e. whilst driving). More work needs to be done to understand how the context of use (space) influences the interactions (place) with a smartwatch.

Other use-cases considered go beyond the phone-to-wrist scenario (Pearson, Robinson, & Jones, 2014). Pearson, Robinson and Jones considered the potential of smartwatches as public displays and provide the first findings around social acceptability and glancing behaviour. Results show that for people it is socially acceptable to glance at others' watches, regardless of their smart or 'dumb' nature. They constructed three types of probes to display on smartwatches: content specific to the wearer (e.g. calendar events, notifications, etc.), content specific to the glancer (e.g. missed calls, notification of messages, etc. relevant to the person looking at the SW worn by the wearer), and public content (e.g. weather information). While the likelihood of actually using a smartwatch as a public display to exhibit information to others in close proximity is still to be determined, what their study suggests is that notifications (either for the wearer or the glancer) on a smartwatch are probably the key element on these new devices. Users (wearers) enjoyed the idea of being connected to someone else (glancers) and receive their notifications, as if there was an 'elastic bond' between them. It must be noted, however, that this study also did not recruit existing smartwatch users and thus, their findings could be confounded by a novelty effect.

As the studies just presented demonstrate, the smartwatch's potential to deliver notifications and literally allowing people to be always connected is a prevalent feature of wearable devices and one of the most critical implication for this thesis. Even though communication capabilities through a smartwatch are still limited to a few canned responses or voice interaction, being able to receive notifications might increase that sense of connectedness.

2.3 Current uses of computer-mediated communication tools

Given all the activities than can be carried out across devices, we have pointed out one that is predominant in multiple forms: communication. As Macdonald (Macdonald, 2004) said, the greatest potential of the Internet lies in communication and O'Hara, Massimi, Harper, Rubens and Morris point out how smartphones "*provide perhaps one of the most powerful platforms for accessing combinations of communication modalities*" (O'Hara et al., 2014, p. 1131). Clearly, mobile communication, synchronous and asynchronous, allows for seamless transitions between work and personal activities anytime and anywhere (Makinson, Hundley, Feldhaus, & Fernandez, 2012) given

its mobility affordance (Axtell et al., 2008). Examples of popular CMC channels include email, instant messaging, and social networks.

Takkinen and Shahmeheri (Takkinen & Shahmehri, 1998) were the first to investigate email use on multiple devices exploring how often email is accessed on different computers, using different email clients depending on the purpose of communication (social, work, educational, etc.) and role. Santosa and Wigdor (Santosa & Wigdor, 2013) discussed how email is frequently used to transfer information to others and across devices, especially for quick access, re-access and *hot* documents, i.e. ones that "*people are currently working with, those that support activities in progress*" (Sellen & Harper, 2002, p.164). However, research on communication across devices is rather fragmented as it either looks at how users access and manage data across personal and work desktop computer/laptop devices, but not smartphones (Dearman & Pierce, 2008); or how tasks are completed across computer and smartphone devices, without distinguishing between personal and work purposes (Karlson, Iqbal, & Meyers, 2010).

A noteworthy study conducted in 2009 by Matthews, Pierce and Tang (Matthews et al., 2009) directly explored how new generation phones like the iPhone 3G were used. They interviewed 21 members of a corporate research lab to uncover usage patterns. Even though they did not focus on cross-device interaction or specifically on communication purposes, their results describe multi-device use of smartphones in combination with computers. For example, their users preferred their phone to triage messages in the inbox, while fully featured computers were used for reading and replying to emails. They also observed that smartphones were used to maintain awareness of information while away from a computer, e.g. by checking emails from remote collaborators. Despite being a seminal work, their results are 'old' compared to the speed with which technology grows and further studies in this direction should be carried out. In addition, their study does not frame findings around work-home boundaries. In addition, in their study email is considered only as one of the several features used on phones, and therefore no granular understanding is provided.

CMC does not just include email, albeit the latter being one of the most popular Internet activities. As pointed out earlier, other forms of CMC are becoming popular, such as use of social networks like Facebook and Twitter, or instant messaging tools like WhatsApp. Shen, Brdiczka and Ruan (Shen, Brdiczka, & Ruan, 2013) compared the use of a popular email client, Gmail, with Facebook. Through social network sites (SNS) users become more aware of others' activities and personality, as SNS users carefully curate the self-image they portray online (Barash, Ducheneaut, Isaacs, & Bellotti, 2007). They were interested in uncovering differences between a more private form of communication and a more public one in terms of emotional content and intensity of engagement. They recruited 1327 participants across the US and retrieved usage data directly from Facebook and Gmail, using a web interface to deploy the study. The main finding was that, despite the increasing popularity of SNS, email was still found to be a very important CMC tool, with users writing many more emails than posts on Facebook, but Facebook content being overall more emotional and

expressive. We would like to draw attention to the fact that in their sample Facebook was used exclusively for personal reasons, while Gmail was used in 42% of the cases as personal, in 2% purely for work, and in the remaining 56% it was used for both work and personal reasons. We will see in the next chapter how work and personal emails are used differently depending on the account, suggesting that these findings may be somewhat misleading. Additionally, the use of these CMC tools on different devices was not logged and thus not teased apart.

Church and de Oliveira (Church & de Oliveira, 2013) wanted to compare different mobile messaging systems and chose to look at WhatsApp and traditional SMS. While the former is used for more social purposes to build a sense of community, and has benefits such as cost and immediacy, SMS were considered more reliable, formal and privacy preserving. Just like Shen et al. (Shen et al., 2013) found that Facebook and Gmail did not replace each other, neither did WhatsApp and SMS in this study. This suggests there is a trend for strong curation of communication, given the communication overload we are experiencing (Cho, Ramgolam, Schaefer, & Sandlin, 2011).

O'Hara et al. (O'Hara et al., 2014) go a step further and investigate what is the quiddity, i.e. the essence of mobile instant messaging applications and they too use the case of WhatsApp, being the dominant platform in Europe. The peculiarity of these instant messaging tools is that they allow to combine photos and videos, as well as audio and written messages, just as email is able to do, yet people still decide to use both platforms. WhatsApp in particular allows users to be notified when a message is sent and delivered, with the use of two separate ticks next to each message. In addition, it displays the last time a user was online, a feature that can be disabled. Since this study was published, WhatsApp added an additional feature: a change in colour (from grey to blue) in the two ticks to notify when a message has been read. Among their 20 participants, they were able to uncover 'doings', i.e. ways of engaging with relationships through IM-like applications. For example, the authors talk about 'plausible deniability' and 'plausible accounting' when discussing awareness features (i.e. 'last seen online' and receipt ticks). They claim that these awareness features are not necessarily perceived as a precursor of interaction and communication – as Nardi, Whittaker and Bradner (Nardi, Whittaker, & Bradner, 2000) argue when discussing the use of IM in the office (see section 2.3.1.3) – but are instead messages *per se*, which they define as an 'encounter of knowing' (i.e. the user gains insight about the interlocutor without having to communicate with him or her) as opposed to an 'encounter of communication'. These awareness features add temporal properties to a communication, which need to be interpreted based on the interlocutor's habits (e.g. how quickly are they likely to reply). O'Hara et al. explain how, when the communication happens between friends or family these temporal patterns can be easily explained, but issues of social pressure to respond rise with particular, less intimate, relationships, such as with acquaintances or work colleagues. We argue that these findings need to be updated since the introduction of the read-receipt blue tick, to understand how these awareness cues may add additional pressure not just in personal environments but also in work ones. Moreover, the introduction of notification devices like

smartwatches can alter the temporal patterns of communications. This should be extended beyond the single case of WhatsApp.

The ways in which people use communication technology, particularly smartphones, is rapidly evolving (Dery et al., 2014) and the usage scenario today looks very different from five years ago. While work communication is fragmented across different devices, it is now also been distributed across a growing number of platforms, which go beyond just email and include for example instant messaging (e.g. Skype, Slack ("Slack," 2013)), yet with the exception of Shen et al. (Shen et al., 2013), to the best of our knowledge no other published work has directly compared how these new communications channels are used within the workplace, together with the most popular of them, i.e. email. These findings need to be reconsidered in the context of today's use of mobile devices, especially now that we do not just have hand-held devices but also wearable ones such as smartwatches. As discussed above, the enhanced connectivity gained by the use of mobile technology and recently by wearable devices is reshaping the way we work, creating the – perhaps perceived rather than real – expectation that employees are always available, increasing workload and consequently work-related stress. In addition, aggravating this problem, some companies are even selling their employees availability as part of the company's services (Mazmanian & Erickson, 2014). As mobile technologies are becoming increasingly affordable and ubiquitous, and workers have access to multiple devices, more research needs to investigate how communication availability is managed across the suite of devices we now own and/or have access to.

2.3.1 Implications for growing popularity of CMC

It is inherent for us to communicate, and it has never been easier given the multitude of CMC tools that exist today. As the vignette at the beginning of this thesis demonstrates, one end result is constant availability. Sophie was reachable throughout the day via a multitude of channels: WhatsApp on her phone and smartwatch; Couple app on her smartwatch, phone and laptop; and Slack and email on her laptop. Market predictors have seen a strong growth in the use of mobile devices for any form of communication and expect it to continue to grow. Use of email on phones used to be an exception when fully-featured computers were not available, but as work becomes more flexible, its use 'on-the-go' is more popular and accepted: approximately 50% of email users access it on their mobile devices (Radicati Group, 2015c; Specht, 2018). Instant messaging accounts, which today are over 3.2 billion, are expected to grow at a 4% rate until 2019, particularly for business use compared to personal use (Radicati Group, 2015b).

In the previous sections, we saw how communication technology can extend working hours, making users perceive they are carrying their work around in their devices and thus cause issues in boundary management. How we choose to use CMC tells something about how we decide to portray ourselves to others and could help inform how technology helps co-construct and negotiate boundaries (Diaz et al., 2012).

2.3.1.1 Negotiating diverse communication needs

Goffman's dramaturgical approach offers the perfect lens to understand how users might decide to portray themselves (Goffman, 1959). Goffman builds on the idea that most behaviours are bounded in space and time, and guided by specific norms belonging to the context. He draws a comparison between this context and a theatrical stage, explaining how users instantiate specific roles depending on the context or stage and its audience. Goffman believed that it was possible to keep different roles separate in time and space, by allowing a few moments in between performances, but at the same time, at any given time, a role has to be embodied. Just like in boundary theory, where different roles can conflict, Goffman acknowledges the idea that roles can collide and result in 'civil inattentions', such as answering the phone in front of others. While today this example might no longer be considered a civil inattention, but rather the norm, mobile phones have increased dramatically the possibilities of two people to be connected in many situations where there might be a mismatch between roles and context.

Hogan (Hogan, 2010) applies Goffman's dramaturgical metaphor to online behaviour on social media. He distinguished between Goffman's idea of *performance*, which is subject to constant self-monitoring with the idea of managing impressions, and his own idea of *exhibition*, where there is an online impartial curator (e.g. Facebook) that manages content carefully selected and uploaded by users. Social media presence in fact has been used for archiving purposes (Greengard, 2012), almost to create an identity trail, which obviously needs to be managed and current social media platforms like Facebook do not support this (Zhao et al., 2013).

Most work in the area of online self-presentation has looked at the use of social media (e.g. (Hogan, 2010; Zhao et al., 2013)) but more work is needed to understand how use of communication technology is also influencing self-presentation and perception of others. Taking Goffman's approach, depending on the *time-space-identity context* we are in (Hogan, 2010), we have different needs for sharing information, which echoes Harrison and Dourish's (S. Harrison & Dourish, 1996) definition of places (see section 2.1.5.1). Also, how we present ourselves to others has to do with the notion of availability to communicate and, in turn, relates to boundary negotiations.

Much like Goffman, Nippert-Eng (Nippert-Eng, 1996) also discussed how self and identity are negotiated around time and space. Farnham and Churchill (Farnham & Churchill, 2011, p. 2) call this 'faceted identity', where "*different aspects of identity are performed depending on context, and expect that identity faceting will vary depending on the individual*" (Figure 4). The concept of faceted identities has several commonalities with ways in which users might segment their work and personal boundaries.
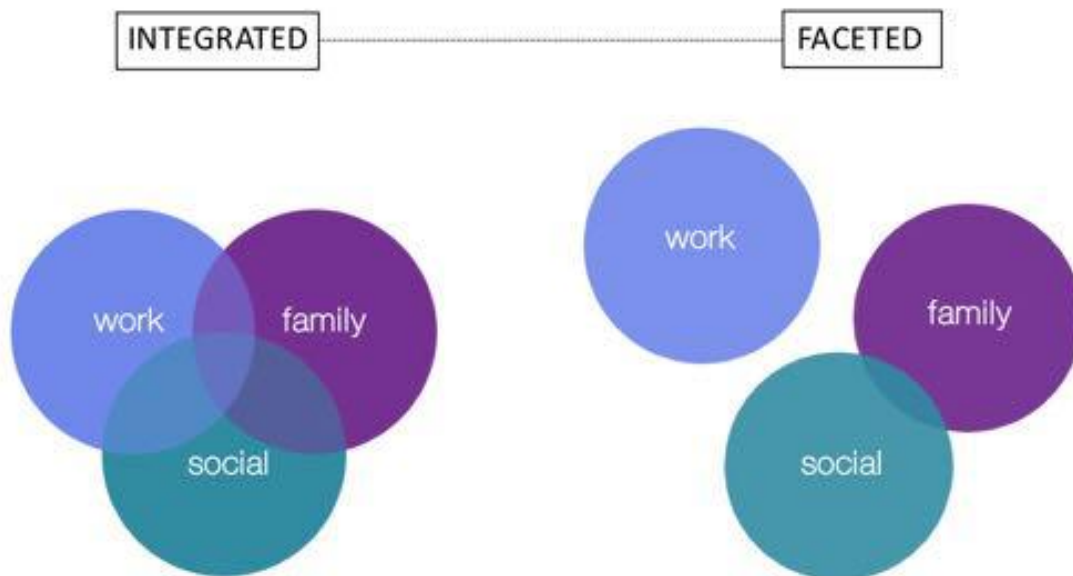
Figure 4 Degree of faceted identities (Farnham & Churchill, 2011).

In their work, in a way somewhat similar to Shen et al.'s (Shen et al., 2013), they looked at how identity and sharing are affected by private and public communication channels. Just like Shen et al., they found that email and Facebook use were positively correlated even among younger participants, suggesting that Facebook is not replacing email. In fact, Farnham and Churchill (Farnham & Churchill, 2011) explain how email and SNS are very distinct and their use depends on the level of privacy needs a user has. Their work is important for us as it analyses the use of communication channels with the degree of separation/integration of one's various identities. Perhaps unsurprisingly, people with more faceted identities had greater communication needs and therefore engaged in email and SNS slightly more than people with integrated identities. When applying this to boundary management and negotiation, we can see how if an interlocutor chooses the wrong communication channel, it can cause a domain conflict. For example, if someone uses WhatsApp as just a personal channel, but suddenly receives a work message from a colleague there, this may be seen as an issue. Part of this self-representation lays in the notion of availability (are we really always available to communicate?), which brings us back to the boundary management and the social-constructivist perspective (do others know when we are available to communicate and where our boundaries sit?).

2.3.1.2 Understanding awareness and negotiating availability

When Harrison and Dourish (S. Harrison & Dourish, 1996) discussed the idea of space and place, they described one of the features of space as being 'presence and awareness', i.e. being able to recognise artefacts of our and others' activity. We saw this happening in O'Hara et al.'s (O'Hara et al., 2014) study on the use of WhatsApp, where participants were using awareness features of that virtual space to infer other people's activity (e.g. 'last seen online'). To be clear, we are using

Oulasvirta et al.'s (Oulasvirta et al., 2007) definition, whereby awareness, or a unit of it, is seen as a cue to infer "updated representations of remote people" (Oulasvirta et al., 2007, p. 100) and their availability. This definition differs from others in the literature (e.g. (Iqbal & Horvitz, 2010)). For example, Iqbal and Horvitz (Iqbal & Horvitz, 2010) used awareness in the context of notifications to provide a quick glanceable understanding of the content of a message. While this is definitely an interesting area of research, it is out of the scope of this thesis.

Oulasvirta et al. (Oulasvirta et al., 2007) stress the need to differentiate between the context of desktop use and context of mobile use, and thus highlight how awareness cues for the two are different. Even though mobile devices are always with us, most of the time they are in our bags or pockets, and when they are out, our attention is still rather fragmented. Thus, they were interested in knowing how and to what extent users pay attention to infer activities of others. They implemented software for Nokia phones, much like a precursor of WhatsApp with added functionalities, where users can see who is online, when someone was last active, people's location, and if they were in nearby. Participants were as a result able to infer someone's activity (e.g. sleeping), someone's potential availability to engage in some sort of communication (e.g. based on when they were last online), or even social situation (e.g. if two people were in the same location). It has to be noted that the participants here were all teenagers who knew each other and were able to create a sense of availability and synchronicity between two non-collocated friends. This work was the first to provide an in-depth analysis of the issues around awareness cues in mobile devices as opposed to desktop computers. However, the authors did not distinguish between communication channels used for work or personal reasons and how awareness cues might differ. Also, their work was conducted in 2007 and since then, technology has allowed work to become even more flexible, and new practices may have emerged or older ones may have changed or ceased. Given the drastic technological advances since 2007, these findings need to be understood in the context of a plethora of devices, types of accounts and communication channels. There are several awareness cues that can be used to infer, not only someone's availability to communicate, but also potentially their boundary strategies, yet to the best of our knowledge no work has investigated this. Now that smartwatches are gaining popularity, it would be interesting to uncover how these awareness cues are used on a device that is always with users, but not hidden in a pocket or a bag, but rather strapped on to the wrist and constantly visible.

Awareness cues can also be used by receivers as a way of communicating unavailability. For example, Birnholtz and colleagues (Birnholtz, Guillory, Hancock, & Bazarova, 2010; Birnholtz, Hancock, Smith, & Reynolds, 2012), and Patterson (Patterson et al., 2008) mentioned strategies to avoid being constantly connected and create boundaries between devices and identities. Birnholtz et al. (Birnholtz et al., 2010) call these 'butler lies', but focus in particular on explicitly verbalized lies or linguistic solutions to overcome the technology design limitations in teenagers. They looked at SMS, IM and BlackBerry Messenger. The authors highlight the importance of being able to manage and coordinate one's unavailability, especially in our always- connected society. These "*butler lies*

provide a useful window into the broader sociotechnical problem of unavailability and inattention management" (Birnholtz et al., 2012, p. 35).

2.3.1.3 Measuring responsiveness and attentiveness

Motivated by the desire to understand non-verbal cues, i.e. temporal patterns of responses, in asynchronous CMC, Kalman et al. (Kalman & Rafaeli, 2005) analysed chronemics (i.e. the role of time in communication) in three existing datasets: email conversation from Enron employees, discussions created on a University online forum, and answers to questions on Google Answers. Their findings show a common pattern in asynchronous CMC: a power law distribution where at least 80% of the responses are created within an average latency (1.5 hours in the case of Google Answers, 23.5 hours in a University forum, and 28.7 hours in emails) and at least 97% of responses happened within ten times the average response latency. That is to say that people either reply relatively quickly or they do not reply at all. Reasons for this are attributed in the paper to information overload and the struggle to keep up with a growing number of messages. In addition, there is a certain social norm where people are expected to respond quickly, especially on mobile phones, where the average response latency is even shorter (Church & de Oliveira, 2013). Despite online communication having the benefit of being able to be asynchronous, people feel the need to reply quickly or be apologetic if their answer is delayed. That is because quick responses give non-verbal cues of immediacy and presence, i.e. being constantly available. If we are not constantly available, we feel we need to justify ourselves.

Given the more or less perceived expectations of quick replies, users are expected to pay attention to their devices and any incoming notification. As a result, recently Dingler and Pielot (Dingler & Pielot, 2015) quantified attentiveness towards mobile messaging. They analysed logs of mobile messaging notifications and user attentiveness for 42 participants over the course of two weeks. Results extend those of Avrahami, Fussell and Hudson (Avrahami, Fussell, & Hudson, 2008), who only considered desktop PC and instant messaging tools, and show how people are on average attentive to messages 12.1 hours of the day, with higher peaks during weekdays and evenings. These findings support the idea that, in order to be less disruptive, notifications should be delivered at an opportune moment (Fischer, 2011) and, given the fact that users seem to find opportune moments over the course of 12.1 hours in a day, these should not be rare.

Nardi et al. (Nardi et al., 2000) instead looked at a near-synchronous CMC tool: instant messaging (IM) use in the workplace. They define it as near-synchronous because it allows users to type a message in a window, like a chat, but rather than the communication being directed to whomever is in that chat room, it is restricted to one other person, just like in a phone call. It is important to note that Nardi et al. used this definition in 2000, and IM tools have since changed. In their study, IM was found to be used for 'outeraction', i.e. to negotiate conversational availability: if the recipient is 'online' it does not mean he or she is in the position to interrupt themselves to engage in a

conversation. On one side senders can infer receivers' availability, on the other side receivers have more control in deciding whether to respond. Yet, more recent studies show how most CMC responses happen in a short time (Kalman, Ravid, Raban, & Rafaeli, 2006) and how awareness cues can increase the social pressure to respond in a more timely manner (O'Hara et al., 2014). How this outeraction – or "*processes outside of information exchange in which people reach out to others in patently social ways to enable information exchange*" (Nardi et al., 2000, p. 79) – occurs today is very different and most likely the result of a combination of media or awareness cues. In addition, there is the added layer of life domains: Nardi et al. report anecdotally of one participant who did not want to use IM when working from home to reduce the interruptions. The literature has shown that similar issues are becoming more of a problem today (see 2.1.5.1). In their implications for design, the authors envisioned a world where IM would be integrated in media spaces that lacked text-messaging (e.g. video-conferencing calls like Skype) and available on phones. In the latter case, the argument was to reduce the disruptiveness of a phone call when establishing availability. While there is definitely some truth in their predictions, we would argue that today, the suite of CMC tools we use only increases the sense of information overload and adds more information to be managed and retrieved.

We have seen evidence of how managing several communication channels, on multiple devices depends on the domain they belong to (work or personal), but none of the research considers the cross-overs between life domains. Kreiner et al. (Kreiner et al., 2009) took a first step in this direction and identified the need to communicate boundary preferences and call out any violators. Interestingly, none of these researches seem to acknowledge the possibility to misinterpret awareness cues, leading to potential work-home conflicts. This is the case of Sophie when was contacted by her supervisor, who was unsure about her working schedule because Sophie had not logged out of a work-related messaging tool (i.e. Slack). Are people good at interpreting these awareness cues? How are they used between different domains? These are some of the questions that still remain unanswered in the literature.

2.4 Summary

In this chapter, we have carefully reviewed a large body of research, pointing out new trends in boundary literature, multi-device literature and computer-mediated communication literature. For each of them we also underlined gaps and the need for future work, which this thesis will build on.

We all embody different roles of our life throughout the day (e.g. parent, employer, friend, etc.). Regardless of where we position ourselves along the integration/segmentation continuum (Ashforth et al., 2000; Clark, 2000; Nippert-Eng, 1996), boundary theory suggests that those with less perceived control over their boundary strategies experience more challenging consequences (e.g. dealing with work emails outside working hours and feeling overwhelmed and compelled to reply) (Kossek et al., 2006). When control is lacking, spill-overs are more likely to occur, causing

unexpected interruptions that can affect productivity and increase stress (Kossek et al., 2012). Boundary management strategies have been studied particularly in telecommuters (who lack physical boundaries between work and personal life), knowledge workers and academics (e.g. (Boswell & Olson-Buchanan, 2007)), whose work flexibility adds a level of complexity to individual practices. However, given this flexibility, it is difficult to understand the boundary management practices of others and little is known about how these practices are communicated between people (e.g. co-workers) in our constantly connected world.

Studying people who have more flexible working arrangement and their use of communication technologies can help unravel issues around work-home boundary management and negotiation. Kossek and collaborators (Kossek et al., 2006, 2012) have done extensive research on telecommuters and other professions with more flexible or challenging working patterns, such as managers. However, their work lacks more practical implications and considerations around communication technologies.

Multi-device interaction exacerbates work-home boundary spill-overs and interruptions, especially given the prevalence of mobile devices and their anywhere anytime connectedness (Boswell & Olson-Buchanan, 2007; White & Thatcher, 2015). Multi-device interaction is a relatively new interest in HCI, and much work has focused on computational capabilities and less on user experience. While we now know what influences the choice of device and patterns of parallel and sequential use (Jokela et al., 2015), the research in this field includes a wide range of activities that can be carried out across devices (e.g. (Matthews et al., 2009)), but little work has uncovered specific CMC and email practices across devices (e.g. (Karlson et al., 2009)).

Boundary spill-overs and interruptions come primarily in the form of CMC notifications. We live in a world of communication overload (Cho et al., 2011), where there are a wide range of channels to choose from, offering different affordances and all requesting our attention. How people use communication technology and CMC tools is indicative also of the type of self-portrait they wish to convey to others (e.g. checking emails only once a day). While some initial work has been done to link the presentation of self in an online/offline binary paradigm, most of the work has focussed on identity and social media use (Hogan, 2010; Zhao et al., 2013), and less on negotiation of availability and boundaries around CMC via awareness cues (Oulasvirta et al., 2007).

The next chapter will focus in particular on one of the most popular and longstanding CMC channels: email. Examples throughout this chapter have shown how email is a good example of a communication tool that can bridge the boundaries between work and personal domains and it works across devices. In addition, compared to other CMC tools, email is a more complex tool as it is not just used for communicating, but also for task and time management (Mackay, 1988), which adds to information overload we experience. The next chapter will provide background knowledge to the reader about email practices. We do so because this thesis will build on existing email research

and frame it around multi-device interaction and boundary theory, while also understanding where email sits compared to other popular CMC tools.

Chapter 3

The Case of Email

[Parts of this chapter have been published in
(Cecchinato et al., 2014; Cecchinato, Cox, et al., 2015b; Cecchinato, Fleck, Bird, & Cox, 2015)].

In this chapter we discuss email management literature in detail and what are the implications for boundary management. We have chosen to take a closer look at email because it is the longest standing CMC channel, that is used ubiquitously for both work and personal reasons. More than that, it is a complex tool that is used for communication, task management, time management, and information management (Mackay, 1988).

In the previous chapter (see section 2.1.5) we have already pointed out how email can impact and blur boundaries between work and home. In particular, understanding email use is not just exclusive to the field of HCI (which has been studying it for decades), but is also a focus in the work-home conflict and boundary management literature where interruptions coming from mobile technologies (e.g. email notifications) are seen as a facilitator of increased spill-overs between personal and work domains, which occur when "_the strain produced by stressors in one domain provokes stressful situations in another domain_" (Greenhaus & Parasuraman, 1987, p. 44). However, the literature does not agree on what is the best strategy to manage email, other than suggesting that less time should be spent in the inbox. As a result, email behaviour can be used as a starting point to address our overall research question.

Before we move onto presenting our findings in the next section of this thesis, we want to unpack the current understanding of email management. Therefore, in this chapter we will start by

presenting what the benefits and drawbacks of using email are, what workflows are used to manage it, how users attend to email in terms of dealing with notifications and response expectations, and finally what are the differences between work and personal email. Where relevant, we will also emphasise any behavioural differences across devices.

3.1 The good and the bad of email

Email is chosen as a case of CMC technology that can be accessed ubiquitously across a range of devices and is used for both work and personal reasons. Along with its many benefits, it has the potential to interfere with both professional and personal environments, blurring the boundaries and making it difficult to establish availability. More importantly, email is the most popular CMC technology.

Email was invented by Ray Tomlinson in 1972, but it existed long before that as a simpler system that could send messages to various users of the same computer (Tomlinson, 2009). As the Internet evolved and computers were able to talk to each other over networks, email became increasingly popular, constituting 75% of ARPANET traffic within a couple of years (Peter, 2004). Email was originally thought of as an asynchronous communication medium, sort of like leaving a post-it note on someone's desk for him or her to see whenever he or she returned to it. Because of this, email can be considered a very useful tool to communicate across time and distance.

Over the past four decades email has brought numerous improvements to the way we communicate and work and it still remains the most common form of communication in the business space (Radicati Group, 2015a). For example, as Szóstek (Szóstek, 2011) highlighted, benefits include being asynchronous (Thomas, 2014), textual (Tyler & Tang, 2003), shared (Dabbish & Kraut, 2006), traceable (Clark, 2000), instantaneous (Mackay, 1988) and efficient (Renaud, Ramsay, & Hair, 2006). Moreover, its main feature is that it lets users decide when and how to communicate (Szóstek, 2011). It has also been associated positively with work performance, because emails carry important information that is critical for job completion, such as the exchange of communication through work-related emails in organisations highlighted by Mano and Mesch (Mano & Mesch, 2010). The authors also found that emails with personal content instead did not seem to affect work performance in either a positive or negative way. In other words, receiving personal emails at work did not affect work performance. Relatedly, some studies (Hovick, Meyers, & Timmerman, 2003) show that personal content emails might even mitigate stress associated with email overload and that the impact of an email also varies based on the content. Nonetheless, information exchanged in emails needs to be understood, managed, stored and retrieved, adding further steps to complete a task.

Despite being a popular and useful tool, the daily demands of email exchange together with the growing number of messages sent and received in both a personal and professional environment, have been found to correlate with stress and a sense of feeling overwhelmed (Jackson et al., 2003). According to Don Norman, "*email occupies a vast no man's land between synchronous text*

messaging (like SMS and IM) and offline word processing, […] [it] *also creates a context where attention goes to die. It's the office memo turned cancerous, extended to home and everyday life"* (Pavlus, 2015). In addition, stress caused by email may have a negative impact on work performance (Mano & Mesch, 2010). Emails can be distruptive and the constant connectivity through mobile devices can increase expectations of being always available, leading to more frequent interferences between work and personal life. Kossek et al. (Kossek et al., 2012) have proven that work interrupting non-work is positively correlated with stress and therefore has a negative impact on wellbeing.

Issues related to email are often referred to, in popular press and in the literature, as 'email overload'. Historically, the term email overload has taken on several meanings. Originally the term was used to define the different ways in which email was employed: as a communication tool, a task manager, and an archive (Whittaker & Sidner, 1996). Ten years later, as the deluge of messages exchanged was growing and email became more popular – earning the label of being a *habitat* (Ducheneaut & Bellotti, 2001)), Dabbish and Kraut (Dabbish & Kraut, 2006, p. 431) updated the definition to reflect *"users' perceptions that their own email use has gotten out of control"* and as a result causes them stress. More recently, the definition has again been updated to reflect the increasing trend of having more than one email account and the differences between professional and personal use of email, as two different habitats. Grevet, Choi, Kumar and Gilbert (Grevet et al., 2014) distinguish between two types of email overload: on one hand, *status overload*, typical of work emails and refers to the actions the various messages require (e.g. read, reply, complete task, etc.). On the other hand, *type overload*, typical of personal email accounts and refers to the number of different types of email that clutter one's inbox, e.g. bills, promotional messages, etc. Renneker and Derks (Rennecker & Derks, 2013) suggest that causes of email overload reside in (i) pressure to respond quickly; (ii) unanticipated tasks generated by receiving emails; (iii) interruptions and task switching associated with responding to emails; (iv) lack of control over incoming messages. One could suppose that as the number of devices we own to access emails increases, the definition of email overload might assume yet a new meaning to include the plethora of devices as part of the 'habitat'.

To try to reduce email's continuing attendance problems, new communication tools are becoming popular and being advertised as the solution, such as instant messaging platforms integrated with personal information management (PIM) tools. As a result of this, there is an on-going debate on whether email is dead or not (e.g. (Kepes, 2015)). Despite this, in 2017 market researchers reported that approximately half of the worldwide population (around 3.7 billion) uses email and this number is expected to grow (The Radicati Group Inc., 2017). They also predict a growth in number of consumer (i.e. personal) email accounts per user from 1.70 in 2017 to 1.86 in 2021, showing how, despite an increased use of other communication channels, email use continues to grow steadily. Similarly, the total number of sent commercial and business messages is expected to increase by 4.4% from 2017 to 2021 (The Radicati Group Inc., 2017). This is all the more interesting in the face of the growing popularity of other social media and instant messaging platforms (Radicati Group, 2015a), that not

only are popular among the younger population (Lacey, 2014), but are also starting to be used in the working environment (Baldwin, 2014). Therefore, it is worthwhile understanding how email fits into the wider ecosystem of devices and communication channels we have access to. This is especially important because the plethora of devices and communication mediums, of which email is part of, are more than ever quacking our ability to manage boundaries and expectations of availability.

3.2 Classifying email behaviours and uses

Previous studies (Fisher et al., 2006; Mackay, 1988; Whittaker & Sidner, 1996) have shown that there is a range of personal, cultural and contextual factors that affect people's behaviour in how they process their email and that typically the processing strategies do not alleviate the effects of email overload. In the following sections we will discuss users' email behaviour and how it has been classified by the literature.

3.2.1 Email workflow and triage

Whittaker and Sidner (Whittaker & Sidner, 1996) hypothesised that a 'one-touch model' would be effective for email management. According to this model, messages can be classified as informational or correspondence. Informational emails get read and then either deleted or filed; correspondence emails instead are read, answered and then either deleted or filed. However, from their study they found that this model was not complete because people use emails as reminders and tasks.

Email triage, defined as "*the process of going through unhandled email and deciding what to do with it*" (Neustaedter, Brush, & Smith, 2005, p. 1977), typically occurs the first time in a day one enters their inbox or when they return to their inbox after for example a meeting. In contrast, email flow is a secondary activity that runs in the background of an unrelated task (e.g. writing a document, reading a file) as a means of keeping up with the flow of incoming messages (Siu, Iverson, & Tang, 2006). Users alternate between these two activities, depending on contextual elements: email triage is more likely to occur after returning from a meeting or a holiday, while email flow is easier when one is in front of their computer the whole day. Neustaedter, Brush and Smith (Neustaedter et al., 2005) found that a dominant triage strategy was to scan emails more than once, reducing efficiency in handling emails, especially in those who receive large quantities of emails. Hogan and Fisher (Hogan & Fisher, 2006) found that frequently checking email did not increase the sense of overload. What they concluded was that inefficiency in handling emails, and thus increased sense of overload, was instead a result of the lack of sufficient time to manage all of the messages.

Venolia, Dabbish, Cadiz and Gupta (G. D. Venolia, Dabbish, Cadiz, & Gupta, 2001) first classified email flow and triage as two of five activities one can perform in their inbox. These are:

- Flow (way of keeping up to date with incoming messages);

- Triage (strategy to handle new messages received after a period of absence from the inbox);
- Task management (use of email as a to-do list and reminder);
- Archive (use of email as a storage space);
- Retrieve (ways to search and find stored emails).

While the last three have been studied in more depth and will be discussed in the following section, flow and triage have received less attention in the literature. Venolia et al. (G. D. Venolia et al., 2001) provide some design guidelines to support these two phases. These recommendations, novel at the time, have since been implemented in most common email clients. On one hand, to support flow activity, Venolia et al. suggest that an email client should provide enough information to the user so that he or she can make an appropriate decision on what to do with the message. One way of supporting this could be for example to redesign pop-up notifications to include additional information on the email and on the possible actions. Suggestions in this paper are over 15 years old and pop-up notifications with that kind of design now exist, for example in Microsoft Outlook. On the other hand, to support triage activity a possible solution is to thread related messages that fit into one conversation. Again, several email clients (e.g. Gmail and Outlook) have since put this suggestion into practice.

Siu (Siu, 2006) developed a situated email interaction model that shows how the triage, flow and task management stages are not so compartmentalised as Venolia et al. described, but rather they are intertwined. Moreover, they analysed how the flow process can be broken down into three steps: glance, scan, defer.

- Glances are a quick interaction with the inbox that lasts less than a second and are aimed mostly at creating an opportunistic awareness of how much email is in the inbox.

- Scanning the inbox happens in between primary tasks or if during a glance something unusual is detected. They are different from glances because they last longer (5-30 seconds) and the focus is on the sender and subject line of each email to search for important messages. When several elements are dealt with in the same scanning session that can be considered a triage-like process but differs from it because the user here is planning to return to the primary task.

- Emails instead are deferred when they cannot/should not be dealt with immediately, as a way of managing overflow.

3.2.2 Email management and archive

Research has underlined how people use email in a strategic way to cope with the stress it may cause, grouping users into behavioural categories. Email has become a tool not only for communication purposes, but also for managing tasks and archiving information that need to be later retrieved (Whittaker & Sidner, 1996).

"Task management: people often use email to remind them what they need to do, and to help them get tasks done" (G. D. Venolia et al., 2001, p. 2)*.*

Interestingly, in 1988 Mackay (Mackay, 1988) pointed out how feeling in control of email does not always correspond to objective measures of email volume. She identified two groups of people from her interviews: prioritisers and archivers. *Prioritisers* were those who set up rule to automatically filter emails before they were read as a way of saving time. *Archivers* instead were people who preferred reading all emails before manually filing them away in several subfolders. Prioritisers were not necessarily more successful at managing their time, despite considering time management a relevant issue, and archivers definitely had more difficulty retrieving emails.

Whittaker and Sidner (Whittaker & Sidner, 1996) found three categories of management strategies to deal with email overload: frequent filers, spring cleaners and no filers. Frequent filers persistently try to minimise their inbox size on a daily basis, using folders in an effective way. The authors recognise that folders are efficient if they are not 'failed', meaning if they contain less than three items and therefore its existence does not help reduce the inbox complexity. Spring cleaners are prone to occasional clean-ups of their inbox, usually every one to three months and half of their folders are 'failed' ones. Finally, no filers made no current use of folders and the ones that might exist are historical and were used in the past in a spring-cleaning manner. No filers may occasionally purge their inbox to reduce the overload, but this is not as frequently as for spring cleaners. A replication of this study was run ten years later and found similar results, with the addition of a fourth category: few folder filers. This category includes people who have small inboxes and a small number of folders (Fisher et al., 2006). Because of these findings and the realisation that a one-touch model to handle emails is not always applicable, the authors concluded that an email tool should be able to support the three main uses of email: as *an asynchronous communication system* (Whittaker & Sidner, 1996) – or communication genre (Ducheneaut & Watts, 2005); as *a personal archive* (Whittaker & Sidner, 1996) – or 'filing cabinet' (Ducheneaut & Watts, 2005); and as *a task manager* (Whittaker & Sidner, 1996) – or production facility (Ducheneaut & Watts, 2005). Ducheneaut and Bellotti (Ducheneaut & Bellotti, 2001) noticed in addition that 83% of their respondents also made use of emails as reminders of tasks they had to do. Hence, they suggest redesigning user interfaces to support email as a personal information management (PIM) tool that allows to-do lists and reminders to be set up. From a longitudinal study on the use of PIM tools, Boardman and Sasse (Boardman & Sasse, 2004) redefined and extended Whittaker and Sidner's (Whittaker & Sidner, 1996) management strategies into: no filers (no filing activity), partial filers (less than five emails filed daily), extensive filers (many emails filed daily) and frequent filers (most emails filed or deleted daily).

Ultimately, what these findings point towards is the idea that email is a complex *habitat* to manage, that takes up a lot of time. In the next section we will review existing literature on how people (should) attend to email, based on frequency of checking, email notifications, and response expectations.

3.3 Attending email

There have been several suggestions as to how often it is appropriate to check emails during the day. Researchers have suggested checking emails between two and four times a day (Gupta, Sharda, & Greve, 2011), a once-a-day strategy (Brumby, Cox, & Bird, 2013), or even every 45 minutes (Jackson et al., 2001, 2003), each motivating that their approach was more effective in reducing email overload or increasing productivity. Although findings are mixed as to what is the recommended frequency, the findings all lead towards one clear belief: checking less frequently is more efficient and Kushlev and Dunn (Kushlev & Dunn, 2015) found proof that fewer checks reduce perceived stress and predicated higher wellbeing. Similarly, Mark and colleagues (Mark, Iqbal, Czerwinski, Johns, & Sano, 2016) found that the longer a person spends on email during a working day, the less productive and more stressed they feel, which confirms Hanrahan and Pérez-Quinones (Hanrahan & Pérez-Quiñones, 2015) results that when more time is spent in the inbox, the more opportunities arise for diversions within the inbox.

However, checking one's emails less frequently is not an easy behaviour to change, especially given that mobile email checking has been defined as an addiction (Turel & Serenko, 2010). In fact, this is a double-edged sword: organisational productivity can increase if employees are always connected and available, but some people can also develop a "mobile email addiction" that reflects higher levels of stress by being always mentally preoccupied. Turel and Serenko (Turel & Serenko, 2010, p. 41) describe this kind of addiction as:

> "*a form of non-substance addiction that involves excessive interaction with both a mobile technology (mobile device) and the content (electronic communication) under conditions of psychological dependency*".

3.3.1 Email notifications and interruptions

Most people leave their email client open and running all day long, especially when at work, and often allow notifications to alert them when a new message has arrived. This means that every new email represents an interruption (Renaud et al., 2006), be it on the phone or laptop, for work or personal email. Although, interruptions are not always considered negative, and there is in fact research showing that they increase speed and accuracy especially in monotonous and well-learnt tasks (Jett & George, 2003), there are also several negative effects to interruptions.

Jackson et al., (Jackson et al., 2001, 2003) note that the common reaction to a new message is to click on it within six seconds, rather than deferring action to a more appropriate time. They also found that users took approximately 64 seconds to recover from an interruption caused by email. Moreover, if email clients are set to check for new emails every five minutes, for example, this means that users are potentially uninterrupted only for five minutes at a time. This implies that there is a constant activity switching, which can have more negative effect on workers than actual

interruptions (González & Mark, 2004). Having a more integrated workflow and task management would mean *not* allowing emails to constantly interrupt (Whittaker, Bellotti, & Gwizdka, 2006), for example by scheduling to be notified only every few hours. Through their interviews, Mazmanian, Yates and Orlikowsky (Mazmanian, Yates, & Orlikowski, 2006) identified two types of users, when it comes to responding to emails: *constant responders*, i.e. those who replied as soon as they received an email; and *batch responders*, i.e. those who defer their replies and attended several emails at once, giving more value to the asynchronous nature of email and exercising more control. More recently, Hanarahan et al. (Hanrahan, Perez-Quinones, & Martin, 2014) combined logged interactions with email with a diary study involving 20 participants and found that users attended email primarily based on notification alerts. Despite this, Iqbal and Horovitz (Iqbal & Horvitz, 2010) also found that notifications do not always act as a distractor, favouring task-switching, but are more often viewed as a mechanism to provide passive awareness. In addition, they found that turning notifications off caused more self-interruptions in some users, while others were instead better at focusing. These findings echo those of Dabbish, Mark and Gonzalez (Dabbish, Mark, & Gonzalez, 2011), who found that self-interruptions depend on personal differences, as well as organizational environment.

3.3.2 Response expectations and deferral behaviour

In this section we compare the recipients' (deferral behaviour) and senders' (response expectation) perspectives regarding replies. Given the widespread working culture we live in, where employees are expected to be always available, and where this often results in having to respond to emails outside working hours, it is important to understand how response expectations are created and affect deferral behaviour when replying. As we discuss in this section, deferring replies has been found to also be device-dependent, showing not only that people have different triage strategies for different devices (Cecchinato, Sellen, Shokouhi, & Smyth, 2016), but have preferred activities for different devices too.

Some people have difficulty in deferring email responses to a more appropriate time. Hair, Renaud and Ramsay (Hair, Renaud, & Ramsay, 2007) described three kinds of approach people take when handling emails: users can be relaxed, driven or stressed. Relaxed users see email as an asynchronous means of communication and refuse to feel pressured by it. Driven users feel there is a mutual-expectation of a quasi-instantaneous response. Stressed users have a negative experience with email, especially when considering the pressure exerted to respond. If people who struggle to delaying a reply succeed in deferring, this often happens as a means of managing their attention and prioritising messages (Siu et al., 2006). Matthews et al. (Matthews et al., 2009) noticed another situation in which deferral behaviour occurs. In their study, users employed smartphones to triage their inbox and later relied on a bigger screen and keyboard (i.e. a computer) to read and/or respond. This suggests deferral behaviours may be favoured by the use of mobile technology and that users dedicate different devices to separate activities. Other reasons to postpone a response include the need for careful examination of the topic; or the lack of importance of a message that thus does not

need to be attended urgently; or it may have reference information that will be needed at a later stage (Whittaker & Sidner, 1996). Deferral behaviour is therefore a frequently used email management technique, together with glancing and scanning through the inbox (Siu et al., 2006).

The counterpart of deferring an email is the response expectation that the sender has. Tyler and Tang (Tyler & Tang, 2003) conducted a study to understand how the timing of email responses conveys important information. From their interviews they noticed that a response expectation was created relatively quickly based on past behaviours; if no past behavioural information was available (e.g. when sending an email to a new recipient) 24 hours were usually expected for a response. These expectations were also modulated by context cues other than recipient and urgency of topic (for example time zone in which a colleague works). These cues help create a communication rhythm among recipients that leads to a more peri-synchronous use of emails (Tyler & Tang, 2003). Peri-synchronously means that responses are sent out nearly synchronously to imply they expect a similar response time in return. However, Gillespie *et al.* (Gillespie, Walsh, Winefield, Dua, & Stough, 2001) identified that quick response expectations can be a source of stress, and therefore could increase the sense of email overload. Through training interventions within organisational units, response expectations could be modified and users could be taught how to better prioritise their emails by resisting the temptation to respond immediately to everything.

Overall, the research presented until now shows correlational evidence that dealing with email is associated with negative consequences on wellbeing and Taylor, Fieldman and Altman (Taylor, Fieldman, & Altman, 2008) present a complete review of such literature. This does not mean that we can infer that email causes stress: as Barley et al. (Barley, Meyerson, & Grodal, 2011) pointed out, email could just be a symbol of stress, rather than a source, given that lots of work and tasks are delivered through one's inbox.

3.4 Work and personal email accounts

Most prior research, and certainly that presented so far, has investigated the professional use of email, focusing on management strategies, e.g. (Dabbish & Kraut, 2006; Whittaker & Sidner, 1996), since the number of business emails sent daily is growing and is expected to increase from 112.5 emails per day in 2015 to 128.8 emails per day by 2019 (Radicati Group, 2015b). However, work and personal emails are considered two very different email *habitats* where users spend a large part of their day (Grevet et al., 2014), and as such it is important to unpack these differences.

3.4.1 Work email

As we have highlighted so far, work email usage reflects both individual preferences and professional demands (Dabbish, Kraut, Fussell, & Kiesler, 2005), and the level of seniority may have an impact (Kamsin, Blandford, & Cox, 2012). Individual preferences include how often the user clears the inbox and files away emails, whether this is done automatically or manually and the frequency of

occurrence (Mackay, 1988). Professional demands have been noticed when comparing managers with non-managers across 29 countries (n=13,877) (Tang et al., 2009). Managers were found to have almost double the number of stored messages, and more than double the number of folders than non-managers, suggesting that job role partially accounts for the variance in filing style.

3.4.2 Personal email

Research has shown that work emails are managed differently to personal emails, i.e. communicating with friends and relatives, and with organisations such as schools and businesses (Capra, Khanova, & Ramdeen, 2013; Grevet et al., 2014). Differences include the software used to check email (desktop vs. web client), the types of emails received, and the email management strategies employed.

Smith, Rogers and Underwood (Smith, Rogers, & Underwood, 2003) were the first to point towards a tension between work and personal email, finding in 2003 that 54% of their participants were maintaining two separate accounts, particularly as a way to keep spam out of work email. Ten years later, Capra et al. (Capra et al., 2013), found that this separation was growing, with 84% of their survey respondents having separate work and personal accounts, as a way of managing boundaries between work and personal life. They conducted a survey-based study (n=596) with university employees (both academics and professional services employees) to look at usage patterns across personal and work email accounts. Their findings suggest that there are strong individual preferences in both contexts and that email is an important boundary management artefact. They argue that email can increase boundary permeation between work and personal life. Despite recognising their importance, Capra et al. do not investigate the role of mobile devices in managing the boundary between work and personal emails.

In 2013, Grevet et al. (Grevet et al., 2014) replicated and extended two seminal studies (Fisher et al., 2006; Whittaker & Sidner, 1996) updating our understanding of email management strategies and adding a comparison between work and personal accounts. They used a mixed methods approach, combining interviews with screenshots to measure the size of each participant's email inbox. They recruited 19 participants with diverse job titles who used Gmail for both their work and personal accounts. They demonstrated that even though work email has doubled in size over the years, personal email accounts were found to be 5 times bigger than work ones, especially for the number of unread messages. Despite this huge growth of exchanged emails, Rector and Hailpern (Rector & Hailpern, 2014) found that only 12.37% of emails are actually critical (i.e. too important to miss).

In addition to being managed differently, personal email differs from work email also for its purpose. More work by Bentley and colleagues (Bentley, Daskalova, & Andalibi, 2017) found that among their sample of 150 users the top three uses of personal email were: to receive advertisements, coupons and deals from shops (67% of respondents), to communicate with friends and family (66%), and to receive receipts or bills (56%). Although communication purposes are still in the top three reasons

for using personal email, these findings suggest that personal email is becoming more of a repository for 'domestic paperwork' (Cecchinato et al., 2016), hinting at the idea that other channels might be used for more personal communications.

While these findings are important, more work is needed to unpack personal vs. work use of email in multi-account settings, to understand any possible boundary issues that can impact their management and negotiation. We will address this in particular in Chapter 4. It is also important to situate our understanding of email use in the context of other communication channels. We address this in Chapter 6.

3.5 Summary

In this chapter we have tried to capture the complexity of email behaviour. There are many ways in which users manage their inbox and attend to messages, some of which may lead to reduced productivity and increased stress. Despite suggesting that spending less time in one's inbox can reduce stress, research is inconclusive as to what is the best strategy to manage emails. In fact, the strong individual preferences, combined with context-specific work demands and cultural differences (Tang et al., 2009) suggest there is no one-size-fits-all solution for dealing with emails in an effective way. How we use email also says something about how we want to present ourselves, particularly around availability: the balance between response expectations and deferral behaviour determines how synchronous email can be and we discussed how the longer we spend in our inbox, the more opportunities for self-interruptions there are. Efforts around email management have to now be multiplied by the number of devices we own or have access to. In fact, technology has improved over time in order to support users email behaviours, and its constant evolving is giving people new opportunities to change their strategies. We have also shown how work and personal emails are used and managed differently, and the implications of this for boundary management need to be better considered, especially in light of new CMC channels being used. More work is needed to understand how managing work and personal emails across multiple devices affects boundary management, and how other CMC channels fit within these ecologies of communication technologies.

This chapter concludes our first part, *Related Work,* and is followed by our second part, *Data Collection*, comprised of four chapters, each presenting a study that all together answer our research question. The next chapter will present our first study on the boundary management implications of dealing with work and personal email across multiple devices and how these should be address in the design of email experiences.

In summary, this thesis brings together three different strands of literature – computer-mediated communication, boundary theory, and multi-device interaction. In doing so, we improve our

understanding of knowledge workers' boundary management, in a world where we are exposed to a wide ecosystem of devices to access emails and other CMC channels anywhere and at any time, and where boundary management and negotiating availability are not always straightforward.

Part II

Data Collection

Chapter 4

Understanding Email Practices around Work-Home Boundaries

[Parts of this chapter have been published in
(Cecchinato, Cox, et al., 2015b; Cecchinato, Fleck, et al., 2015)].

4.1 Motivation

In Chapter 3 we discussed how people manage personal and work emails differently and there is evidence to suggest that users access and manage their inboxes differently on the plethora of devices they own (Matthews et al., 2009). However, most email research is prior to 2007 – when the iPhone was first launched (BBC News, 2007) – and does not take into account mobile technology, especially in relation to other devices. Of the more recent papers, some consider smartphones in the context of XDI but look at different kinds of task, not just email (e.g. Oulasvirta et al., 2007, Dearman et al 2010). Dery et al. (Dery et al., 2014) also show how the use of mobile devices evolved and changed drastically over a 5-year span, between 2006 and 2011, and we can assume that this change will continue to progress as technology evolves. While Capra et al. (Capra et al., 2013) recognises the importance of considering mobile devices when studying email behaviour, Grevet et al. (Grevet et al., 2014) consider their findings on XDI anecdotal and do not report them.

Even though devices have been classified as being personal or work-related, or a mixture of the two (Dearman & Pierce, 2008), there is still a lack of understanding how users access and manage both personal and work emails across multiple devices, in particular mobile devices. There is a need for an updated view of mobile usage patterns, especially in the context of boundary management and

we use email as an example of boundary artefact (Capra et al., 2013). HCI literature has given little attention to the impact of technology on work and personal boundaries and we defend the need to create a better understanding of its impact. From the review in Chapter 2, we know that the way people manage their work-home boundaries is changing as a result of technology allowing for more frequent cross-domain interruptions, but little is known about how this change is happening. We have also discussed how there is little evidence on how different professional groups manage emails within the same organisation, even though there is indication of its existence (Tang et al., 2009).

As briefly presented in section 3.6.2, Capra et al. (Capra et al., 2013) carried out a pioneer piece of research that investigates how email is used by the same sample in both work and personal contexts. They presented results from a survey conducted in 2010 among 596 university employees (both academics and professional services), from a large institution in the United States. The purpose of the study was to quantify characteristics of email and analyse it as a boundary management artefact, i.e. its impact on preventing or favouring boundary permeation, using an exploratory and quantitative approach. As far as work-home boundaries are concerned, they found that email accounts act as important boundary artefacts that help separate work and personal domains (work and personal), but also serve as vehicle for boundary permeation. They found examples of boundary permeation in: having the same account for work and personal email (primarily in faculty staff); using a work account for personal reasons and vice versa; or forwarding email from one account to another. A final example of boundary permeation is given by the use of mobile hand-held devices. The authors found that the majority of respondents used their mobile device to access both personal and work email. A lack of deeper understanding of this behaviour led Capra et al. to assume only one device was used, but they note the importance to investigate this further.

By bringing together the three strands of literature (CMC management, cross device interaction, and boundary management) presented in the previous chapter, and more specifically building on Capra et al.'s work, in this chapter we present a study with university employees to investigate how they manage work and personal emails across devices and how this impacts their work-home boundaries. Given little prior knowledge on the topic, we took an exploratory approach to answer the following research questions:

- How do people manage work and personal email accounts?
- What are the boundary management strategies adopted for personal and work email accounts across devices?
- Are there email and boundary management differences between two professional groups from the same organization?

By answering these questions, this study builds on Capra et al.'s in three novel ways: first, we take a more qualitative approach; second, we consider cross-device interaction and better define its

implications for work-home boundaries; and third, we compare boundary management across accounts and devices in different professional groups. Finally, we are able to help inform better design for email software and highlight the importance of more effective organisational guidelines.

4.2 Method

Following the approach taken in previous work (Capra et al., 2013; Dearman & Pierce, 2008; Grevet et al., 2014; Matthews et al., 2009), we took a qualitative approach to gain an in-depth understanding of participants' email practices. Interviews are a useful method to understand "*people's perceptions and experiences*" (Blandford, 2014), and semi-structured interviews in particular, allow the researcher to follow up on interesting and unexpected topics that emerge. By choosing a qualitative approach we wanted to study the behavioural nuances, rather than quantifying strategies.

Sixteen interviews were conducted in May 2014 in participants' offices and department labs and lasted between 30 to 60 minutes. Participants were asked to bring along any device they used to access email as a prompt to facilitate contextual explanations. Questions explored differences between work and personal accounts based on the type of accounts one had access to, inbox triaging strategies, perceived sense of overload, use of email across devices, use of email in different social and physical contexts, and perceived sense of work-life balance and boundary management. In particular, emphasis was given to mobile devices (i.e. smartphones and tablets) and comparing their use with computers and laptops while working and when not working. The ubiquitous nature of mobile devices, combined with that of email, makes the role of context even more important. Questions also addressed the context in which particular email behaviours occur. At the end of the interview reflection on the topic was also investigated, targeting users' awareness of their own practices. A list of questions used is reported in Appendix A.3. Participants were also asked if they were willing to share screenshots of their inboxes on their various devices, however only five participants agreed, and of these, all shared only desktop-interface screenshots (none of mobile devices).

Following the interviews, participants were asked to fill out a survey (see Appendix B.2): the first one included two email overload measurement scales (Dabbish & Kraut, Hogan & Fischer), whilst the second one included the Work-Life Indicator scale (Kossek et al., 2012) to measure boundary management strategies. All but one participant completed the post-interview questionnaires. As the email overload scale is outside the scope of this thesis, we report quantitative findings only from the Work-Life Indicator scale, to triangulate our interview data.

4.2.1 Pilot study

We conducted pilot interviews lasting between 25 to 50 minutes with two post-docs and two PhD students, all very familiar with qualitative methods and experts in HCI. These interviews had a

threefold purpose: to estimate the length of interview, get feedback on the type of questions, and as practice for the researcher. During the pilot test it became apparent that PhD students did not consider their research work as a job, and they confirmed that their PhD research was more of an extension of their student life, rather than a profession. As a result, PhD students were excluded from the final recruitment.

4.2.2 Participants

Of the 16 participants, nine were academic employees and seven worked for professional services. Academics' job titles included research associates and assistants, a lecturer, and a teaching fellow. Professional service employees reported job titles like a department manager, a human resources manager, a library assistant, an assistant study coordinator, a personal assistant, and a public relations administrator. Fourteen were employed full-time, one had two part-time jobs within the same university and one was employed part-time. Two participants had an additional part-time job or were involved in volunteering. Ages ranged between 20 and 54 (five between 25 and 29; six between 30 and 34; three between 35 and 39; one between 40 and 44; and one between 50 and 54) and 11 participants were female. All participants owned a smartphone with an Internet data plan (except for one who relied on Wi-Fi only); three participants mentioned owning a tablet in the interviews and all had access to computers at home and at work. Participants were recruited using a recruiting website; posters; opt-in mailing lists and word-of-mouth. In total, participants received £17 in Amazon gift vouchers for taking part in the study.

4.2.3 Materials: Work-Life Indicator scale

The Work-Life Indicator (WLI) scale is comprised of five factors: Work Interrupting Non-Work (WINW), which measures one direction of boundary crossing; Non-Work Interrupting Work (NWIW), that measures the opposite direction of boundary crossing; Boundary Control (BC), which measures the perceived control over boundary crossing; Family Identity (FI), which measures the degree of identification with a family role; and Work Identity (WI) which measures the salience of an occupational career. The five factors capture different boundary management styles by identifying the relationship between cross-role interruption behaviour (WINW, NWIW), identity centrality (FI, WI), and perceived control of boundaries (BC). The scale is comprised of 17 items that measure the five factors, using a 5-point Likert scale, with 1=Strongly Disagree and 5=Strongly Agree.

4.2.4 Analysis

Half of the interviews were transcribed verbatim and the remainder were partially transcribed based on emerging themes. Interview transcriptions were then integrated with paper notes and the email inbox screenshots and analysed. The first level of analysis focused on differences between work and personal accounts, and email management differences across devices. This led to uncover differences between the two professional groups (academics vs. professional services staff), so the

second level of analysis focused on the differences between professional groups and boundary management strategies across devices and email accounts. Code categories used included: reasons for different accounts, email management behaviours, checking email behaviours, feelings towards email, direction of interference between work and non-work, use of social media, notification preferences, reactions from friends/family, and self-experimenting with strategies. These were then refined and organised into four themes: (i) integration-segmentation boundary preferences, (ii) ways of managing accounts, (iii) ways of managing devices, and (iv) boundary-related issues. The WLI scale questionnaire data were statistically analysed for differences between the professional groups.

4.3 Findings

In this section, we present findings from our mixed methods approach. We start by discussing the survey results, which highlight boundary management differences between professional groups. Later, we move on to presenting themes that emerged from our interviews on email management practices for work and personal accounts, practices across devices and across boundaries, and finally we discuss the related issues that our participants have encountered.

4.3.1 Work-Life Indicator questionnaire

We analysed the WLI scale using a non-parametric test in SPSS, because it is a more conservative way to treat Likert scales where data are categorical, i.e. the difference between each scale point might not be treated equally by participants. To compare our two independent groups, academics and professional services staff, we used a Mann-Whitney U test and report effect size using Pearson's r. Based on the literature, we hypothesised that there would be a difference between academics and professional services staff, especially in how they allowed work interrupting non-work.

Mann-Whitney tests showed a significant difference (z=-2.04, p=0.04) between professional services participants and academics for WINW. On average academics experienced greater WINW (mean=3.62, SD=0.94) than professional services staff (mean=2.33, SD=1.04) and this represents a large-sized effect (r=0.53). The difference between the two professional groups was not significant for NWIW (z=-0.41, p>0.05); FI (z=-0.89, p>0.05); WI (z=-1.37, p>0.05); nor for BC (z=-1.36, p>0.05).

Results show a distinction in how the two professional groups manage boundaries between work and non-work. Figure 5 shows the mean scores for each professional group for each of the five factors of the scale. There is a notable difference between the two groups regarding the extent to which they allow work to interrupt non-work: the academics score much higher on this value than the professional services staff, suggesting that their boundaries are more permeable.

This analysis provides evidence to suggest that there is a significant difference between the two professional groups in terms of how they manage their cross-role interruptions. Boundary theory

suggests it is unlikely that profession is the only factor of influence and that personal preferences play a large role in the extent to which people are willing to allow their work to interrupt their non-work time (Ashforth et al., 2000) and this might affect their use of technology (Park et al., 2011). The interview data support this and provide evidence that, in addition to professional differences, individual preferences also play a role in boundary management styles. We also find evidence that people use their devices and digital systems to create boundaries between work and non-work.

	ACADADEMICS (N=9)	PROF. SERV. (N=6)
NWIW	3.7778	3.8
WINW	3.6222	2.3333
BC	3.3322	3.8883
FI	3.2778	3.5833
WI	3.7778	3.25
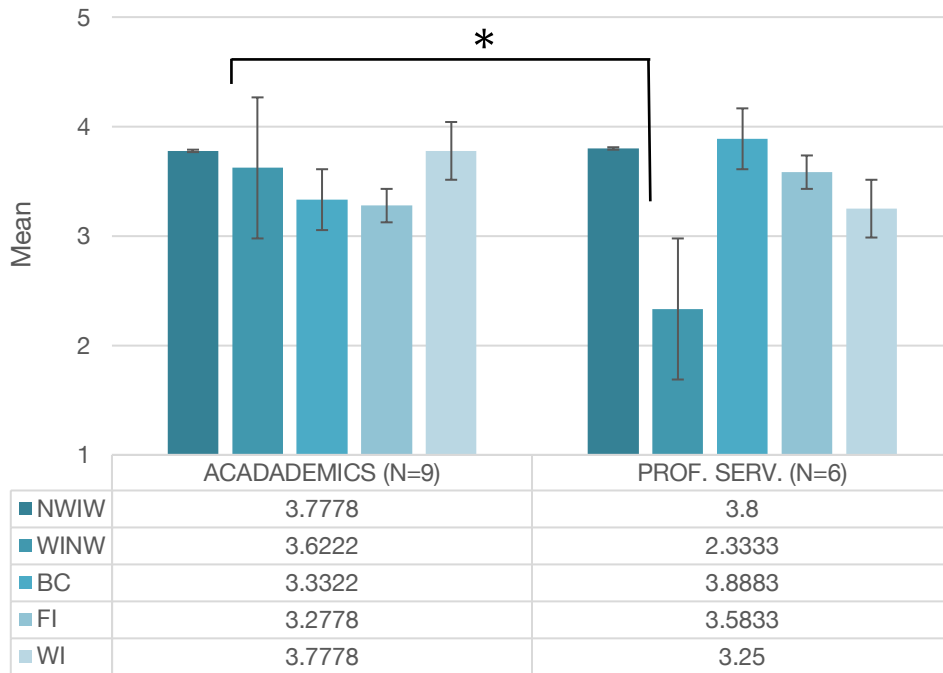
Figure 5 Mean values for the 5-factor Work-Life Indicator scale showing differences between the professional groups

4.3.2 Boundary management

We now present findings from out interviews that identify how the two professional groups manage their work and personal email accounts across devices and boundaries, based on the way they perceive their job. When appropriate, we will compare qualitative data with survey results.

4.3.2.1 Professional services staff vs. academics

Professional services participants reported not being required to take emails outside office hours, and some were not even allowed to, as P12 exemplifies: "*I'm quite fortunate in that my work doesn't require me to take it home and I've never been in the situation where I would need to check it outside of working hours until now*." [P12, Professional Services worker (PS)]. These participants occasionally checked their work emails during weekends or holidays as a way of maintaining awareness. Similarly, they checked their personal email accounts whilst at work, but as P13

explains, it was not viewed as a completely legitimate practice: "*In a way it's a demarcation* [the fact that she cannot work from home] *but actually it's not* […] *because I have my personal email even when I'm at work,* [whispers] *it's a little bit cheeky isn't it?*" [P13, PS].

Conversely, the same situation is seen in a completely different manner by academics, who felt legitimized to check both personal and work accounts at all times. For example, P9 described, "*some companies, they block your personal emails right? And I'm really glad I don't have that in case... you know, I really like that I can reply to a personal email and I don't need to have it so separately but then I also... if I can reply to personal stuff at work then I feel that I can reply to work stuff in my personal life*." [P9, Academic (A)].

In interviews, academics described how theirs was not a typical office job and hence how the boundaries between work and personal life were blurred.

"*I know it sounds a bit silly, but this job doesn't feel as much as a job and I don't mean it's not like hard work, but academia always feels a bit different.*" [P1, A].

No significant difference was found in the survey between WINW and NWIW for academics, and our interview data suggest that there is a symmetrical interference where work interrupts non-work and vice versa within academics. Rather than having clearly demarcated work hours, academics often reported that work and non-work are interweaved:

"*The first check is probably right after I woke up, I will check everything that has come in the night* [on the phone]. […] *I will probably have another look once I'm outside the house, so during my commute time I will check once again. And once I'm in my office, I don't have any specific rule, it's really case by case.* […] *Once I'm home* […] *I have a second work shift after [my son] goes to bed until quite late in the night.*" [P15, A].

"*In the back of my head I would like to not check my work emails in my personal time but I guess, realistically speaking, research is not really a 9 to 5 thing anyway. I guess if I had a job [where] working happens between 9 to 5 and not outside that, then I would make more of an effort to not cross that boundary, but now it doesn't really fit with research I think.*" [P9, A].

In particular, one participant compared academia to other research jobs in industry, stressing the fact that email practices vary among professions and are influenced by company policies. While she was not allowed to take work emails outside the office in her previous industry research position, she now relies on being able to do so:

"*I should say that when I was at* [previous company] *I never checked email outside of work because I couldn't. It was only on my laptop, it wasn't allowed on my phone, I wasn't allowed to access it remotely and I very rarely checked on my laptop. So I only checked email going in the door at 8.30 in the morning until 5.30 at night and I never checked at home.* […] *I have long commutes so for me,*

especially now that I work part-time and I have to leave early, if I can get my emails done there and back that's a real advantage." [P1, A].

4.3.2.2 Individual differences

Despite these general differences between professional groups, we identified also individual differences. For example, two of the professional services participants showed similarities to academics: the boundary between work and personal emails was not as clear for them and they reported this as a benefit. In one case an HR manager was able to better organise her work and her personal life as a result of allowing work to interrupt non-work time: "*I don't see looking at emails that are from home or vice versa as an interference at all in work-life balance. This is my life. So actually, they balance it.*" [P14, PS]. In the other case, a librarian underlined the positive benefits that mobile devices can bring to boundary management in the context of email: "*The environment is pushing you to have an imbalanced life towards of course work and that amazing smartphone is actually helping us not be unbalanced.*" [P7, PS].

4.3.3 Types of accounts

In our interviews we asked how many email accounts respondents had access to and how they used them. All of our participants had at least two main email accounts, one of which they considered personal and the other work-related. In the following sections, we will articulate how these multiple accounts were used. A summary of participants' types of email accounts can be found in **Table 3**.

		# WORK ACCOUNTS	# PERSONAL ACCOUNTS	Total # ACCOUNTS
ACADEMICS	P1	1	4	5
	P4*	2	1	3
	P5*	3	3	6
	P6	1	2	3
	P8	1	2	3
	P9	1	5	6
	P10	1	2	3
	P15	2	2	4
	P16	1	1	2
PROF. SERV.	P2	2	2	4
	P3*	3	1	4
	P7	1	2	3
	P11	1	4	5
	P12	1	4	5
	P13	3	1	4
	P14	1	8	9

Table 3 Types of email accounts participants had access to. Participants marked with an asterisk (*) used work accounts as "mixed", i.e. both personal and work related.

4.3.3.1 Work accounts

All of our participants had at least one Outlook account for their university job. A little more than a third of participants (N= 6) also had access to an additional work account, and reasons for this included:

- Having a second job;

- Needing to access a shared email account;

"Because I am PA of head of department I also access his emails, so I can his inbox open as well." [P2, Male, PS].

- Needing to access other features (e.g. Google Calendar, Google Documents);

- Needing to access social media (e.g. Facebook, YouTube);

"I was setting up [the department's] *YouTube channel and a* [department's] *Twitter account so I had to have an email account associated with it, so I created one in Gmail."* [P5, Male, A].

- Archiving forwarded emails from a previous job account to which they no longer have access to.

4.3.3.2 Personal accounts

Generally, participants reported that the main use of personal accounts was "*for job applications, news enquiries, booking tickets, etc…*" [P11, PS]. In our subset of participants, email is not used frequently to communicate with friends and family, because other means, like Facebook, were preferred:

"*I don't really communicate with many friends via email anymore. I think there was a time when I did that more frequently, but now I would tend to communicate with friends through Facebook.*" [P2, PS].

"*I do most of my correspondence by Facebook directly, so it's not technical an email system, but it's a messaging system which is static, so you can send it… It's not like chat. But you send it and it stays there and the next person can see it whenever they access their Facebook account. So, my family, friends, correspondence happens through that*" [P3, PS].

"*In a lot of other parts of life email is becoming kinda obsolete. In work it's really important and I wonder whether that's going to change*" [P1, A].

"*Other means have now superseded email*" [P14, PS].

Of course, there are some exceptions, based on personal preferences or on location (e.g. if they live abroad). These three participants can be exemplar of how email is still rarely used for communication. In some cases, practicality takes over, like in this case:

"*With my group of friends, it's quite interesting. We don't have all each other's phone numbers, but we've got all each other's emails. I think it's because we're all sitting at a desk all the time, doing office hours, we're like "you're already sitting at a desk so why not send an email while you're at it*" [P13, PS].

Other times, personal preferences might dictate the preferred means of communication, like P6 explains:

"*I have one friend who I am quite close with and we'll, like email each other about our lives, and do that maybe twice a week or three times a week. But that* [is] *through my Hotmail account. She's not a very... some people don't like using the phone. She's one of those people. So, we just spend ages emailing instead.*" [P6, A].

Finally, different participants mentioned the use of email for communication when this occurred between people in different countries or time zones:

"*With my family through emails, and sometimes phone calls. Because writing emails is really convenient, if I've got five minutes I'll do it here. If I'm walking I can write an email, write a short email, just to give an update or something, and it's convenient because I can choose when to do it. A phone calls means I need to allocate time for that because usually it does take ages. My phone calls are long, because it's like updating people what I'm doing.*" [P7, PS, his family lives abroad].

Moreover, the majority of our participants (N=10) had at least one additional personal account, mostly used for signing up to mailing lists and receiving promotional email that did not fall in the spam category but were still considered unwanted messages. We can summarise the motivations as:

- A desire for a different online identity (e.g. anonymous, full name, or nickname accounts);

"*I have an old Gmail account in my maiden name*" [P1, A].

"*I needed an email address that isn't one that's made up by a 15-year-old*" [P2, PS].

"*I've got another couple of accounts that I use too when I don't want to be... when I want to be anonymous, because my personal account has got my name and surname*" [P14, PS]

"*I have a yahoo account which I created for online dating.*" [P6, A].

- A management strategy to reduce email overload, expressed well in these quotes:

"For example, if you apply online to something and then, you know, I don't want my email inbox to be uploaded with a lot of rubbish, then I use a different account, and I use that account just whenever I need it. [...] Because then I don't want to be bombarded by all this commercial and promotion stuff." [P14, PS].

"I have a couple of old yahoo accounts that I use when I'm signing up for stuff that I only have to put my email to sign up but I don't actually want to get emails from them so I don't look at those ones." [P1, A].

"I have a couple of Gmail accounts which I use mainly for when you sign up to newsletters and competitions and the kind of stuff you want to keep out of your main inbox, I use those addresses just for the unimportant stuff." [P12, PS].

- Needed it for the device used:

"Because I have an android phone I have to have a Google account so I do have a fifth email account [...] it purely exists for logging into here [phone] and for using my Google calendar online" [P11, PS].

"Since I've got an iPhone I've now got an iCloud email" [P14, PS].

- As archive/record:

"I thought it would be nice to have every email there" [P15, A]

4.3.3.3 Mixed accounts

Three participants (two of whom academics, the other was a personal assistant to the department director) had an account that is used both for work and personal purposes. In all three cases it was a Gmail account and participants reported how this made boundaries between work and personal domains blurred specifically because of the additional features it offers, like Google Calendar and Google Docs.

"The Google one is kinda... work-related because it's a work calendar but I also have a personal calendar in it. When I started in my job here... another part of my role is being a PA to the director so I was PA to [Name of Director] *when I started and she had a Google Calendar. So, I needed to be able to access her calendar as well and then I just kinda obviously got my own one there. So, I could you that as a way to ask for leave."* [P3, PS].

"The Gmail one is kinda both, but mainly for work because of the calendars and also we use Google drive and things like that, so just it's easier" [P4, A].

"*Gmail accounts come with many things associated, like you can have the Google docs, which I use for work for example when I work remotely with people in a Skype we open this Google doc so that I can edit... at the point they already have my Gmail account*" [P10, A]

Given the small number of cases and the fact that all of these are related to a Gmail account, we would like to stress that these might not be the only cases in which boundaries are crossed.

4.3.4 Devices used

4.3.4.1 Email access on computers

The majority of email literature has looked at email behaviour on desktop/laptop computers. This comes as no surprise since other devices, such as smartphones and tablets, have been around for less than 10 years. Our intent is not to look at specifically one device, but compare how work and personal email accounts are accessed and managed on different devices. In addition, we want to emphasise these differences within professional groups.

Therefore, as far as computers are concerned, all participants had access to one, from which they checked their email accounts. Three participants (one of whom was a professional services participant) had personal email synchronised to the same desktop application they used to access work emails in the office. The majority of participants instead checked their personal account at work through a browser window or tab, which they always left open. Of these, only one participant (a professional services participant) had notifications enabled also for their personal account, as a Firefox plug-in.

4.3.4.2 Email access on smartphones

All participants accessed at least one of their email accounts on their phone. While all academics accessed both work and personal email through their phone, only two professional services participants had both personal and work accounts on their mobile devices – the same ones who have permeable boundaries between work and non-work. Five participants (the remaining professional services staff) accessed only their personal email account from mobile devices. Of the participants who accessed both work and personal accounts on their phone, five of them accessed the two types of account through separate applications. Of these five, four were Android users and the remaining owned an iPhone. Android users used two separate applications (one for work accounts and the other for personal accounts), while the iPhone user had two Internet browser bookmarks for the different accounts. When asked why, she explained that:

"*I did used to have an app and then messages came up straight away but I would find that anytime that I would look at my phone I'd see messages unread and I'd always want to check and I don't*

always want to being doing that when I'm on my phone. Sometimes it's best not to know all the time if you have an unread message." [P6, A].

Four participants, all of whom were academics, accessed both account types from the same application on their phone, signifying they did not separate their personal and work inboxes.

		TYPE OF MOBILE OS	WHICH TYPES OF ACCOUNTS ARE CHECKED?	ACCESS THROUGH (for all account, unless otherwise specified):
ACADEMICS	P1	iPhone	Personal & work	Default app (Mail app)
	P4	Android	Personal & work	Browser for work & personal accounts
				App for personal account
	P5	iPhone	Personal & work	Default app (Mail app)
	P6	iPhone	Personal & work	Browser bookmark for work account
				Browser bookmark for personal account
	P8	iPhone	Personal & work	Default app (Mail app)
	P9	Android	Personal & work	Default app
	P10	Android	Personal & work	App for work account
				App for personal account
	P15	iPhone	Personal & work	Mailbox app
	P16	iPhone	Personal & work	Default app (Mail app)
PROF. SERV.	P2	Windows	Personal	Default app
	P3	Android	Personal	Default app
	P7	Android	Personal & work	App for work accounts
				App for personal account
	P11	Android	Personal	Default app
	P12	iPhone	Personal	Default app (Mail app)
	P13	iPhone	Personal	Default app (Mail app)
	P14	iPhone	Personal & work	Default app for personal & work accounts
				Yahoo app for personal account

Table 4 Email access on smartphones.

Overall, our participants were happy to use their smartphone for scanning through new emails and saw clearing their inbox as a way of dealing with an overloaded account.

"*[On my phone] I sometimes just look at my emails and delete all the [spam] ones at night so that I think 'oh when I go in in the morning then I won't have to do that at work and my inbox will be a bit more clear.'*" [P8, A].

"*I check my email very frequently [on my phone], especially to get rid of all the spam.*" [P5, A].

In addition, the majority of respondents explained they generally only reply on their phone if it is an urgent or quick matter, because they find "*having a little keypad is not very good for writing long*

things" [P11, PS]. Only two academics and one professional services participant used their phone to manage most of their emails, including replying, explaining that "*it's just quicker*" [P4, A].

4.3.4.3 Email access on tablets

In the interviews only three participants mentioned having a tablet: one did not use it for accessing emails [P15, A]; one used it to check both work and personal emails [P14, PS]; and another used it only to access personal emails [P10, A]. P15 explained:

"*[I] don't use it for emails. It's takes up an awkward space on the spectrum of a laptop and a phone. So, if I have a laptop nearby then there is no reason to type on the tablet, or between phone and tablet. I still feel it's chucky to have it around.*" [P15, A].

P10, despite having intentionally bought the tablet to substitute her old personal laptop because "*that won't allow me write and it will be just for watching movies, checking Facebook*", she occasionally found herself using it for work emails, other than personal emails. So, despite finding it "*annoying*" to type on as P15, and wanting to dedicate to personal use, she resorted buying a Bluetooth keyboard for the times in which she used it for work purposes.

P14 instead preferred her tablet to the smartphone to do personal emails because it has a wider screen and she could see better. Interestingly, even while at work, she preferred replying to personal emails through her tablet, despite having the personal accounts also synched to her desktop application at work. However, given these diverse sets of responses from a very small subset of participants, we will treat these findings as anecdotes and therefore will not be included in the discussion.

4.3.4.4 Checking habits

Most participants used their phones primarily at home, when commuting, when socialising, at weekends and on holidays. Computers were mainly used in the office, or at home only if work had to be done. Only two participants did not use their phone at home to check emails, using instead a computer or a tablet. Respondents explained that it was faster to check on their phone because, along with always being at their fingertips, it helped fill up moments when one is bored, such as when commuting. One academic reported that using her smartphone meant she was: "*more in touch with what's going on more immediately than what I used to be before I got my new phone*" [P8, A].

However, our interviews indicate that smartphones can intrude even in the most private of moments, and lead to work interfering with non-work, as highlighted by the questionnaire. For example, email was accessed in private moments as described by some participants, who used smartphones to check emails first thing in the morning when still in bed, or even in the bathroom:

"*I get up, check my email, in bed, **check my email on the toilet**, check my email downstairs, maybe whilst I'm having breakfast, walk to work, generally don't check my email while I'm actually walking, when I'm waiting for the train, on the train, maybe in the lift getting up to work. Maybe then at work, then on the train on the way home, in front of the TV, during dinner, yeah, that's about everything I think.*" [P5, A].

To understand better how checking habits occur, we asked participants how they handled notifications on different devices and accounts. In the subsequent section, we will delve more into how email is checked and accessed on different devices.

4.3.4.5 Notifications

We found a substantial difference in the way devices are used when we asked about notifications: while all but one had work email notifications enabled on their computers, almost all of our participants (N= 13) chose to limit or not be interrupted by email notifications on their phone. In fact, they either disabled them completely; consciously disabled them during certain hours; disabled pop-up/sound notifications that would increase the number of interruptions; or limited them only for particular senders or specific accounts.

"*I turned* [notifications] *off, it's really annoying* […] *when I'm not at work I don't like being alerted about emails coming in. If I want to check my emails I'll check it, but I don't really like being alerted.*" [P16, A].

We found that participants were inclined to attend to work emails based on notifications, particularly on desktop/laptop computers:

"[I] *have the pop-up which means every time something comes in I'm supposed to check and the pop-ups tells me if something urgent or that kind of* [thing]" [P7, PS].

However, the same finding did not apply so clearly for personal emails or mobile devices. When checking personal emails on a desktop computer, participants did not receive alerts, with the exception of one participant. Moreover, by turning off notifications on their smartphones, our participants were reducing the number of interruptions but at the same time they might be reinforcing a compulsive checking habit, as suggested by Turel and Serenko (Turel & Serenko, 2010). Table 5 shows more specifically how notifications were enabled on mobile phones in our sample.

Interestingly, one participant used her phone as a notification centre that triggered her to check directly on her computer while at work because "*it's a nice big screen and it's a nicer interface to sort of read the emails with*" [P8, A].

		WHICH TYPES OF ACCOUNTS ARE CHECKED?	NOTIFICATIONS ON PHONE	
			Enabled?	Additional notes
ACADEMICS	P1	Personal & work	Limited	Only for VIP folder, i.e. close family
	P4	Personal & work	Limited	For Gmail only (used only for calendar)
	P5	Personal & work	No	
	P6	Personal & work	No	
	P8	Personal & work	Yes	
	P9	Personal & work	Limited	Relies only on Wi-Fi
	P10	Personal & work	No	
	P15	Personal & work	Yes	
	P16	Personal & work	No	
PROF. SERV.	P2	Personal	Yes	
	P3	Personal	Limited	Periodically disables them
	P7	Personal & work	No (for work account) Yes (for personal account)	
	P11	Personal	No	
	P12	Personal	Limited	Only number on app icon, no screen lock notification
	P13	Personal	No	
	P14	Personal & work	Limited	Only number on app icon, no screen lock notification

Table 5 Notifications on smartphones.

4.3.5 Issues encountered

We will now present problems that emerged during interviews, which relate to checking habits, boundary management strategies and cross-devices issues. We would like to underline how these issues are not necessarily tied to a specific professional group, but rather depend on the technology used, the context of use and individual differences.

4.3.5.1 Compulsive checking and "email addiction"

When discussing checking habits, dependency on email spontaneously emerged from the interviews, as did the unexpected reward of finding emails in the inbox, irrespectively of participants' profession.

"*I'm bored on the train, let me check emails". It's not like checking your phone for text messages, because you get notifications. To see if there is an email AT ALL.*" [P13, PS].

"*There is this habit to subscribe to things and then you get bombarded. It's a nightmare to unsubscribe. […] But still you can't unsubscribe cause maybe one day you will go. It's a*

reassurance to have these emails. That you are worth it. Your interests are there. Not to have emails in your inbox, it could be frightening!" [P14, PS].

What is interesting is that this unexpected reward seems to be linked to "junk emails" from which users find it hard to unsubscribe:

"*Why I keep them* [junk messages]*? Because it's a lot of crap, but sometimes you get really interesting things*" [P1, A].

Compulsively checking email, particularly on mobile devices that make it easy, can be disruptive, especially during non-working time. As P1 said: "*I find, at home, our phones do creep in and we are suddenly looking at our phones rather than talking to each other.*" [P1, A]. In fact, most of our participants reported checking emails throughout the entire day, suggesting that such behaviour might have become somewhat out of control:

"*If I'm walking, many times I check on my phone, which is very dangerous, but...I do it*" [P10, A].

"*The work one I'll be hitting refresh like every 10-15 minutes maybe. I've set automatic refresh to be 20 minutes but I don't think I really wait for that.* […] *In some sense you do feel a bit addicted to it. You know if you tell yourself "I won't check it this morning" and then suddenly you're itching to see what's going on.*" [P5, A].

"*I obsessively check it, so it doesn't tell me there's new emails, unless they're from my VIP list, my close family.*" [P1, A].

"*I want to be freer from the email chain. I compulsively feel that I need to immediately react, whether it is actually responding or deciding that this is not relevant.*" [P15, A]

We found that this compulsive checking resulted in tensions with partners/spouse/household and such consequence reinforces the idea that mobile devices may have a very negative impact on work-home boundaries.

"*I wouldn't have told my husband that I did* [checked work emails on holiday]*, 'cause he'd tell me I shouldn't be doing work while I was on holiday (laughs).*" [P1, A]

"*Like my wife said* [on holiday] "*just leave your emails alone!*" *but then I think I just check them anyway.*" [P5, A].

4.3.5.2 Boundary management challenges

The interviews revealed situations where it was not possible to maintain clear boundaries between work and personal email, despite the fact that participants created some alternative strategies like using devices for only one type of account or not checking emails at certain times. While weekends were generally considered personal time which required less checking "*'cause I know that most*

people are not at work" [P16, Female, A], work emails might have been dealt with as an exception for urgent matters, as one participant explained "*if I am on a deadline it can interfere*" [P4, A].

P10 underlined a boundary management issue that can arise during holidays because not everyone has the same time off work: "*If I'm going on holidays not everybody is going at the same time and sometimes they really need something urgent and I feel they cannot wait.*" [P10, A].

Similarly, working part-time can also force people to deal with work emails during non-work time:

"*Our students, they aren't part-time and because I take Fridays and Mondays off, if they need something on a Friday then I don't check again until Tuesday, that's a long time for them to wait. So I guess it's like yes my life is carrying on in a different way but other people's lives they also have needs and I have a responsibility to them.*" [P1, A].

Participants reported receiving complaints at home when work interrupted their personal life:

"*It does irritate my partner. Like if we're in front of the TV and she's playing on a game on her phone and I check my work email then that would irritate her 'cause* [...] *she sees it like me being in work rather than spending time with her.*" [P5, A].

Even when participants tried to keep personal and work email accounts separate there were cases of interference between work and non-work, again suggesting individual differences. As we discussed in section 4.3.3, when presenting mixed accounts, three of our participants found it especially hard to separate the two accounts, because of the extra features in Gmail. For example, one participant used Gmail for their personal account, but also got work notifications because it is automatically linked to features used primarily for collaborative work (e.g. Google Documents). This blurring of boundaries is bidirectional. For example, another participant's work account received personal messages from her close family/friends who chose to use that account "*because they know that I see it more often*" [P10, A].

4.3.5.3 Cross-devices issues

Despite continuous improvements in technology, users still experience problems related to cross-device interaction that are mostly a result of technical issues. For example, several respondents reported feeling frustrated when email applications on different devices did not synchronise properly (e.g. an email sent on one device was not shown in the sent folder on the other device).

"*That is quite annoying because if I send it on my Mac I can only see it on my sent items on my mac, I can't see it on the sent items on thunderbird on my pc, I have to log into the web browser, the outlook, so I can see everything that's been sent and received no matter what device you are on.*" [P8, A].

"They don't all synchronise nicely cause there are different protocols behind it. I do tend to go to that combined view and press synchronise to make sure that I have all of them. But then it's annoying because there might be emails in between that I've already seen and it knows I've already seen them so then other email accounts have an email account have an email that came in much earlier and I have to scroll a lot so usually then I go back to the individual inboxes again and check where exactly there is an email. So it's a bit of a cumbersome process." [P9, A].

Another issue raised was related to cross-device task completion. Users who relied on messages being marked unread as a strategy to remember to do something, had trouble keeping track of their inbox to-do list because when they scanned emails on their phone while travelling to work these messages would then be marked as read and they would then forget to act upon them once they arrived in the office.

"What I'll do on my phone is […] *I'll go into my work email* […] *at night time and then I'll say 'I'll sort all those tomorrow when I go to work' but because they're not marked as unread anymore, whenever I go to work I forget to reply to them because they're marked as read so I sort of feel I've handled them."* [P8, A].

One participant used her phone to do most of her emails and had both personal and work account synchronised to her Mail app on the iPhone. She encountered a cross-domain problem because of this.

"I can email [on phone] from both [accounts] *and sometimes I make mistakes and think I'm emailing from my work one and then I email my students from my personal one, that's kind of annoying. Two worlds getting confused."* – [P1, A].

A particular case of cross-device interaction problems that was raised in the interviews is Gmail and issues with its tabs. This specific case of Gmail will be discussed in the following section.

The case of Gmail tabs

Capra et al.'s paper found that people who forwarded emails all had a Gmail private account and the authors speculated participants did so because they preferred Gmail's features. While this result cannot be validated with our findings, it must be noted that Gmail has since changed its interface. From our findings, Gmail's popularity has more to do with the feature it offers such as 1GB of storage space, and access to Google Drive (which now includes Google Docs).

Gmail introduced tabs in mid-2013. Tabs allow emails to be sorted according to their content, and as of August 2014 these are: 'primary', 'social', 'promotions', 'updates' and 'forums'. The 'primary' tab includes messages from contacts (friends and family) as well as emails that do not appear in other tabs; the 'social' tab includes emails from social sites such as Facebook, LinkedIn, Twitter, but also online gaming platforms, online dating services and media-sharing sites; the 'promotions' tab includes all emails that give promotions, deals or offers, for example from Amazon, Groupon or

shopping websites; the 'updates' tab includes bills, receipts, confirmations or statements; the 'forums' tab includes messages from online groups, discussion boards and mailing lists.

To our knowledge no paper has been published expressing how people perceive this function, although Grevet's work (Grevet et al., 2014) introduces the need for such feature. During our interviews, participants spontaneously brought up the topic of Gmail tabs. They found it a useful way to filter emails and a time saver.

"*I think it's good because generally the social stuff I'm not that interested in and the promotional stuff is mainly spam. So, with my primary inbox that sort of filters out what I mainly want to focus on.*" [P5, A].

However, they complained about the lack of this feature on other clients other than the web one.

"*The online the account creates three tabs: social, commercial, promotion, which is actually quite helpful for me, which I don't have here* [Thunderbird] *but I use quite a lot there [web client] because it divides stuff. So, I just go on the social tab and delete most of the things, I go to the third tab and I delete most of the things. Here it does not do that.*" [P7, PS].

Some technical issues still rise around the novelty of these tabs, especially concerning cross-device interaction:

"*It's interesting because when I access my same account on my phone it doesn't have those filters* [Gmail new tabs], *so it's just all in one block.* […] *With the phone I need to delete things that are near the top, so they might be maybe promotional stuff that I've looked at or social things, because that's getting in my way, whereas on the browser account because I've already filtered out those things I can just leave them there. But on the phone, I can't leave them there* [doesn't like unread]. […] *Most of the time I ignore those tabs. I normally read them or delete them on both, but there is more of an urgency to read and delete on my phone because they get in the way, whereas on my laptop they don't get in the way so much.*" [P5, A].

4.4 Discussion

This study extends previous research by providing insights into how different professional groups in the same organisation manage work and personal emails using different devices and how this impacts the way they manage the boundaries between work and non-work. By triangulating the interview data with the findings from the Work-Life Indicator questionnaire, we are able to make several novel contributions.

4.4.1 Work and personal email differences

Two seminal papers (Capra et al., 2013; Grevet et al., 2014) that look at differences between work and personal email accounts focus primarily on inbox size. We take a step further and concentrate

on what the implications of having separate accounts are on work-home boundaries, in relation to different devices.

In 2003, Smith et al. (Smith et al., 2003) found that just over half (54%) of their participants (all academics) owned a personal email account, in addition to their work account. Ten years later, in their survey Capra et al. found that 84% of their participants (university employees including academics and professional services) had both a personal and a work email account. We found that all of our participants (both professional services and academic employees of the same university) had at least two main email accounts, one of which was considered personal and the other work-related (all interviewees had an Outlook account for their university job). These results imply there is growing trend of maintaining separate email identities. Moreover, almost 82% of our participants have at least an additional personal account used for signing up to mailing lists and receiving promotion email that do not fall in the spam category but are still considered unwanted messages. Our findings suggest that personal email, although with some exceptions, is no longer used primarily for communication purposes, but rather for managing personal information, such as travel tickets and bills. This finding has since been confirmed at a much larger scale, with evidence from over 150 interviews showing that personal email is used more generally for coupons, deals, receipts, and event notifications (Bentley et al., 2017).

4.4.2 Professional differences in email and work-home boundary management

Our study confirms Dearman et al.'s (Dearman & Pierce, 2008) findings that the working environment influences people's boundary management practices across devices and extends them to different professional groups. We found that both professional services staff and academics allow non-work emails to interrupt work, for both convenience as well as emergencies. However, there is a significant difference between the two groups in the extent to which work email interferes with non-work: in the interviews, academics report having symmetrical interference between work and non-work domains, whereas professional services staff report having an asymmetry and work does not tend to interfere with non-work.

We found that professional services participants generally have a work culture that rigidly separates work and non-work. This means they do not need to access work emails in their private time and there are fewer work interruptions during non-work time. In contrast, academics do not consider themselves to have a traditional 9 to 5 job and have more permeable boundaries between work and non-work. Academics often reported that they needed to be available for work during personal time, particularly if they worked part-time, and for some this also extended to when they were on holiday. A potentially negative consequence is that academics reported work interrupting non-work more often than professional services participants and this was supported by the results of the Work-Life Indicator questionnaire.

Capra et al. (Capra et al., 2013) also found an asymmetrical imbalance between work and personal life, but they did not distinguish between professional groups, nor did they consider the consequences of these interruptions. We found that work interfering with non-work led to complaints by other members of participants' households, and this was especially true for academics. This comes as no surprise, given that academics are known for having more challenging work-home boundaries compared to some other professions, due to the overarching work culture that goes beyond individual universities.

A few exceptions were found in the patterns of interference between work and non-work typical of professional service staff and academics. Two professional services participants reported having symmetrical interference more similar to academics; and two academics said that they did not allow work to interrupt non-work as much as their peers. These exceptions can be partially explained by a personal preference in how to manage work-home boundaries. This does not mean however, that the working environment does not influence their behaviour. P1 in particular illustrated the importance of organizational culture on email management when comparing her previous research job in industry, where she was not allowed to check work emails outside the office, with her current academic role, where she benefitted from being able to manage her emails on her commute to and from work.

Such exceptions can also be explained by the fact that when communicating with others, we are also implicitly negotiating our boundary management practices with those of our interlocutors (i.e. the people we communicate with). In fact, boundaries are not just something that we set for ourselves but are also affected by the boundaries that others have. For example, on one hand P1 explained how working part-time forced her to disrupt her own boundaries and send work emails to students during her personal time. On the other hand, P10 experienced both in her personal and work account people not respecting her personal boundaries, i.e. one account was personal and one was for work, but friends would still email her on her work account. Capra et al. had found that work email accounts were often used for personal needs and vice versa, although in a less frequent manner. This result can be interpreted as a sign of boundary permeability, which Clark (Clark, 2000) derives from the use of insights or habits from one domain to another. Capra et al. suggested that boundary permeability, where boundaries between work and personal accounts were consciously blurred, was a result of a preference of feature for Gmail accounts. We suggest that while boundaries do have to be set in the first place, their permeability depends on a combination of factors that need to be constantly re-evaluated: professional context, individual preferences, availability of devices, and others' personal boundaries.

4.4.3 The impact of XDI on work-home boundaries

We found that there is a difference in the way professional groups used smartphones to access their different email accounts. All academics used their privately-owned phone to check both personal

and work accounts, supporting research that has argued that phones are sometimes considered both personal and work devices (Dearman & Pierce, 2008). In contrast, only two professional services participants accessed their work email accounts on their phone. Participants had a tendency to use their devices in specific locations: smartphones were primarily used to access emails at home and on the move (e.g. on public transport), but usually not in the office; computers were primarily associated with work activities. The fact that only professional services staff restricted their email to personal accounts on their phones suggests that smartphones are considered differently between the two professional groups. Moreover, we are able to confirm that Matthews et al.'s (Matthews et al., 2009) findings are still valid after five years where people generally still use their phones to triage their email, and computers respond to messages, despite the fact that mobile behaviours are said to have changed over the course of that time (Dery et al., 2014).

In addition, confirming our finding that smartphones intrude even in the most private of moments, Pielot et al. (Pielot, Church, & de Oliveira, 2014) found that the number of emails received on smartphones is correlated with stress from receiving work emails after work. In fact, mobile technologies and the ubiquitous nature of email are only going to increase the problem of mobile email addiction, as defined by Turel & Serenk (Turel & Serenko, 2010, p. 41): "*a form of non-substance addiction that involves excessive interaction with both a mobile technology (mobile device) and the content (electronic communication) under conditions of psychological dependency*". However, the "*variable interval reinforcement schedule*" (Marulanda-Carter & Jackson, 2012, p. 86), typical of gambling behaviour, can aggravate the problem of email addiction if for example notifications are turned off and users occasionally find emails in their inbox when randomly checking. If notifications are enabled with sound or pop-up, and users only access their inbox as a reaction to notification, there would be no surprise effect, or reinforcement like would happen in gambling. This is what typically happens in the work environment, where users are supposed to be available and reachable more than ever. We found that several of our participants limited email notifications on their phone or disabled them completely. Hanrahan et al. (Hanrahan et al., 2014) combined logged interactions with email with a diary study involving 20 participants and found that users attended email primarily based on notification alerts. While we found that this might be true for work emails, particularly on desktop/laptop computers, the same findings might not apply for personal emails or mobile devices, as suggested by the literature and our findings. Moreover, Jackson et al. (Jackson, Dawson, & Wilson, 2002) found that users react to 70% of emails within 6 seconds from being notified. However, Jackson's findings date 2001, before smartphones were on the market, and Hanrahan et al.'s findings do not distinguish between notifications on a mobile or desktop/laptop device, nor between personal and work accounts. Therefore, with more mobile devices becoming available, it could be interesting to see if wearables such as smartwatches will exacerbate this effect of mobile email addiction, or on the contrary will help create stricter boundaries.

4.4.4 Microboundaries to minimise interruptions

We have showed how work and personal accounts, managed across devices, can disrupt work-home boundaries, in particularly depending on the professional group, individual differences and other's personal boundaries. Our study indicates how, in general, interviewed professional services participants are positioned towards the segmentation end of the work-home boundary continuum (i.e. have more rigid boundaries), while interviewed academics are placed more towards the integration end of the continuum (i.e. have more permeable boundaries). However, boundary management behaviours are context-dependent and the pervasive nature of email and its accessibility across devices has increased the frequency of unexpected micro-role transitions, i.e. shifts in life roles as a result of for example, receiving a work email at home (see section 2.1.1). We found these transitions can have negative consequences, such as participants reporting complaints in their household about their emails habits. The interviews show that, particularly within devices, users developed resilience strategies to help them minimise micro-transitions between different work and home roles and their associated negative effects. We describe these strategies as microboundaries and define them as:

> *A strategy to limit the impact of micro-role transitions caused by cross-domain technology mediated interruptions*

Examples of microboundary strategies in email management that emerged from our interviews occurred:

…through accounts, for example:

- Having one account per role;

- Creating dedicated folders for one domain in another domain account with automatic filtering, i.e. functionality that is similar to Gmail tabs.

…through devices, for example:

- Having personal email only on the smartphone, and work email only on the laptop;
- Deliberately removing work email from their phone during time off, e.g. when on holiday;

…through software, for example:

- Checking personal and work emails on the same device (computer or phone) but on separate applications, thereby limiting the temptation of checking work emails during non-work time.

All but three participants kept personal and work accounts separated while at work and used microboundary practices to switch between the two domains. We hypothesise that people who are

highly engaged in their work and therefore suffer more from high levels of work interrupting non-work (such as academics) could benefit from these practices.

4.4.5 Limitations and future work

Given our small sample size, some of the findings had to be treated as anecdotal. For example, findings regarding tablet users in our sample mirror those of Stawarz et al. (Stawarz, Bird, Cox, & Benedyk, 2013), who found that tablets can blur the boundaries between work and personal life because they are often purchased without a clear purpose in mind. More work should be done on users' appropriation of tablets and their role in the plethora of devices that affect our work-home boundaries. This could include understanding how more recent forms of laptops, where the screen can detach and become a tablet, are appropriated with respect to boundary management.

Additionally, given the differences between different professions within the same organization, our results cannot be necessarily extended to other organizations, but we provided a comparison with a similar population (Capra et al., 2013) and found that there are overlapping strategies and that the differences could be a result of technology advancements.

4.5 Considerations for policies and design

Strategies to overcome the stressful effects of email need to take into account boundary management preferences and cross-device interaction and be regularly updated to keep up with technological advancements. We argue that organisational email policies are as important as design implications for email software, because our study has demonstrated that work context influences email management practices. We propose a set of considerations that can help minimise the negative consequences of email on boundary management:

- **Rethinking company email policies to reflect professional groups.** Our study has demonstrated that two professional groups at the same organization have very different email and boundary management practices and that they vary in the symmetry of the interference between work and non-work email management. Interview data showed that these differences are primarily a result of different working cultures. Companies therefore play a crucial role in minimising the negative impact of email and can identify the professional groups that are most likely to be affected and tailor their policies accordingly. More importantly, in order to take into account personal preferences, rather than policies, companies should create guidelines and suggestions that can accommodate individual preferences and professional differences. A notable recent example is German company Daimler-Benz who in August 2014 allowed employees to configure their email clients so that all emails they received whilst on holiday were deleted and the sender was emailed asking them to resend the message when the recipient returned (Gibson, 2014).

- **Setting notifications based on location and account-type.** Our results suggest that people have personal preferences as to when they want to be notified about new messages depending on the type of account and where they are (e.g. home, office, commute). For example, sometimes participants limited work email alerts to office hours, which is an example of a microboundary strategy. Jackson et al. (Jackson et al., 2003) found that users react to 70% of emails within 6 seconds from being notified. By turning off notifications our users reduced the number of interruptions caused by email. We recommend creating smart-notifications that let the user decide when to be notified and from which account, based on their location, in order to give users more control on when and where interruptions occur. This is especially important for users who prefer to have all accounts synchronised to the same mobile application, because it supports microboundary practices that help keep work and home separate.

- **Tagging email with device icons based on where they were first opened.** Some of our participants complained that while at work they sometimes forgot to reply to emails which had been opened on a mobile device and thus got lost in the sea of messages. Tagging emails with an icon based on where they were first opened would enable users to re-arrange their inbox and address this issue.

4.6 Conclusions

The work presented in this chapter extends previous work on work-home boundary management and multi-device interaction by investigating the email practices of two professional groups at the same university. Several conclusions can be drawn from our findings. This study shows differences between work and personal email accounts, differences between professional groups in terms of email and boundary management practices, and the way these are carried out on multiple devices.

Firstly, we confirm previous findings on the differences between work and personal emails and that personal accounts are not being used for communication purposes as much as work accounts. However, there are still some exceptions and more work is needed to understand how personal and work communications are evolving now that several types of computer-mediated communication tools are becoming popular. Secondly, we show how there are professional differences within the same organisation. Interviewed professional services staff typically have more rigid boundaries defined around working hours; interviewed academics have more permeable boundaries and report significantly more interference between work and non-work, which other studies have shown can result in increased stress. So far, the only distinction that the literature has found is vertically across hierarchy, between managers and non-managers. We believe that there are more subtle boundary management differences between individuals and professional groups belonging to the same organizations and that the latter need to take these into consideration when defining guidelines and company policies regarding email behaviour. Thirdly, we add to the work-home boundary literature

by showing how cross-device interaction can be disruptive and have negative impact on people's wellbeing, by allowing interruptions between work and non-work.

Ultimately, we found that although boundaries need to be actively created in the first place, they come as a result of personal preferences, professional context, but also as a result of interactions with other parties. We uncovered a series of strategies that our participants put in place to manage work-home boundaries using communication technologies, and that we have characterised as *microboundaries*. Future work should further investigate how microboundary strategies occur across domains, accounts, and devices. For example, in this chapter, we highlighted how notifications – which can cause cross-domain interruptions – are used differently depending on the device or the account. We argue that a closer look should be given to notifications and differences across domains and devices, especially notifications that could challenge one's availability and boundary management by being constantly on the user, i.e. delivered on a wearable device. In the next chapter, we will discuss the user experience of smartwatches within device ecologies, and what are the implications for boundary and availability management.

Chapter 5

Notifications, Awareness Cues and Smartwatches

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*[Parts of this chapter have been published in
(Cecchinato & Cox, 2017; Cecchinato et al., 2017; Cecchinato, Cox, et al., 2015a)].*

5.1 Motivation

The previous chapter discussed the types of strategies users adopt to manage work-home boundaries around email on smartphones and laptops, as one example of communication technologies. Whilst this provided some interesting insights, today's modern communication is conducted across multiple channels and devices. Extending our findings from Chapter 4, the study presented in this chapter investigates boundary management around a variety of communication channels (e.g. WhatsApp, email, Facebook messenger, etc.), and multiple devices, with particular emphasis to notifications. In section 4.3.4.5 we have shown how notifications can challenge one's availability and boundary management, and this may become even more of an issue as wearable devices, such as smartwatches, become more popular and extend the device ecologies (Bødker & Klokmose, 2012) through which users can be notified.

Market figures show that smartwatch worldwide shipment expected to grow from 19 million in 2015 up to 25.95 million by 2019 (Statista, 2014). These numbers show a steep increase in popularity and interest, especially after the launch Apple Watch (Apple, 2014) in September 2014. According to NDP, in 2014 (when the study presented in this chapter took place) was 71% of smartwatch users are male, and average age is skewed towards the 18-34 years old bracket (The NPD Group, 2015).

While forecasters are busy understanding how companies should best market their wearable devices to increase the still low adoption (The NPD Group, 2015), it is important to understand how the design of these devices can be improved by leveraging on insights from early adopters. Smartwatches are being sold as devices that can help "*get information you want conveniently on your wrist*" (moto360.motorola.com, 2015) and "*stay connected to things that matter*" (Getpebble.com, 2014), yet it is unclear what is the use and value of having notifications on the wrist, compared to other mobile devices. In addition, there is still no understanding of how this may impact one's control over work-home boundaries, especially in the context of other devices users have access to.

Therefore, in order to understand how these new devices are appropriated and how they might support or challenge preferred boundary management styles in the context of device ecologies, we conducted an investigation, combining an autoethnographic diary study with interviews from 17 early adopters. We found that smartwatches were used to create and maintain boundaries through notifications, as well as we identified points where other devices and applications challenge users' boundary management styles. The findings hint at the importance of understanding how to give more control and agency to users, for example through notifications and expectations of response.

5.2 Related work

5.2.1 User experience of smartwatches

At the time of conducting the study presented in this chapter (2014-2015), there were only a handful of studies that had been looking at aspects of user experience of modern smartwatches. Two of these – the most comprehensive at the time - gained their insights by providing participants, who again were non-smartwatch users, with new smartwatches and observing their interactions, along with collecting qualitative data. Shlögl, Buricic and Pycha (Schlögl, Buricic, & Pycha, 2015) provided 12 participants (six women, average age 30) with a smartwatch for a week and collected qualitative data around challenges and problems encountered, but do not mention through which method. Their main finding seems to be around the difficulty in pairing the watch with the phone and the short battery life. The authors advocate for in the wild studies on the use of wearables to understand challenges of use as well as possibilities for design, which our study here responds to.

Pizza, Brown, McMillan and Lampinen (Pizza, Brown, McMillan, & Lampinen, 2016) carried out a noteworthy study, using a unique methodology, i.e. naturalistic video recording *in vivo*. They provided a brand-new Apple Watch to 12 participants (seven women, aged 23-36) for a month and video-recorded the last three days of their interactions, amounting a total of 168.5 hours of videos and 1009 instances of watch use. Findings show that using the watch as a timepiece made up for 50% of the interactions, followed by notifications, activity tracking, talking to the watch and other apps. Because all participants had the same smartwatch, there is no discussion around the role of aesthetics or differences in features, but the physicality and materiality of the device showed that

interactions could be hands free, but also that the device has an 'always-available nature' (i.e. it is always on). Interestingly, they found that only 3% of the watch uses were followed by phone usage. The watch could be seen as a way of reducing time spent on the phone, and to also balance availability to others with one's own concerns and demands. In fact, short refrains from conversations to check the watch were found to be "unproblematic", as they state: "*glancing at the watch may be less of a distraction than the cognitive load of wondering about the incoming message and negotiating access to the phone around the current task*" (Pizza et al., 2016, p. 5465). While this is probably the most complete and comprehensive study to date on the user experience of smartwatches, there are a few limitations: first of all, it does not include existing users, nor do they mention if participants were even interested in purchasing a smartwatch. The types of interactions recorded may have been a result of novelty effects and inexperience, and therefore may not represent a realistic set of interactions. While a month is still longer than any other study presented so far on smartwatch use, it is unclear whether a month is enough to show changes in use following initial novelty effects. This is particularly true when considering the smartwatch they provided their participants with, which at the time was the latest most fashionable smartwatch on the market. Pizza et al.'s study only started to scratch the surface of what smartwatch users do, and more work should look at existing users.

Schirra and Bentley (Schirra & Bentley, 2015) are the only ones who have reported interviewing early adopters of smartwatches. However, they only present initial findings with five smartwatch users (two women, aged 18-51) who had owned the device for 4 months or longer. Among their results, smartwatches were considered to be an "*extra screen for* [the] *phone*" (Schirra & Bentley, 2015, p. 2155) and notifications were pushed to the watch "*without using filtering options provided by the smart watch to further limit the amount of notifications they receive*" (Schirra & Bentley, 2015, p. 2154). They also found that their participants were taking extra precautions to keep personal information displayed on the watch private.

5.2.2 User experience of notifications

Building on literature we have presented in Chapter 2 (see section 2.2.1.2), in this section we discuss related work that looks at the role of notifications on smartwatches, compared to other devices. For example, Giang et al. (Giang et al., 2014) looked at the impact of smartwatch notifications compared to smartphone ones in a driving scenario. Their findings show that smartwatches may be more detrimental to driving performance compared to phones, highlighting potential differences in interactions with the two devices. However, this may only apply to drivers or specific contexts.

Shirazi and Henze (Shirazi & Henze, 2015) conducted a large-scale survey with 440 participants (289 women, average age 24.19). Their interest was to understand which notifications would be useful to have on a smartwatch compared to other devices. Their findings suggest that calendar and messenger notifications were considered the top most important types of notifications for

smartwatches, compared to messenger and email notifications on smartphones. However, despite their large sample, only four existing smartwatch users were included, so these responses relate to what users think they might like, rather than coming from smartwatch users who have gained some experience of which notifications are actually useful to receive via this device. To validate their findings, they later provided eight participants with a smartwatch to track their notifications for a week and found that indeed their survey results were confirmed. With such new devices, a week of use might not be long enough to account for novelty effects. Nonetheless, their findings point towards the idea that the importance of a notification depends on both the app it comes from and the device it's delivered to. For example, further results from the survey showed that smartphones were the most preferred device to view notifications on, laptops/PCs were preferred for emails, tablets for social media, and smartwatches were the second most often selected device for calendar notifications. Such findings may be dictated by the fact that the sample did not include many smartwatch users and there are plenty of examples in the HCI literature of how new devices are adopted and appropriated differently from the initial expectations (e.g. (D. Harrison & Cecchinato, 2015; O'Kane, Rogers, & Blandford, 2015)). However, an interesting concept the authors come up with is that of differentiating notifications based on the device the user wants to view them on. Despite their lack of discussion around what this may entail, and the granularity of notification controls a user might want, we argue this should be a future direction to look at more closely as the ecosystem of devices per user grows.

While these findings start shedding light on real use cases, there is still a lot more to unpack on the use of smartwatches in everyday life, particularly in relation to other devices and how this might affect users' perception of their availability. Moreover, as mentioned at the beginning of this chapter, smartwatches have the power to provide instant and glanceable notifications that can add up to the distracting buzzing on multiple devices, but also filter out notifications from multiple channels.

However, current literature as presented so far does not seem to take into account the impact of having a smartwatch on availability and interruptability, two constructs that challenge work-home boundaries. Smart wrist-worn devices introduce the opportunity to explore new research areas of mobile user experience because, unlike mobile devices, wearables are more discreet and can allow minimal interference between the user and their current activity. This is one of the first studies that reports findings on why and how existing smartwatch owners use the device in real life, as well as uncovering the role smartwatches have in increasing the expectation that users are always online. Therefore, our study answers the following research questions:

- What are the benefits and challenges of wearing a device that is always online?
- How do smartwatches fit into users' wider multi-device ecologies?
- How can the design of smartwatches be improved in order to better fit user needs?

5.3 Method

Consistent with the overall approach in this thesis, we relied on mixed methods to answer our research questions, combining a diary-based autoethnography and semi-structured interviews with early adopters of smartwatches. These two methods were chosen because of their in-depth qualitative nature and the ability to validate each other's findings. Given the lack of literature on the topic at the time of data collection (2014), the autoethnography was also used to inform the question for the interviews with 17 early adopters of SWs.

Through an autoethnography "*the investigator creates an ethnographic description and analysis of his/her own behaviour, attempting to develop an objective understanding of the behaviours and work context under consideration by casting the investigator as both the informant 'insider' and the analyst 'outsider'*" (Cunningham & Jones, 2005, p. 1). When talking about technology, Orlikowski (Orlikowski, 2000, p. 423) advocates the need for researchers and practitioners to "*better understand how and why people are likely to use their technologies and with what (intended and unintended) consequences in different conditions*". Therefore, conducting an autoethnography would allow us to collect situated data on the user experience of a smartwatch, as well as first-hand experience with a technology that is not (yet) widespread and common. The author of this thesis carried out the autoethnography.

Combining both the autoethnography and the semi-structured interviews allowed us to validate our findings from different angles. Given that the participant of the autoethnography is also the researcher, the observations were directed towards uncovering unexpected patterns as well as later helping the interview participants explain their own behaviours and interactions, especially when they might not have been fully aware of or may not have considered relevant for the purposes of the study.

5.3.1 Data collection

Autoethnography. In order to gain insight on the use of smartwatches an out-of-the-box autoethnography was carried out for two months, from early November 2014 to early January 2015, for a total of 60 days. This period allowed the author of this thesis (as the participant) to cover a broad sample of routine and non-routine activities, such as: daily activities, social events, work meetings, commute, abroad travelling, holidays, visiting family, etc., along with being able to gain empathy with the use of a smartwatch (Wright & McCarthy, 2008). The duration of two months was an arbitrary choice but with the aim of reducing any potential novelty effects (Brynjarsdottir et al., 2012). Data were collected through daily diary entries using the OneNote app, and included descriptions of use and non-use of the smartwatch, pictures of interaction with the device, short captions of feelings and comments received from people. In addition, diary entries also included self-reflections. A diary-based autoethnography was preferred to other methods such as *in vivo* techniques (e.g. (Brown, McGregor, & McMillan, 2014; Pizza et al., 2016)), where the interactions

with a device – be it a smartphone or a smartwatch – are video recorded as an alternative to diary entries. Although such videos would produce a larger amount of data, they would also create ethical issues for anyone appearing in the videos who had not given their consent. To ensure that all relevant interactions were recorded in the diary, Carter and Mankoff's (Carter & Mankoff, 2005) pipeline for diary studies was followed as closely as possible: by using both pictures as aide-memoir and diary entries, situated data (at the time of interaction/use) and recall data (evening diary study) were collected.

Interviews. Interviews lasted on average 49 minutes (min: 16 minutes; max: 81 minutes; median: 45 minutes) and took place over Skype, with the exception of two, which took place in person in one of our department's offices. The interviews were scheduled in December-January 2014/15 and May 2015. The first round of data collection was meant to take place almost in parallel with the autoethnography, while the second round of data collection was carried out to ensure a larger sample. Interview questions included motivations of purchase, initial set up and setting changes over time, general everyday use and non-use, specific use of notifications, aesthetics and form factor, reactions and social context, added value of smartwatches, issues and unmet needs. In addition, further questions were asked about the participants' general habits for work and personal communications, use of other devices owned, and general feelings about their 'work-life balance'. A list of questions used can be found in Appendix C.3.

5.3.2 Recruitment process

The interview study was advertised using a variety of mediums: flyers, paid and targeted advertisements on social media and online groups, a stand-up comedy event, and by word-of-mouth. The advertisement required participants to fill out the short survey described above and share contact details in order to later agree on a time and day for the interview. As an incentive to take part in the study, participants were entered into a prize raffle for one of three £25 Amazon vouchers. The study was originally intended to run from December 2014 to January 2015 and targeted to UK population through word-of-mouth. However, due to lack of participants signing up, our criteria were broadened to other English-speaking countries and a second round of recruitment took place in April and May 2015, leading to a total of 33 users signing up to the study. Of the 33 users (three women) who completed our recruitment survey, six (two women) did not own a smartwatch.

Initially, local meet-ups related to wearables, personal informatics, and new technologies were attended to advertise the study through word-of-mouth and flyers. Later, an online campaign was created on Facebook and subsequently Twitter, to run for a week each in December 2014 and in January 2015 respectively. The Facebook campaign was targeted to UK population only, while the Twitter campaign was extended to USA, Canada, and Australia, as well as UK. More details about the campaign and insights gained, including gender split of audience (which are outside the scope of

this thesis) can be found here: bit.ly/1V4rVwS. In the second round of recruitment participants were recruited at a large HCI conference using flyers, social media, and again through word-of-mouth. Recruitment ended when saturation was reached (Silverman, 2013).
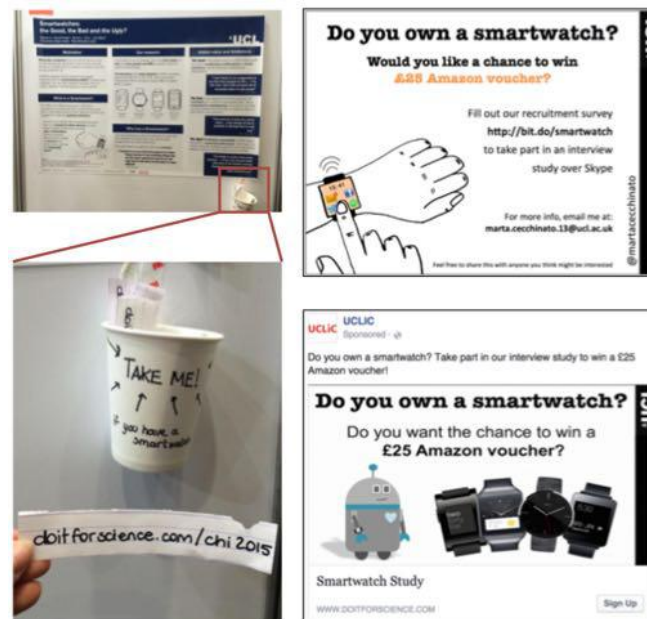
Figure 6 On the left, recruitment flyers at large HCI conference during the poster session, on the top right the flyer used at meet-ups, at the bottom right the online campaign ad on social media.

5.3.3 Participants

5.3.3.1 Autoethnography

As part of the autoethnography, the author of this thesis – a woman in her late twenties at the time of data collection – collected comments from 60 people (friends and family). The median age of these 60 people was 32, ranging from 12 years old to 78 years old. Of them, five had a smartwatch and several were aware of what a smartwatch was through knowing someone who had one or via the popular press. Comments and quotes were recorded to gain a richer understanding of the perceived usefulness of smartwatches among a wider sample of users and non-users. We report findings from the autoethnography using A0 to refer to diary entries of the author of this thesis, and using A1-A60 to report comments from friends and family.

5.3.3.2 Interview Participants

Interview participants (n=17) were all male, with ages ranging from 23 to 68 (median: 31). All participants were, or had been, knowledge workers and had a technology-related job. Occupations included: four students (three PhD, one MSc), three UX researcher, three commercial managers, a facilities manager, a software engineer, a chief innovation officer, an implementation consultant, a digital producer, a professor, and a retired teacher. Most participants (n=15) were educated to

undergraduate degree level or higher. Fourteen participants lived in the UK, two lived in the USA, and one lived in Australia.

Participants were screened through a pre-study survey (see Appendix C.2) for the type of smartwatch owned and length of ownership, to ensure a variety of devices and at least three weeks of experience with their watches. The survey collected general demographics, information about the smartwatch, traditional watches and other devices owned (type, who bought it, wearing habits), and it asked participants to identify themselves according the Diffusion of Innovation Theory (Rogers, 2003). Most participants self-identified as innovators (n=11), followed by early adopters (n=3), and early majority (n=3).

Despite our efforts in trying to reach out to women to take part in our study, the only female user who signed up opted out before the interview took place. As many articles in popular press discuss, the majority of smartwatches available, and particularly those available at the time of the study are generally criticised for being too 'masculine', 'bulky' and 'clunkly', suggesting that the appearance may be a hindrance for women [e.g. Huawei] (Fumo, 2016). However, we believe that our sample, although skewed, does indeed provide a rich qualitative set of insights that go beyond possible gender difference.

5.3.3 Analysis

For the autoethnography, a single Word document containing all of the diary entries was compiled and loaded into Atlas.ti for analysis. This was then coded using an inductive thematic approach, given the lack of pre-existing literature. Code categories used for the autoethnography included: initial settings, wearing behaviour, the role of aesthetics, privacy concerns, UX issues, location-based use and non-use, reply behaviour, notification preferences, and reactions from friends/family. Being both the participant and the researcher, patterns of behaviour started to emerge during the data collection, but the data were analysed only once the study was completed, to allow for further reflection. In addition, given the very limited pre-existing literature at the time of the data collection, there were few preconceptions, other than own reflections, that came about as a result of the study.

For the interviews, a deductive thematic analysis was carried out, whereby data were coded more specifically for our research question around the role of smartwatches in boundary management and specifically its use for receiving and viewing mobile notifications. Full transcripts of interviews were loaded in to Atlas.ti for coding. Code categories used for the interview data included: initial appeal, use of analogue watches, wearing behaviour, the role of aesthetics, initial settings, location-based use and non-use, comparative use of other devices, reply behaviour, notification preferences, privacy concerns, security issues, UX issues, reactions to awareness cues, reactions from friends/family, and social acceptability.

Once both datasets were coded, several analysis iterations across both interviews and the autoethnography were completed until the final set of themes was identified: (i) boundary management strategies resulting from using smartwatches; (ii) communication practices across devices and the impact on boundary management; and (iii) awareness cues in communication apps that can support or challenge boundary management. Other themes were also identified but went beyond our research question and the scope of this thesis, therefore they will not be reported here. Findings presented below comprise data from both our methods.

5.4 Findings

In the initial survey, participants were asked to list all their devices, categorised by type (smartphone, smartwatch, tablet, laptop, desktop PC, activity tracker, other wearable). On average participants had 5.59 devices each (min: 3, max: 9, median: 5). All interview participants owned one smartwatch, with the exception of P17 who owned two: a Pebble and an Apple Watch. Models owned by participants included: Pebble (n=8, of which only one Pebble Steel); Samsung Gear (n=3, two Gear S and one Gear Fit); two Moto360s; one LG G watch; one Apple Watch; and one Basis Peak. On average, participants had owned their smartwatch for almost 8 months (min: 3 weeks, max: 25 months, median: 5 months) and wore them "always" (n=8) or "most of the time" (n=9). Thirteen participants also owned traditional watches (i.e. non-smartwatches), of which seven owned more than one and only five had stopped wearing them all together. Based on a 5-point Likert scale survey answers, P6 still wore all his watches "most of the time", alternating between them, P9 and P1 wore traditional watches "sometimes", and the remaining five participants wore them "rarely" (e.g. only for formal occasions such as weddings).

5.4.1 Motivation for wanting a smartwatch

Findings from both the interviews and people talked to during the autoethnography suggest that users are interested in owning a smartwatch "*because it's cool to play with*" [A21] or because they want to be one of the first ones to try a new technology, "*because it was promising things that we never experienced and we are not clear how it will make our life easier or more difficult.*" [P8]. Through the autoethnography we were able to collect reactions from non-users of smartwatches and their reasons for not wanting one. The latter were usually motivated by scepticism and related to not feeling the need to be constantly connected or not perceiving the added value compared to a smartphone: "*why would I need it if I could use my phone?*" [A19].

Interview participants identified themselves as early adopters and often recognised the limitations that go along with this. Despite having curiosity as their main motivation and few expectations, participants did find value in the smartwatches, as P8 explains: "*After getting it, I found it's a lot more useful than I thought.*" However, three participants did have particular motivations that went beyond the appeal of a new device, and were looking forward to "*being more connected*" [P2]. For example, P9 wanted to be more responsive to his girlfriend: "*I guess the main reasons was curiosity.*

[…] *But also the secondary motif my girlfriend used to keep calling me and I would never pick up 'cause I keep my phone on silent so I thought it could be handy to make notifications easier to get hold of.*" [P9].

5.4.2 Receiving notifications

Overall, receiving notifications on smartwatches was considered the main benefit, as P2 explains: "*I like the idea of being more connected generally* […] *everything is just a little bit of a convenience,* [an] *improvement of what you have before*". The types of notifications allowed on smartwatches by participants were primarily communication-related (e.g. email, SMS, iMessage, WhatsApp, Facebook messenger, calls, Skype) but also included social media (e.g. Twitter, Facebook), news and information (e.g. BBC, weather, Google Now cards), health data (e.g. Fitbit), and other (e.g. calendar events, alarms, to-do lists, IFTTT (Ifttt.com, n.d.)).

Participants from both the interviews and the autoethnography had a clear idea of *what* sort of notifications they wanted, *how* they wanted to be notified, *when* they wanted notifications and *where* they were happy to be notified. We discuss each below.

5.4.2.1 What: priority notifications

Participants wanted to be in control over *what* they were notified about on their smartwatch, and this was generally *different* from notifications on their phone, as expressed also in the autoethnography: "*I'd like to be able to control on which device* [phone vs. smartwatch] *I see the notification. It's becoming redundant like this*" [A0]. Despite initially allowing most or all notifications on their smartwatch, mirroring those on the phone, more than half our participants (n=9) turned off at least some notifications after an initial novelty period (which varied between an hour and a few weeks). Seven participants disabled email notifications on their smartwatch altogether; four allowed only personal email, one of whom enabled only priority personal emails; and six participants had both work and personal email notifications enabled, one of whom only had priority emails coming through. Overall, the reasons participants reported for turning off these notifications mirror those found in the autoethnography: they found them annoying, or wanted to be less distracted.

However, participants not only wanted to be able to select the types of notifications they received, but also wanted to specify which people could notify them or the topics they could be notified about. P6 explained:

"*Twitter sort of lets you enable notifications for a certain few people* […] *that's good. On the other hand with WhatsApp* […] *I would have to go to WhatsApp and* [disable] *the notification, but what if I had something important come in?* […] *The way you adjust notifications and the way it is right now is really high level, you just switch off notifications for a certain app and switch it on.*" [P6]

Specifying subsets of notifications from different applications were something participants desired but were not able to achieve with the current devices. For example, P10 only wanted email notifications from certain people because "*customising your wearable and making it actually yours, whatever you want to receive, it gives you control. It feels nice to have control over technology*". However, smartwatches do not support this level of customisation yet, as he goes on to explain: "*still I don't have the luxury to decide I want emails only from this specific person.*" [P10]

5.4.2.2 How: glanceable information

Participants found that the major benefit of having a smartwatch was that by quickly glancing at their wrist they could decide whether to interrupt their current activity or not deal with the notification (be it reading the whole message, replying, deleting, etc.). This was consistent across the different models of smartwatches and apps used, ranging from those that allow seeing the whole message to those that only preview the first few lines.

"*It's made my life easier in terms of managing notifications and seeing which ones are duds and which ones are actually ones I want to deal with.*" [P9]

"*I don't let myself be interrupted.* […] *So the Pebble serves as an extension of the phone that lets me know that something is going on and has the added benefit of finding out in a more convenient way what that something is. It gives me a little bit of distance;* […] *I can't answer it because I have no microphone, but at least knowing what's going on can be useful. I can decide is it worth running to grab the phone.*" [P13]

Although perhaps specific to our sample, all participants bar one [P6] also agreed that glancing at their smartwatch was less rude and more socially acceptable than looking at their smartphone. In particular, being able to check the smartwatch without interrupting the flow of any on-going social interaction or being too distracted from the current task was seen as a major benefit.

5.4.2.3 When, where and wear: contextual alerts

Another feature participants desired were contextual notifications, whereby they could retain control of *when* and *where* they received notifications, something that current smartwatches do not fully support. Participants had different interpretations of what they considered contextual. For example, some (n=5) were more keen on having location-based notifications, such as knowing about the next train when nearing the station, while others (n=6) wanted to have different types of notifications enabled depending on the activity they were involved in (e.g. not receiving social media alerts when working). As a result, participants created rules around when and where to be notified, some of which were automated using the existing settings, while others were manually enabled at the time of need.

The most frequent automated setting used was muting the watch at certain times, such as at night. As P11 puts it, being able to mute your device is an important feature that is not always advertised, probably for fear of reducing engagement with the device:

"it's quite inconvenient if you forget to put it in sleep mode and then people start talking to you on Facebook and then your wrist vibrates, that's quite annoying! […] *If you put it in sleep mode the only thing that will interrupt you is your alarms.* [...] *They don't tell you that you need to do that, but you do need to do that basically. It's on the watch from the beginning."* [P11]

Some participants (n=5) preferred having a more active role in deciding when notifications should be disabled and thus manually changed the settings from time to time. For example, P4 would disable his notifications whenever he went on holiday, but also if he went out for dinner with friends: *"I have from time to time stopped certain notifications…* [for example] *when I've been out for dinner with a friend or something like that."* [P4]

The Case of Meetings. Meetings were a particular context that participants frequently mentioned when discussing notifications. Although smartwatch use in formal meetings (e.g. job interviews) or when giving a presentation was dismissed for fear of it being distracting, participants were very keen on using a smartwatch for day-to-day meetings for several reasons.

For example, checking the time in a meeting is considered socially acceptable, especially if this is done on a smartwatch rather than a phone: *"People will think that you are just possibly checking the time, or looking at something as opposed to actually getting some information through it. I think it's a little less rude I guess."* [P17]. Getting useful information such as emails or when the next appointment is due seems crucial for staying on time and up to date: *"It makes sense to check the time and contemporarily see how long until the next meeting."* [A0]

More interestingly, during meetings other people could take advantage of a user's smartwatch and send timely and contextual messages. This was the case of P8, who considered his colleague "*smart*" when they sent a message during a customer meeting so it would appear on the smartwatch. Although this may not have been as intentional as the participant led us to believe, it still portrays a realistic scenario:

"So normally we mute our phones and my phone is in my pocket, but when I was discussing something with the customer […]*, a colleague of mine wanted to remind me of something to mention* […]*. So he simply sent me an SMS to my phone, my phone is in the pocket, in my* [hung up] *coat, but then I got the message simply on my watch, and looking at the watch is never rude, or never offending compared to looking at a mobile phone, while in a meeting. So because he was not actively participating in the discussion, he managed to send me that SMS so just with a glimpse on my watch I knew what he wanted to remind me of and then I picked it up and managed not to forget it."* [P8]

Wearing habits. Depending on the context, deciding whether to wear the smartwatch was another way to control *when* and *where* to be notified. While not wearing the smartwatch could sometimes be a result of aesthetics and fashion preference on certain occasions (e.g. "*I had taken it off a couple of days ago because* […] *I didn't want to look too much like a techno-nerd* [for an event]" [P1] and "*if I'm attending an event or a place that's a little more dressy I've got more of a dressy watch which I wear.*" [P3]), some participants (n=6) purposefully decided not to wear it because they did not want to be constantly connected. For them, having the smartwatch *on*, meant they were also *online* and potentially available. P8 provides a detailed account:

"*I try to use it while I'm driving* [or] *I'm in the office, but once I'm home I can just disconnect from my smartwatch. I think I'm one of the people who fell into the trap with the ability to work really remotely and have business emails on my mobile phone. It makes me keep checking it when I check my personal email.* […] *and then I start to get worried* […] *when it's not the time for it at all. I should wait till tomorrow.* […] [Interviewer: So why do you take your watch off?] *It's just to decide to stay away from the phone, so just to keep* [the watch] *off, put it on the table. Just keep it far from my hand. That's it.*" [P8]

In a similar way, when P5 reached home, not only would he take his watch off, but he would also turn the Bluetooth off on his phone, cutting that 'always connected' thread between devices: "*I'll turn the Bluetooth off on my phone, start charging the Moto360 - the minute I come in the door I'm done with it. If I go out again I'll turn it back on*" [P5].

A few participants (n=3) found that the watch itself was something that reminded them of work, so they did not wear it at the weekend. P17 compared his wearing habits with his two different smartwatches. He originally had a Pebble, which he wore most of the time, until he got the Apple Watch which he then wore all the time. When probed about the reasons, he explained: "*you know, funny I didn't* [wear the Pebble all the time]*. I wore it during the week, but weekends and holidays I would wear one of my normal watches.*" [P17]. He goes on to explain how he only used it for notifications and he did not receive as many at the weekend. While his notifications may not have changed much since owning the Apple Watch, he now used his new device to replace the Fitbit he owned and track his physical activity. In this case, the affordance of the watch clashed with one of the participant's values: despite not wanting to have a connection to the online world at the weekend, tracking his physical activity superseded his previous habit of not wearing the watch.

Those participants who did not necessarily want to take off their smartwatches would instead turn off the connection or even the device from time to time to get some distance from the online world. For example, P11 stated, "*Sometimes I wear it while it's turned off* […] *because I don't want to get any notifications at all.*" P15 provides more explanation of a similar behaviour: "*Sometimes if I'm at work I'll turn my Wi-Fi off on my phone, so if I turn it on and I get everything stacked up then I find that quite distracting, but* […] *over the weekends I don't find it distracting at all.*" [P15]

5.4.3 Managing availability

Once a user receives a notification, he or she is faced with deciding between three options: ignore the notification, dismiss it, or read it. In addition, reading a notification can be done on the watch or on another device, depending on the app. Deciding which device to use, in turn, opens different options for further actions, such as replying. With smartwatches generally offering limited reply functionalities (depending on the model), we found participants took advantage of not always being able to reply to help them manage their availability.

Participants used notification settings to gain not only a sense of control of how, when, and where to allow interruptions, but also a sense of increased flexibility and control over when to reply, as notes from the autoethnography exemplify:

"*Having the watch has also changed my sense of availability: despite having a notification device strapped to my wrist which could potentially make me feel more compelled to reply, I feel it buys me time.* […] *Being on the watch could help me decide if I needed to reply.*" [A0]

Other participants, like P5, shared similar thoughts and explained how the smartwatch prevented them from mindlessly completing habitual actions:

"[having the smartwatch means] *I spend less time on a device. You know what happens… if I open the phone to check email then there are other things that you could very easily get into doing. You know, replying. Whereas on a smartwatch you can't reply, so it's very much just reading and then dismissing a notification, so it's actually made technology less intrusive.*" [P5]

5.4.3.1 Awareness cues

This gained flexibility in when to reply to messages was particularly welcomed when it allowed participants to view messages without having the sender being notified that the message had been read. Information such as when a person was last online or whether a message has been read is known as an awareness cue (Oulasvirta et al., 2007). Particular communication apps mentioned by participants, such as WhatsApp and Facebook Messenger, include read receipts. For example, WhatsApp introduced this feature in the fall of 2014, by which a message is marked as 'read' by two blue ticks appearing next to it (Collinson, 2014). However, when viewed on a smartwatch, WhatsApp messages are not marked as 'read' on the sender's phone, and the same happens with similar features in other apps. Most smartwatches work in the same way as the notification centre in a smartphone, where the user can preview a message without actually opening it. The only difference is that while on the phone the user can only see part of the message, on the watch one can scroll through the entire conversation, depending on the app. Because of this difference between devices, participants were more aware of these cues and expressed mixed feelings about them.

With IM messaging platforms, and particularly those integrated with awareness cues, there is an underlying expectation that people will reply as soon as they read a message. As P11 explained, "[when the person does not reply to the call] *I prefer going online on Skype, or sending* [a message] *on Viber or WhatsApp because I can see the other person is actually online. So* […] *on WhatsApp they will reply to me when they see it. I think it's much faster compared to an email."* [P11]

Another participant, P6, expressed his absolute dislike for awareness cues in messaging apps that tell the other person when a message is read and create or increase the expectation of being constantly available. In fact, he reports on being criticised, "*I receive a lot of flank from my girlfriend and other people*" for not being responsive and quick enough: "*I would stay away from Facebook Messenger and WhatsApp* […] *and the reason for that I HATE the online available thing with the tick marks… ARGH! It's just so annoying! It's just added pressure to have all of that."* [P6] He then goes on to compare messaging systems with emails, in relation to the added pressure of availability and connectedness.

"The best part of email is that you don't have that kind of pressure. For some reason, […] *email just comes there and you know how important an email is, but with messages it's not like that, it's just so instant, in case if you don't get back to them now, the context is lost. If they sent you a message now, if you got back to them in a week or two then it sort of defeats the whole purpose of instant messaging. So I think that's the reason why you have that added pressure and I really don't like to a have the pressure. In case if you don't reply to them that's a bad thing to do socially.*" [P6]

During the autoethnography, the author of this thesis discovered that knowing that the sender would not know whether she had read the WhatsApp message made reading the message on her watch suddenly more appealing than taking out the phone, just in case she decided she did not want to reply there and then. Another participant, P11, explicitly mentioned awareness cues with respect to the watch. His experience somewhat contrasts with that of P6 above, as he explicitly used his smartwatch to avoid sending awareness cues to the other person:

"another nice feature of it, is that you can read the message without… like Facebook Messenger and WhatsApp… the other person can see that you've read the message, so (laughing) you can read the message without them seeing that you've seen it so then they don't feel offended that you are ignoring them. [So I can reply] *when it's convenient for me, rather than* [feeling pressured].*"* [P11]

However, although the smartwatch could be used to decide a more appropriate time to reply and to moderate what cues are, or are not, sent out, the mental models associated with smartwatch use created by non-users are still unclear. A4 commented, "*I know you have this watch and you see my messages!*" in reaction to not having received a response in a timely manner. However, as noted in the diary, "*what* [A4's name] *doesn't know is that I don't receive notifications from all apps, yet, because of the watch, he now expects me to be even more responsive.*" [A0]. We found that non-smartwatch users did not have a clear mental model of how the device could be used by its owner

and thus may pose a challenge in how smartwatches can help manage users' availability and moderate expectations of reply.

5.4.4 Replying to messages and the cross-device experience

After receiving a notification on a smartwatch and deciding to reply to a message, a user has to select which of their devices they will use to compose a reply. Different smartwatches afford different degrees of reply, ranging from no reply (e.g. Basis Peak), using canned messages (e.g. Pebble), relying on voice interaction (e.g. Moto360), or even full QWERTY-keyboards (e.g. Samsung Gear S). Other devices can be used to reply to messages received on a smartwatch: of course, smartphones, and occasionally other devices such as tablets and laptops/PCs can also be used if the app that sent the notification works cross-device. These are becoming more frequent: for example, email and IM channels like WhatsApp, Facebook messenger, and Slack.

Smartwatches generally prompted short replies to urgent messages or negotiating a better time to communicate. As P3 explains, "*I usually only reply on my watch if it's an element of urgency or it's very short and easy to reply. Usually if I reply from my watch it's just a couple of words.*" Other participants (n=3) felt that while prior to owning a smartwatch they were not good at replying to important messages, they have since improved, like P9: "*I'm a lot more timely in replying to her now to text and WhatsApp.*" The distance that a smartwatch provides from a smartphone extends also to the ability to make interactions politer or simply negotiate availability by letting someone know when it is a better time, without having to pull out the phone, which would either interrupt the current task/social interaction flow or draw the user into checking other things.

"*It makes those communications simpler and in some cases more polite.* […] *I've programmed you know a few quick responses for text, like 'ok', 'I'm busy I'll get back to you',* […] *I don't have to pull the phone out in a number of situations* […] *where it's just physically awkward, but also situations where it's socially awkward.* […] *I mostly reply from the watch in situations where the reply is either simply acknowledgement or letting people know I can't reply.* […] *Just because someone wants to be synchronous doesn't mean that I am going to be.*" [P13]

In contrast, when the message was not considered important or urgent, participants' responsiveness using other devices such as smartphones and laptops depended on their availability and initialisation time (i.e. the time to boot a device and start an application). In the following quotes, P1 nicely explains reply behaviour, comparing smartwatches, smartphones, and eventually laptops:

"*The way notifications work, I see text messages in a more timely fashion, but I don't actually respond to them. It means I'm quicker at seeing them, but I'm probably less likely to actually write a response. If you have to take your phone out to look at it you're already there, whereas... if I see with it on the watch I'll think "ok I'll deal with it later" and then never do it. So, in some ways it probably reduced my*

text message response rate. It means that if I see something that is urgent I'm more likely to respond to it, but if it's not urgent I'm less likely to respond to it." [P1]

Generally, smartphones generated slower responses to non-urgent notifications because the burden of pulling out the phone and unlocking it to respond was not justified. This selective responsiveness across devices can help users align their behaviour to their values (e.g. not being constantly available), such as delaying a reply to a more appropriate time. However, we observed how users' behaviours and values could be challenged if there was a readily available device. P1 explained how he was less likely to respond on his phone when he saw a notification on the watch, but *"actually, I'm far more likely to respond if I'm on my laptop and it's way more easy to type on that. So, if it bumps up on my watch 'this happened' then I'll flip open the iMessage on my laptop and respond. Whereas if I'm away from my laptop I can't be arsed to get the phone out and send something.*" [P1]

However, this cross-device experience can also cause issues. In our case, P6 found himself with redundant notifications on several devices and ultimately disengaged with the smartwatch: *"so what I ended up doing was to mute all that came in. When I did that, it pretty much ended all the smartness about it. I stopped looking at the device, it was just the time.*" [P6]

5.4.5 Costs associated with smartwatch use

Along with smartwatches providing the benefit of *buying* time by enabling users to decide whether to delay a response and thus *save* time by not pulling out their smartphone, smartwatches are also associated with negative *costs*. In addition to the monetary costs associated with purchasing an aesthetically pleasing smartwatch (and a data plan for some models), and 'battery costs' with having "*another thing to charge?!*" [P7], smartwatches can also pose a threat to privacy and attention.

5.4.5.1 Privacy cost

Despite most participants (n=14) not being disturbed by having personal information displayed on their wrists for others to potentially view, some (n=5) did voice concerns that this could make the information visible to other people. For example, P5 stated: "*sometimes when I text my family member in a work environment that made me think that actually the notification could be seen if my wrist is turned outwards, a personal message could be seen by someone across the table from me, when I don't really want it*". P7 described a friend who had a Pebble and did not wear it at work precisely because he did not want others to read his messages and "*it has been an issue.*" [P7]

One participant found it weird that his friends could read his messages on his wrist but explained: "*it's a risk you take if you wear your screen on you that someone is going to see your screen*" [P11]. However, another participant (P6) experienced some issues with a friend as a result of messages being visible on his smartwatch:

"*The ex of my friend was messaging me – we've been good friends for the last 10 or 15 years* […] *– when he saw the messages* […] *he was really... his first question was 'why are you messaging her - what's the need? We have broken up now, so you shouldn't be friends'* […] *the reason why it happened was because he happened to see what those messages are, and in a social context I guess you value your privacy and when it's all there for everyone to see it's not the best.* […] *you should have a way to tweak that.*" [P6]

These findings suggest that privacy settings should be better considered in the design of notifications on wearables.

5.4.5.2 Attention cost

In addition to being distracting to the user, smartwatches may be distracting or attention grabbing for others as well, and the autoethnography was valuable for uncovering these situations. On several occasions, real-world interactions were interrupted by somebody pointing out something that was happening on the watch, mainly out of curiosity for the novel device. This was also the case for P3's friend who also owned a Pebble: "*sometimes* […] *his work mates know he's got it, they'll say 'you've got a call' and he's like 'yeah I know'*". In the autoethnography, one person explicitly mentioned how the watch had distracted her during a seminar: "*I found it distracting during the seminar. You were playing with it and then you were resting your head on your hand and the screen was lit up.*" [A1]

5.5 Discussion

In this chapter, we provide insights into how smartwatches are used by existing users, how they fit within existing device ecologies, and how they can impact both the smartwatch owner's sense of availability as well as other people's expectations of availability. These findings have several implications for boundary management, which we explore in this discussion. By combining qualitative methods, we confirm and extend previous findings, along with presenting several novel insights.

5.5.1 Designing smartwatch notifications

Receiving notifications on a smartwatch was considered the major benefit by the existing users recruited in our study, confirming previous findings (Pizza et al., 2016; Schirra & Bentley, 2015). However, we also extended existing findings in a number of novel ways.

Previous work on mobile notifications identified how users are aware of their disruptive nature, yet want to maintain awareness nonetheless (Iqbal & Horvitz, 2010; Mark, Voida, Cardello, & R, 2012). However, not all mobile notifications are treated equally, with some (primarily communication ones) being considered more valuable (Shirazi et al., 2014). Whereas Schirra and Bentley (Schirra & Bentley, 2015) found that *all* notifications in their sample were being pushed to the watch, we found that once novelty effects wore off, most participants disabled at least some notifications on their

watch, but left them on their phone. This in turn allowed them to create some distance from their phone, rather than just being "*an extra screen*" (Schirra & Bentley, 2015, p. 2155). As smartwatches are worn, it is not a great surprise that users want to limit the amount of notifications they receive, and the implications of this preference need to be considered carefully.

Pielot and Rello (Pielot & Rello, 2015, 2017) uncovered how smartphone users find it hard to not have notifications, even though they can have negative effects. Their study on disabling notifications for one day made people aware of wanting more control over their settings because they experienced "notification overload". Similarly, we found that additional control to combat notification overload can be gained by using a smartwatch that helps filter out notifications and distractions, and even completely helps them disconnect when the device is taken off. As a way of exercising control over notification settings, we found that participants removed their watch, strengthening the idea presented by Pizza et al. (Pizza et al., 2016) of a smartwatch having a distinctive affordance and materiality to it. Taking off the watch is a physical act that can have a strong metaphorical meaning to the user, almost as if he or she were taking off the *digital handcuff* that as long as it is always on, it keeps them connected to the online world. This in turn can enhance the expectations of availability. Future smartwatch designs should leverage on the device materiality and affordances to support users' values. For example, allowing modular components that separate communication functionalities from other features (e.g. activity tracking).

Ultimately, our participants wanted smartwatches to have three specific features to make them feel in control of notification they received. Specifically, they wanted notifications to be (i) glanceable, (ii) priority-filtered, and (iii) contextual. Most commercial smartwatches already support glanceable information, however this is not the case for other smart wearables such as jewellery, which often only offer haptic alerts and no screen (Charara, 2016; Roumen, Perrault, & Zhao, 2015). More importantly, we have seen how the smartwatch screen can be distracting for bystanders and therefore the type of glanceable information displayed on the screen needs to be considered carefully. Alternative solutions have been proposed, such as creating more intimate notifications that can come in the form of vibrations (D. Harrison & Cecchinato, 2015) or subtle peripheral light alerts (Pohl, Medrek, & Rohs, 2016), but these type of alerts still lack salient information such as sender and topic.

Priority and contextual notifications are considered a desirable feature not yet fully supported by existing devices. We found that participants prioritised and filtered the notifications they received by creating manual and automatic rules around what and how to be notified. While smart and contextual notifications have been suggested before (e.g. (Fischer, Greenhalgh, & Benford, 2011; Mehrotra, Pejovic, Vermeulen, Hendley, & Musolesi, 2016)), our findings go a step further and point towards the usefulness of geo-fenced notifications on a smartwatch, based on virtual fences around physical locations where alerts can be enabled to determine where one should, or not, be notified. For example, this could be introduced in future smartwatch designs by allowing users to be notified based on sender, topic, or even location. To optimise this, notifications settings should not be designed as

app-centric, but rather as person-centric to favour for example starred contacts. This de-centralisation would allow to move away from the current model of applications and devices being built in silos, without considering users' cross-device activities.

5.5.2 Delivering the cross-device experience

Previous work identified the importance of apps providing some cross-device features, such as differentiating notifications based on the device the user wants to view them on (Shirazi & Henze, 2015) or keeping track of where they were first viewed (see section 4.3.4.5). Building on this line of work, we found that responsiveness depends not only on the level of urgency, but also on the devices available and the type of awareness cues sent or not sent to the sender. Viewing a notification on a smartwatch allowed a delay in replying, depending on the importance of the message and devices available, but independent of the degree of reply allowed on the smartwatch (e.g. using canned responses vs. full-QWERTY keyboard). While smartwatches afford a specific kind of response – short and urgent – replies on smartphones and laptops depend on many more factors. We found that the initialisation time (Matthews et al., 2009) was a major barrier to switching (Jokela et al., 2015) from a smartwatch to compose a reply on another device. Matthews et al. (Matthews et al., 2009) found that smartphones' initialisation time was generally quicker than laptops' and therefore users preferred completing a task on their phones if possible. However, our results suggest that this is not always the case and more importantly, that device switching also depended on the application in use. As Jokela et al. (Jokela et al., 2015) point out, and our study confirms, being able to access the same application across multiple devices is a strongly desired feature.

However, our study suggests that this cross-device experience needs to be delivered appropriately to avoid negative consequences, such as overall disengagement. On one hand, designers need to avoid occasions for abandonment, such as in the case of P6, who decided to stop using the smartwatch for notifications due to redundancy issues. On the other hand, designers should keep in mind users' values and needs. Nudging the user to respond on the nearest device might not always be the best solution, or one that is in line with their values. It can not only cause further interruptions, but also provide situations that further challenge one's desire to disconnect.

5.5.3 Managing availability through frictions

In a society that encourages people to be always online and available (Mazmanian & Erickson, 2014), smartwatches facilitate people receiving notifications in more contexts than any other mobile device. Although they have the potential to be digital handcuffs that increase other people's expectations of availability, they can also enable users to connect more selectively to only those things they consider important and can reduce users' compulsion to reply immediately to notifications. Our findings suggest that using smartwatches help users manage their availability and can reduce the time spent on other devices and consequently helping with issues of mobile addiction (Turel & Serenko, 2010).

Pielot and Rello (Pielot & Rello, 2015, 2017) suggest that it is those same notifications we cannot live without that create expectations towards timely responses. By focusing on smartwatches among multi-device ecologies, we found that seeing notifications on the smartwatch reduces feelings of missing out, but also helps users meet their values by being in control of when to reply. This is partly due to the limited interaction capabilities, which are seen positively as a means to create some distance, and partially to the greater control over the kinds of awareness cues sent out. In this sense, smartwatches can introduce a small friction to the user interaction that can nudge users to think more carefully about their interactions. It should be noted, however, that these benefits were not always perceived by those communicating with smartwatch users: for example, some people expected even more timely replies once they knew notifications were being delivered to the other person's wrist, not thinking that users might prioritise alerts. Thinking about these aspects can help inform how new smartwatches or smart wearables should be designed.

Building on our concept of *microboundaries* (see section 4.4.4), we now characterise the kinds of strategies our participants used in order to regain control over their availability. While some users did welcome the notifications and interruptions, regardless of time and place, others wanted to shield certain situations from any notifications. Therefore, we see how these strategies can relate to *social microboundaries* (e.g. disabling notifications when out for dinner); *temporal microboundaries* (e.g. enabling 'do not disturb' mode at night); *digital microboundaries* (e.g. disabling selected notifications only on selected devices); and *physical microboundaries* (e.g. deciding when not to wear the smartwatch or carry a device).

5.5.4 Limitations and future work

Although our sample primarily consists of male early adopters, by confirming previous work, our findings around the use of smartwatches for communication purposes open the floor to future work with a more heterogeneous sample. We tried to recruit a diverse sample and have provided evidence of that, including sampling users with a diverse set of smartwatches owned for varying amounts of time. Future work should investigate long-term use of smartwatches and instances of abandonment, as previous work has observed that phenomena in other kinds of wearables (D. Harrison, Marshall, Bianchi-Berthouze, & Bird, 2015). Efforts to include a more gender-balanced sample should be made when investigating aesthetics and form factor, given the proliferation of wearables and their highly personal value.

We call for further work to investigate specific contexts of use and behaviours. For example, studies could use logged data across devices to understand reply times. Some initial work to see if viewing notifications on smartwatches are faster than on smartphones has been done simulating driving behaviour (Giang et al., 2014), and smartwatches were found to require longer glances. As smartwatches become more popular and the novelty effect wears off, these findings need updating.

More importantly, as cross-device applications become more prominent, whole device ecologies, including laptops, tablets, smartphones and smartwatches should be studied.

Other interesting contexts of use are meetings and working environments. Our findings support the idea that there is a strong value in using smartwatches during meetings to keep up with information. Some research has already been done in this area, for example using smartwatches to provide peripheral awareness during videoconference meetings (Mäkelä & Marlow, 2016). Other work has explored the use of smartwatches to augment interactions in office environments, with implications for managing one's availability (Bernaerts, Steensels, & Vermeulen, 2014). This work points towards a new level of cross-device experience and we call for further research in this direction.

5.6 Considerations for design

Although our findings are not representative of all smartwatch users, they provide useful insight on what existing smartwatch users see as the major benefits and drawbacks. As new models are released, and sales figures grow, we believe our insights can help inform how new models should be redesigned, before adoption becomes more mainstream. In particular, to help users have more control of their notifications and availability, we make some suggestions.

- *Decentralising Notification Settings*. Notification settings should leverage on users' existing contacts lists and starred contacts, rather than on single apps, to select when, where and how to be notified by certain people. For example, different level or category of priorities could be assigned to a user's contacts (e.g. always notify me for this person or notify me only during working hours/days for this person).

- *Designing Smartwatch Affordances*. The materiality of the smartwatch and the symbolism of wearing it can be used to inspire new shape shifting or modular wearables that align with users' values and behaviours. For example, having modular components that help users disconnect from notifications but still track steps, could cater for users like P17 who changed his wearing patterns when he upgraded his smartwatch and abandoned his activity tracker. This has important implications also for managing availability and shifting general expectations that people might have or perceive.

5.7 Conclusions

The wearable nature of smartwatches enables people to be notified even when other mobile devices might not be at hand. As a result, users can feel always online and more available. We have shown how for some this may increase their productivity and enhance their social lives, while for others, smartwatches may appear like digital handcuffs. In this chapter, we investigated how existing users manage smartwatches, how they use them in conjunction with other devices, and how the overall user experience can impact participants' availability management.

The main finding is the value perceived in being able to quickly glance at information, without it being considered rude or too disruptive, and deciding whether to interrupt the current task. For most users, wearing a smartwatch led them to carefully manage people and information streams that were able to contact them and when, where and how they could be notified: having a device that enabled them to be 'always on' made them aware of when they wanted to be 'off'. As a result, using a smartwatch as a boundary artefact can help participants better control when they want to be available for work purposes and/or for personal reasons. We have suggested features for future smartwatches to facilitate greater user control over their notifications.

Moreover, we have uncovered how participants used smartwatches differently from other devices to help them create microboundaries. Thus, we have started to extend our understanding of microboundary strategies as we first identified them in Chapter 4: other than being device-, software-, and account-based, they also have social, temporal, physical and digital properties.

While findings from Chapter 4 uncovered boundary management strategies around email across devices, Chapter 5 uncovered further boundary and availability management strategies across device ecologies, including smartwatches. We have also started to discuss how different communication channels, that have different features (namely awareness cues) can challenge one's boundaries and availability, depending on how they are interpreted by others. More work is needed, however, to understand how these awareness cues are interpreted and used across different channels for boundary management. The next chapter will present a mixed method study that considers both the sender's and the receiver's perspective to uncover how availability is managed.

Chapter 6

Understanding Awareness and Availability Management in CMC tools

6.1 Motivation

People's use of CMC tools is shaped by the impression they wish to convey to others and how they manage boundaries. For example, a separator who does not access any work-related information after hours will not reply to work communications and thus is likely not going to be available for work purposes. Similarly, an integrator may find him/herself always available, regardless of time or location. While some initial work has linked the presentation of self in an online/offline binary paradigm (Farnham & Churchill, 2011), most of the work in this area has focussed on identity and social media use (Hogan, 2010; Zhao et al., 2013), rather than all CMC channels. How we present ourselves is linked to the notion of availability (when are we available to communicate?) and the ability of others to correctly interpret awareness cues (e.g. 'last seen online at 14:45' (Oulasvirta et al., 2007)) to determine our availability.

Findings from Chapter 5 suggest that awareness cues affect how others perceive one's availability. Whilst we found that smartwatches can help manage awareness cues and support boundaries by not automatically sending cues, these devices are still not as widespread as other mobile devices such as smartphones. In smartphones and laptops, these cues can lead others to assume someone

is available to communicate, which in turns creates expectations and may then lead to boundary crossing, interruptions, reduced boundary control, and eventually stress.

Previous work defined cues as "*the unit of awareness information at the user interface [that] refers to a perceptually separable representational entity that can be used in the mental process of the social inference of a remote other*" (Oulasvirta et al., 2007, p. 100). The use of awareness cues has been studied on individual instant messaging or mobile messaging platforms (e.g. (O'Hara et al., 2014; Oulasvirta et al., 2007)), but not comprehensively across several different CMC channels. Researchers have called for looking at communication channels and practices in a more holistic manner (Gross & Churchill, 2007). Although we present here the example of 'last seen online at 14.45' as an awareness cue, the latter can actually be any kind of cue that suggests a person is online/available and/or the kind of activity they are doing (e.g. 'typing', 'in a meeting'). We know from prior work that calendars for example are used as additional contextual cues that can give insights on the whereabouts of someone (Tyler & Tang, 2003). Yet there is no clear understanding of what information people use as awareness cues to infer someone's availability to communicate (Oulasvirta et al., 2007), particularly when this affects work-home boundaries.

Strategies to avoid being constantly connected have been previously identified, along with boundaries between devices and identities (Birnholtz et al., 2012; Patterson et al., 2008). These include for example logging into IM channels but purposefully appearing as 'offline' or other explicitly verbalised lies. However, most of this work has focused on linguistic solutions to overcome the technology design limitations in teenagers using SMS, IM and BlackBerry Messenger. These lies can be important for managing one's *un*availability, especially in our always-connected society and can have implications for boundary management. However, this work does not consider if and how the interlocutor (i.e. the other person, reading these cues) experiences these butler lies. To this point, Avrahami et al. (Avrahami et al., 2008) found that people took awareness cues in the context of IM as a measurement for how soon to expect a reply. With new channels, accounts, and devices available, as well as the increased flexibility of work it is still unclear if these findings still apply, to what extent, and more importantly what are the implications for boundary management.

Therefore, in this chapter we aim to answer the following questions:

- What communication technologies (devices and channels) do participants use for work and personal settings?
- Why do participants choose different CMC channels?
- How do senders manage their awareness and how do receivers manage their availability?

To do so, we present findings from a mixed method qualitative study where we combined a focus group, interviews, and a diary study that involved participants who had a reason and the opportunity to interact with each other during that time. The motivation for involving participants that could correspond with each other was to uncover the receiver's and sender's perspectives. This allowed

us to understand whether the availability management practices for boundary management of one interlocutor (i.e. a person involved in a conversation) were noticed and considered by the other. By using a combination of methods, we were also able to triangulate findings to validate them. Ultimately, this chapter makes two contributions: first, we uncover how communication technologies challenge and support conveying availability between the sender and the receiver, especially when these cause boundary cross-overs. Second, we deepen our understanding of people's strategies to manage their availability across channels and devices and how these relate to boundary management.

6.2 Method

Data were collected between July and December 2016 and involved three stages, each collecting more in-depth data (Figure 7): firstly, participants (n=29) were asked to fill out a survey which covered demographics, number and type of devices, and number and type of communication channels used; then participants took part in interviews (five of which were conducted in the form of a focus group); and finally, a subset of participants (n=17) completed a two-week diary study with follow-up interviews. Each stage is discussed in detail below.

Interviews, focus group, and diary methods were chosen for different reasons:

1. The focus group would allow us to uncover group dynamics and better understand sender and receiver perspectives among a group who work together.

2. The interviews would allow us to gain a vocabulary to understand how much people are aware of their own behaviours and practices when it comes to managing and inferring availability

3. And the diary study would allow us to collect examples of practices as they occurred, to reduce the bias in retrospectively having to remember instances, which is typical of interviews (Singh & Sareeka, 2013).
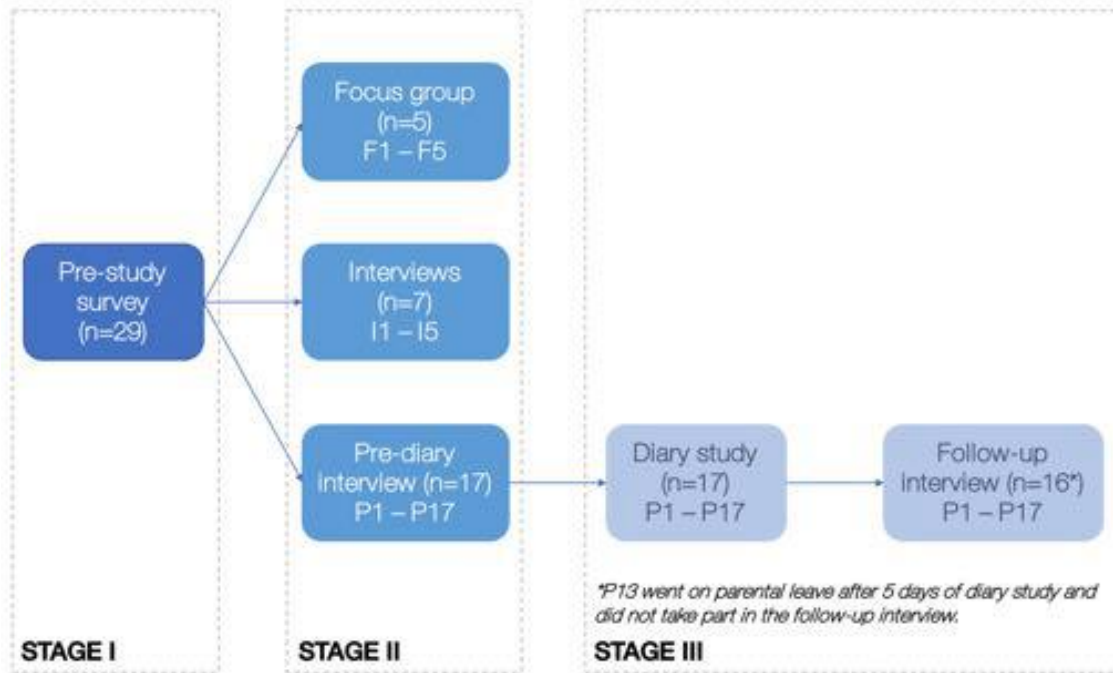
Figure 7 Study procedure and participants labels (F1-F5 for focus group participants; I1-I5 for interview participants; P1-P17 for diary study participants).

6.2.1 Participants

In total, we recruited 29 participants (17 women), aged between 24 and 52 (median age: 31). Participants were all knowledge workers (12 of whom worked in a university) with flexible working practices. Occupations included: PhD student, research associate, professor, lecturer, reader, product manager, engineer, marketing manager, UX researcher, and visual designer.

Participants were recruited through convenience sampling, snowball sampling, word-of-mouth, and social media ads. We were keen to recruit participants that had reason to communicate with each other on either a personal or work level in order to capture both perspectives. However, to ensure privacy, it was not always possible to establish the nature of the relationship if participants worked within the same company. In addition to wanting to recruit people that could know each other, participants were screened for occupation, range of communication channels and devices used, and ability to work flexibly. Of the 29 participants, nine had no apparent connection with other participants, and of the remaining:

- five were all members of the same research team, who met once a week as a group, and had regular one-to-one meetings,
- two were colleagues and friends,
- two had a line manager-employee relationship,
- two were husband and wife,
- three were employees from the same government agency (two of whom with a similar job, but we do not know if they collaborated or knew each other),

- two worked for the same consultancy agency and occasionally collaborated on the same project (one was more senior but did not act as a line manager to the other),
- two occasionally worked on the same projects as part of an engineering team,
- two worked for the same marketing agency (one more senior than the other, but we do not know if they have ever worked together).

In this chapter, to distinguish between the different methods used, we will refer to participants as follows: F1-F5 for focus group participants, I1-I7 for interview only participants, P1-P17 for diary participants with pre- and post-interviews.

6.2.2 Procedure

Pre-study survey (n=29). All participants filled out a pre-study survey, which covered demographic information, details about devices owned, and communication channels used. A copy can be found in Appendix C.2.

Focus group (n=5). We were keen to include a focus group with a small team to uncover group dynamics that might occur through CMC when managing availability. While we understand this may not be representative of other (research) teams, it offers a lens into the diversity of approaches to availability management and considers different levels of seniority. The group regularly met once a week and had regular one-to-one meetings between the team leader and individual members.

The focus group lasted one hour and took place in the group's regular meeting room. Questions included: what are advantages and disadvantages of different communication channels? How aware are you of preferred channels? How did you become aware, and does this knowledge affect how you communicate? How do you infer someone's availability? What are your opinions on people hiding their availability?

At the beginning of the focus group, participants were asked to draw a 'communication tree', where the first layer of branches represented individuals or groups with whom the participants communicated on a regular basis; the second layer of branches sprouted out of each person and indicated the channels used (e.g. email, WhatsApp); finally, the last layer of branches sprouted out of the channels to indicate on which devices those channels were used (Figure 8). The purpose of this activity was to have a visual representation of how participants' communications are split between work and non-work across multiple devices and understand the extent to which their communication practices were spread out.
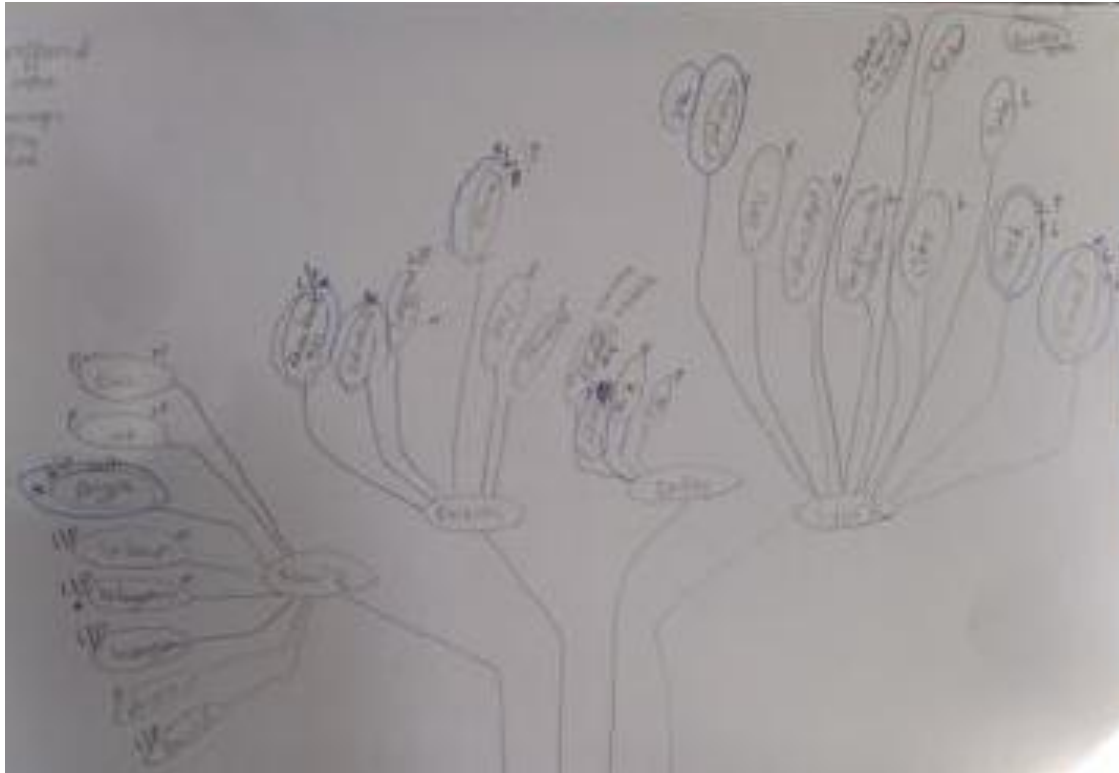
Figure 8 Communication tree of one participant

Semi-structured interviews (n=24). Interviews lasted on average 69 min (min: 35, max: 92), they took place in one of our offices (n=11), in participants' offices (n=7), public spaces (n=4), or participants' homes (n=2). Questions included general settings, perceived differences between channels, practises of manipulating their own availability through deception or other strategies, practices of inferring someone else's availability, and general work-home boundary practices. A full list of questions can be found in Appendix C.3. At the beginning of the interview, participants were also asked to complete the 'communication tree' activity, like in the focus group.

To minimise the risk of misremembering, we asked participants to record situated, contextual examples of how they manage and infer availability through their diary. We could have added data logs of people's communication, but previous research has shown how users are reluctant to have their communication habits tracked (Cecchinato et al., 2016). In addition, the logs would not have been able to capture the nuances of practices. Given these premises, 17 participants from the interviews were invited to take part into a diary study for two weeks.

Diary study (n=17). Starting the day after the interview, participants were asked to diarise every time they were waiting for a reply, they felt compelled to reply, and/or they delayed a reply (see Appendix C.4). These three instances were provided for two reasons: firstly, we wanted to simplify what people had to record and help them identify instances; secondly, we wanted to understand how availability management was affected when the same person was the sender (waiting for a reply), or the receiver (delaying a reply, feeling compelled to reply). We stressed how we were particularly interested in instances that happened on the cross-over between work and non-work and in instances where

participants made use of cues to infer someone's availability or manipulate their own. Participants were asked to use the diary for two weeks, in order to capture weekdays and weekend behaviours and cover a range of both routine and non-routine situations.

Diaries were completed using the OneNote app, which allowed the inclusion of pictures, audio recordings, handwritten notes, and typed text, and could be accessed on both laptops and mobile devices. Daily reminders were sent out. This also allowed the researcher to access the diary entries before the follow-up interview, to ensure all critical questions were asked. Diary study participants were incentivised with a £50 Amazon voucher.

Follow-up interviews (n=16). Following Carter and Mankoff's (Carter & Mankoff, 2005) guidelines, following the diary, we scheduled a follow-up interview within a week from the end of the diary period, based on participants' availability. All participants bar one took part in the follow-up: P13 completed five of the 14 days for the diary study, after which he went on paternity leave and decided not to take part in the follow-up. The purpose of this follow-up interview was to gain more insight into people's diary entries, so the participant walked the researcher through each entry and provided additional details. These interviews lasted on average 45 min (min:14, max: 89) and took place on Skype (n=14) or in person (n=2).

6.2.3 Analysis

All audio recordings (from focus group, interviews, and pre- and post-diary interviews) were transcribed and integrated with written notes, survey answers and, where possible, with diary entries. This resulted in building a comprehensive picture for each participant. For example, the initial survey provided information about channels and devices used by participants. However, if inconsistencies were found during the interviews or diary study, participants were probed further, and the information about each participant was later updated on a spreadsheet.

The whole dataset was analysed through an inductive and deductive thematic analysis using Atlas.ti and Excel. Code categories used included: meaning of (a)synchronous communication, selecting a channel, issues around fragmentation of communication, intrusive channels, variability in response expectations, reactions to awareness cues, misleading behaviours, negotiation of preferences and responsiveness, and desire for separation. After several rounds of iteration and code refinements, we identified the following set of themes: (i) curating communication through CMC channel, (ii) strategies to build awareness, (iii) strategies to manage and negotiate availability, (iv) truthful and misleading use of awareness cues.

6.3 Findings

Between the focus group and the pre- and post-interviews, we collected more than 40 hours of audio recording with participants and 29 communication trees that map out how they used channels and devices for work and personal reasons. We collected 533 diary entries, averaging 31.5 diary entries per participant (min: 11, max: 67) over the course of 14 days. The initial survey uncovered detailed information about participants' use of devices, email, and other communication channels. We discuss details from the survey below distinguishing between ecologies of devices and communication channels, before delving deeper in how participants viewed channels differently, how senders managed their awareness of receivers and their communication, and how receivers managed their availability.

6.3.1 Device ecologies

We found that on average participants had 3.5 devices each (min:2, max:5), between smartphones, tablets, laptops, desktop PCs, and smartwatches. All participants had at least one smartphone and one laptop, of whom two participants (I4, P13) had two smartphones, five participants (F5, I3, I9, P9, P17) had two laptops, and one participant (P13) had three laptops. Six participants owned a smartwatch (F4, I5, I7, P10, P17), three of whom had purchased it, while the remaining had received it as a gift.

Participants used devices differently to create a boundary between work and personal. Although this behaviour is discussed in more detail in the previous chapter where the use of multiple devices is compared, here we provide further evidence as a way of triangulating findings between studies.

Several participants used devices to separate out work and personal domains, such as P17, who had a work laptop and a personal laptop. For example, P10 treated his phone as a personal device, but would occasionally *relax the boundary* to check work emails if he was trying to focus on a task and wanted to avoid being distracted further. Whilst others found that checking email on their phone led them to check other apps too, in this case P10 managed to have more self-control by separating out the devices.

"I view my phone as quite a personal device. Well, one, because I paid for it. And I guess the other... Although, in saying that, I do view work emails on it. So, say if I'm in the middle of, like, editing a Word document on my laptop screen, although I have dual-screen monitors, I will, kind of, usually sometimes check an email on my phone just because sometimes I find it easier. I think it's maybe just because once I open a browser, it's, kind of, very easy to then open up another tab, and then I'm on Facebook, or oh dear, I'm on Reddit, and there goes 30 minutes. With the phone, it's quite easy to be like, right, face down, device pushed away, yes." [P10]

P4 described a similar experience, whereby she used devices differently to separate her work and personal life domains. Although, in her case, she ended up not synching work email on her phone because of technical issues but welcomed this unintentional hurdle as a nudge towards creating more separated boundaries.

"[interviewer: So, you don't have emails on your phone?] *No. In every other company I've worked for, I* [had] *because they were using something really simple like Google Mail, or Hotmail, or something. But we recently moved over to Office 365, which means that there's… I'd have to download a specific app and install, like, what is it? DNS settings and the IP address, and all that stuff. And it's such a, like, massive pain in the bum for me to get my head around that. And then I feel like I don't switch off from work as it is. So then to have my work emails on my phone, I think would just make things… My work/life balance, it would be more disruptive. So, I kind of take a hit on not getting to my emails as quickly as some people would like me to.*" [P4]

6.3.2 Communication Channel Ecologies

On average, participants had 3.4 email accounts each (min:2, max:6). All participants had at least one work email account. Two participants (I8, P16) did not have a strictly personal account, but used the same account for both work and personal reasons. Five participants (including I8, P16) had an account they used for both work and personal reasons. Four participants had an additional account for 'other' purposes (e.g. having secondary personal account, to access services, for volunteer jobs). Separating email accounts is consistent with what was found in Chapter 4.

In terms of other communication channels, participants overall listed 21 different communication channels used, besides email. We found that in addition to email, each participant used on average 6.3 other communication channels (min:3, max:10), including WhatsApp, Facebook messenger, phone calls, Skype, SMS, Slack, and iMessage as the most popular ones. Of these many channels used, each participant had on average 1.57 work-only accounts (min:0, max:17) and 4.76 only-personal accounts (min:0, max:21), while 2.95 were used for both work and personal reasons (min:0, max:18). A small number of channels (n=3; Lync, Good, and Vidyo) were listed across all participants as exclusively work channels. A slightly larger number of channels (n=7; Couple, Discord, Instagram messages, Signal, Snapchat, Telegram, Viber) were used across all participants only for personal reasons, with some for very specific purposes (e.g. Discord is used for gaming; Couple can only be used by two people, generally in a romantic relationship).

The choice of what constituted one's CMC channel ecology was based on several factors which we discuss in this chapter, including participants' own boundary preferences. This meant that for some, it did not matter where communication happened, and they prioritised having easy access to all communication. This is the case for example of P11 who claims, "*in work I do a very good job, I tend to be very available and outside of working hours I do check Slack sometimes, before going to work and before I go to sleep*", and P9, who never thought of using separate apps for work and personal

email, because *"I just figured that it might be easier if they're all in one… […] if there's already an app, then why waste the space?"*. For others instead, it was important to have some sort of separation between work and personal channels to curate their identity and/or to limit interruptions.

6.3.3 CMC channels: how are they different?

The communication trees that participants drew showed an intricate array in which emails and other communication channels - which generally fit under the umbrella term of instant messaging (IM) tools - were used for work and personal reasons across multiple devices. While lots has been written on the use of email, and, albeit less, on IM channels independently, very little research has compared the two, which is somewhat surprising given that both types of channels are used for work and personal reasons. Given the wide range of channels that users can select from to communicate nowadays, it is important to unpack what are the differences between them, before we can move on to understanding how the use of CMC channels supports and challenges boundary management.

Therefore, in this section we will present the main differences that participants perceived between channels and that relate to work-home boundaries. We characterise four of them and discuss each below: formal vs. informal channels, synchronous vs. asynchronous channels, response expectations, and awareness cues. We would like to point out to the reader that there are other differences we identified but that we do not include here (e.g. how different channels are used for personal information management, or the role of privacy in various channels) as they are outside of the scope of the thesis.

6.3.3.1 The formal-informal continuum

We observed how participants assigned each channel a degree of formality, which depended on the relationship with the receiver and the purpose of the communication. Historically, email has been used only for work purposes, and when IM channels came about much later, they were used primarily for personal reasons. As a result, we observed a formality legacy tied to these two channels within our sample, as P13 describes: *"email is quite… you've got to put a lot of effort into, a lot of cognitive effort into it to get the spelling right and all the other, make it more formal and pretty whereas instant messaging is just casual talk between people. I'd use email for more formal things where I want a record of it and stuff like that whereas the instant messaging stuff, no."* [P13].

However, this formality also varied within the different IM channels based on who the receiver was. For example, P6 explained how she saw a difference in formality between SMS, phone calls, and iMessage, and chose one over the other accordingly, depending on whether she was communicating something quick to her team members or her line manager: *"it depends also on how formal the relationship is, but if it's my team, easily I can iMessage, if it's my boss I tend to text less, I'll call, most likely, and then if it doesn't happen then I'll text."* [P6].

6.3.3.2 The synchronous-asynchronous continuum

Another difference between channels lies in their chronemic nature, i.e. the role of time in CMC, which can be summarised as how synchronous a channel is. Understanding whether a channel is considered synchronous or not is important because it has implications for one's availability and response expectations, which may interfere with boundary management.

Although with exceptions, email was generally considered by participants as a more asynchronous channel, *"Email is definitely asynchronous, so it's not expected that you'll respond immediately, yes, even if there are, like, three or four different conversations that have been triggered from that email."* [P9]. Contrarily, IM channels, especially for work purposes, were considered more synchronous, *"with apps like WhatsApp and Messenger, it seems like it is more of a real-time conversation"* [P7], and again, *"Slack is really synchronous, which is good"* [P11]. In fact, all participants agreed that IM channels for work purposes is used for *"a quick response"* [P3] or *"a quick favour"* [I6].

However, the same channel could be viewed differently by different participants in terms of synchronicity, suggesting that personal preference and relationship between sender/receiver have a strong influence on how a channel is considered. Contrarily to P7, P9 considered WhatsApp more peri-synchronous (Tyler & Tang, 2003) (i.e., responses could be occasionally synchronous or asynchronous), *"So is WhatsApp, in a way, but I think it's a bit more forgiving if you come in the conversation late."* [P9]. We found some evidence of this also in the previous chapter where the same channel (e.g. email) was used by a participant in that study (P13) as a synchronous channel that warranted quick replies with some people and as an asynchronous channel with slower replies with others. This was also confirmed by more recent research, which suggests the presence of difference *places* within the same *space* of a communication channel (Nouwens, Griggio, & Mackay, 2017). For personal reasons, a channel's chronemics was not as clearly defined as a binary synchronous/asynchronous status, but depended more on the purpose of the communication, the relationship with the receiver, and how the channel itself was used by a participant.

Treating a channel as synchronous, asynchronous, or peri-synchronous depends on how quickly a receiver believes he or she should reply and the expectation of responsiveness that is assumed by the sender. Thus, chronemics is strongly linked to response expectations, which we discuss in more detail in the next section.

6.3.3.3 Different response expectations

Response expectations depend on several factors. In addition to the inherent response expectations tied to certain channels, other factors included the relationship between the sender and receiver, and the topic and purpose of the message related to its urgency. Certain channels were generally associated with quicker replies. In line with viewing IM channels as more synchronous, overall

participants agreed with the idea that IM channels required a quicker reply than email, as exemplified in the following quotes:

"*Emails at work are slower than Slack, but faster than my personal email. In my personal email I have like 64 now. I check but most of the email is really irrelevant so even if it stays there I don't care. but the work one I prefer to have it to zero. WhatsApp I reply quite quickly normally*" [P11].

"*instant messaging is more read then and reply then, because the effort to do it is a lot less and it's not a whole conversation. It's not, you know, you're not writing an encyclopaedia, it's just one sentence. I think SMSs there is kind of an expectation to reply somewhat quicker on them as well. Some people think quick replies with emails, but I think they don't understand that if required to read an email straight through it and send it back because it's a lot more formal so…*" [P13]

Participants also admitted taking notice of other people's response patterns and observing on which channel people were quicker at replying. This information was particularly relevant for senders when choosing a channel, as P10 described when he decided to contact a colleague on a personal channel (WhatsApp) despite having a work channel (Slack) available: "*Although she's on Slack, it was… Just always seemed to be that on WhatsApp, there's been a more instant response*".

When it comes to prioritising replies, "*everyone's equal,* [but] *some are more equal than others*" as P12 explained. P7 reported in the diary how his neighbour always expected a quick reply so our participant always made an exception to reply to the neighbour on time: "*Text from my neighbour to see if I wanted some bike inner tubes he had spare. Replied straight away as I didn't want to appear rude. Plus, he kind of expects a prompt reply as he always has his phone on him and I feel he expects the same from others.*" [P7, diary]. I2 neatly explained how this applies in the work context: "*work is a status quo. Responding to email, Slack, anything is a status quo. So, you respond to your managers, or peers across different teams, or people who you want something from, bang on. Whereas people who want something from you [laughing] or people at the bottom of the status quo, unfortunately* [have to wait]". Similarly, P12 tried to reply to his boss more quickly than to others, but only if he was free, because "*if I decide I'm busy and I'm working, it doesn't really matter who's contacting me, it's about what they're contacting*".

Urgent communications are an opportunity for boundary cross-over, because they require timely replies (or action), regardless of the other person's availability. P6 reported in her diary how she decided to work during her morning commute, despite considering it her personal time, because of an urgent matter: "*9:30am. Work e-mail from important stakeholder. Even though I was supposed to be at work, I feel commuting is still my personal time. But as I was late and it was an important matter, I decided to reply just in case I forgot or something else came up while in the office*" [P6, diary]. In this case, both the sender and the receiver agreed on the urgency of the communication. However, response expectations and behaviour varied in particular when what the sender considered urgent was not consistent with the receiver's interpretation of the same message. It was

often the case that senders considered a message urgent and wanted to get the receiver's attention (and a quick reply), no matter what the receiver thought. In these situations, we observed how senders would spread their message across multiple channels or accounts, as P7 explained: "*Because they're trying to see how fast they can get a hold of me using one of those* [email addresses]*, and if I've, if I've, if I'm on an e-mail and I have the time, I'll deal with it. Otherwise, I'll just respond when I get back to the one I'm supposed to be responding.* […] *like this morning, I was sitting my desk and there was an e-mail about something that they should've taken care of a couple weeks ago. But now it's urgent, because it has to be done by Wednesday, so they copied all of my e-mail addresses on it.*" [P7].

6.3.3.4 Different awareness cues

Another difference between channels is the type and the amount of awareness cues that they provide. Awareness cues provide users with information regarding when another user was online, if a message has been delivered, and if it has been read. This information can be used to understand when a response might be expected, but also to know whether the other person is available. A rough distinction sees email as having very little awareness cues embedded compared to other forms of communication such as instant messaging.

To know or assume when someone is online via email, there are effectively only three ways: (i) one can see a message come in from that sender and assume it was just sent and not pre-scheduled; (ii) one can request a read receipt and use the response information if sent; or (iii) one can embed a pixel-tracker into their email to know every time a message is read, without the receiver knowing. However, the last two options are not very popular. Read receipts were generally frowned upon by our participants, because they were seen as "*really overbearing, like that's so controlling and demanding*" [P10] and used "*to show that you've read their e-mail, and I'm like, Why in the world? Like this e-mail wasn't even that important*" [P8].

Pixel trackers, like Streak (streak.com, n.d.), are popular in email marketing, but generally require a specialist knowledge to be aware of them. Two of our participants [I5, I6] worked in marketing and had used pixel trackers for their email campaigns: "*it's very helpful to track the success rate, open rate of your emails with clients and especially we often do outreach messages to our sellers and it's good to see who sees the message, how they respond to it, how many times they've opened the messages.*" [I6]. While I5 only used them for this purpose and assumed that no colleague used it internally, I6 used them also for her own emails, to monitor her colleagues' behaviour: "*That's a very good way to track* […] *how quickly the person responds to you if you have some very important information sent over to them.*" [I6]. She assumed her colleagues in the UK were also using pixel trackers, "*so I need to be more cautious when I open things*". In fact, as a result, she has changed her own email behaviour, by avoiding opening work emails when not at work, in case colleagues are tracking her opening rates:

"*obviously when I come to work I open all the emails, however when I'm at home, I sometimes judge by… I don't want others to see that I've opened or that I've seen that email during my off-office times, even though I sometimes do that. It definitely changes my behaviour and I'm more cautious with whom might have seen how many times I've seen that email.*" [I6]

It is important to note that read receipts and pixel trackers need to be both actively selected by the sender, who needs to be aware of them. They are opt-in. Although pixel trackers can be active for any email sent out, the software needs to be downloaded, and initial settings let the user decide whether they want to activate it for every message or ad-hoc.

Awareness cues in IM channels are primarily of three types: (i) knowing when a person is online or was last online; (ii) knowing whether someone is typing; and (iii) knowing whether someone read a message and when. Furthermore, these cues are automatically embedded in the various apps and assume an opt-out behaviour if the user wishes to change the settings. Interestingly, despite participants being really against read receipts for emails, they seemed to be accepting of the same feature for IM channels, *"because it's less obvious and because it's already set up in the settings, I haven't done anything to* [it]" [P7].

Awareness cues from one channel are also used when no cues are available on other channels. For example, taking notice of someone being online on a work IM channel can lead to assume that that person is currently working and therefore should be able to respond to an email that was just sent. As P7 summarises, "*you know when they're on Hangout. So why aren't you responding to me?*" [P7]. This behaviour will be discussed more in detail later in the chapter in section 6.3.6.1.

6.3.3.5 When channels become intrusive

Regardless of all these differences between channels, having access to a plethora of channels also meant additional management effort, because "*it's another thing to think about, isn't it?*" [P7]. The main complaint of having such an array of choice was that participants found it hard to keep up with all the new channels that were emerging, "*Why do I have to start another app? When was it invented?!*" [P16] or again, "*will someone just tell us what they want us to use? Because I'm finding it very tiring trying to catch up and learn how to use something different every six months.*" [P7]. This resulted in fractured communication across different channels, whereby a participant "*might be communicating with the same person in Facebook, in WhatsApp, in Skype and in Viber. All the information gets very fractured*" [I6]. Ultimately, a channel becomes intrusive depending on how it is used, as P17 explains, "*I don't think there's a channel that's inherently intrusive, I think it's down to people's use of it*", which we identified as being in two ways.

First, we found that participants took advantage of this plethora of channels when they wanted to grab the receiver's attention by sending a message on multiple or more public channels, as P3 exemplifies: "*if I need to get hold of someone then I'll just use every channel, apart from social*

[media], available. So, email them, telephone them, text them, Skype them because it must be important for me to get hold of them, otherwise if it's not then I'll just let it fly" [P3]. This behaviour assumes the receiver warrants the same level of importance to the message or the receiver's perspective is not taken into account, leading to potential boundary cross-overs.

Second, channel intrusiveness also related to IM messages being sent in a fragmented manner, for which participants expressed strong negative feelings like P6, "*I hate that*". P4 elegantly explains how a message that could be sent as one is suddenly sent as a series of shorter messages, each with its own disruptive notification: "*SMS, I feel is quite intrusive because of the way that people structure messages. Which is similar to WhatsApp in that they won't just send one message. They'll send, like, five or six tiny ones. Which, like, really annoys me because then it's like, this just constantly. So, I find them intrusive because of the way that the content is structured. And I don't know whether or not that's the people that I'm speaking to over those channels that are doing that, or the channel itself is making people feel like it's okay to structure content like that.*" [P4]. The reason for this behaviour can probably be traced back to the increased availability of mobile data and free-of-charge messaging services, compared to "*15 years ago,* [when] *texts cost 20p. So, if you had something to say, you would do it within, like, one message because it was going to cost you money.*" [P4]. Nonetheless, at least three participants (P15, P16, P17) have been criticized by friends for sending so many messages, which could result in an interruption and a boundary cross-over: "*they were like, 'please try to send just one because when I'm working this causes me problems'*" [P16].

Two of our participants (I1 and P10) who owned a smartwatch, explained how sending multiple lines of text was a particular issue when wearing a smartwatch. In the previous chapter, we saw how participants used the smartwatch to decide whether to engage in a communication and whether to send awareness cues or not. Here, I1 explained how it was difficult for him to make that decision because he could not preview the whole message: "*for a text or messages, you can generally get the gist of it [on the watch preview]. unless someone has sent lots of individual messages and then I'll get the last one, which may be a question mark, and then I have no idea what that means*" [I1].

6.3.3.5.1 IM overloaded

Having more channels at one's disposal meant also more notifications, and more distractions, adding to the information overload knowledge workers often experience. As P4 and P7 describe, it can be an exhausting activity: "*I feel like I'm firefighting a lot of the time with messages coming through all these different channels*" [P4].

There has been a lot of talk about email overload in the past 20 years, especially in the work domain (Bentley et al., 2017; Fisher et al., 2006; Grevet et al., 2014; Whittaker & Sidner, 1996). When IM channels started to be become popular in the office environment, several of them were advertised as a solution to email overload. While the issues of overload remain for the inbox, participants did admit

that IM channels helped reduce the amount of emails, if anything because they now have an alternative channel to exchange those quick bits of information: "*With colleagues,* […] *it's been great since we implemented* [Slack]. *It reduces emails by so much*" [P12].

However, not everyone seemed to agree on the benefits of IM for work, especially if the company does not have clear policies or guidelines around what kind of communication should take place where, and regulations around expected responsiveness. The two examples below show how there is an implicit expectation that participants had to be available and attentive to incoming messages at all time. In the case of I2, Slack was not an official channel the company had chosen, but instead was used within her smaller team ("*if it's cross team communication, it goes through that [official IM channel], if it's in team communication, then it's Slack.*" [I2]): "*instant messaging for work is fucking bad!* […] *I just hate that people expect me to know things that they've said on Slack, because I'm in the meetings, 5 hours back to back meetings and then they send all sorts of shit and they expect to be look*" [I2].

P11 found that to overcome this constant expectation of being online and responsive, she had to sign out of work IM channels not just during non-work time, but also during working hours: "*we* [my boss and I] *were talking about Slack and the fact that it did reduce a lot our email overload but **sometimes you have Slack overload** and I was saying that sometimes when I need to really focus on something I turn off everything for like one hour and then I turn it on again. And he told me that he started to do that, so people Slack him less*" [P11, emphasis our own].

6.3.4 CMC specialisation and relaxed boundaries to reduce boundary cross-overs

Several participants (n=9) had multiple accounts for the same channel, which include: Facebook, Twitter, Slack, and Skype. The main reason for having multiple accounts was to separate work and personal life roles, or as P16 describes it, "*one is public (i.e. I use for work) and the other is private*") (n=6; F4, I3, I5, I6, P13, P16). Other reasons include having legacy or more frivolous accounts (n=3; I2, P4, P13), or to better manage different work roles (n=2; I2, P4). Those who had work and personal accounts for the same channel often made that distinction for multiple channels (e.g. I3 has two Skype accounts and two Slack accounts).

So just like with device specialisation (see Chapter 5), we observed some degree of 'channel and account specialisation', whereby certain channels or accounts were dedicated only to work or personal purposes, and participants made an effort, as part of their boundary management, to keep them separate. For example, I2 chose to use certain channels only with certain people, to separate out work and personal domains and avoid saying the wrong or inappropriate thing: "*you know you open your app and you have this list of people you have last communicated with on the top, and if you are an absent-minded person like me you may send a message to one person not the other just by mistake.* […] *So it's kinda good to have a different app for the family and friends and a different*

app for... just in case you say something stupid" [I2]. Similarly, P16 had two Facebook accounts to reflect her personal and professional personas, and explains how she considers carefully what she posts based on audience and content: "*So it's like my private one. Basically, it's there I can publish whatever I want without caring who's looking at it. Like I don't care about what they think because either they're my friends or either they're people that I don't know that much. So I don't care. But with work stuff, I don't want to publish my private stuff*" [P16].

If a channel became blurred with work and non-work content, rather than creating multiple accounts, another approach was to *relax the boundaries* to allow for exceptions. Boundaries could be relaxed temporarily, such as in the case of P6: "*My boss sent an email apologising for not talking to me regarding a raise before I received my pay check. Because he's on my VIP group [on phone], the first few lines of the email pop-up on the screen and that's why I opened the email. It was a very nice gesture of him to apologise for not following the right process and therefore I felt it justified me replying even if I was already on my 'personal time'*" [P6, diary]. Or, boundaries could be relaxed more permanently. For example, P10 explained how he viewed Facebook as a very personal channel and would never allow work contacts on it. However, he made some exceptions for a colleague who he viewed at the same level and with whom he'd developed a personal relationship, and for his supervisor, who was very understanding of the fact she might be crossing a boundary. The explicit acknowledgment (and thus the implicit understanding that there might be personal content) made it easier for P10 to accept the boundary cross-over and relax his boundaries:

"*I view Facebook as being something that is more personal. And as well, it's the thing where, you know, I've had Facebook since I was 14, and there are… **Although I've curated the drunken photos of me**, you know, holding cans of Foster's, they still are floating around there, and I don't really want a professional environment to, kind of, seep in… You know, I'd like to keep them separate.* […] *And because* [colleague's name – who he's friends with on Facebook] *and I, like, we have known each other for ages, we've done lots of projects together, and **we're the same level, I think that, kind of, has a little bit of a differentiation**. So, I think [supervisor] was friends with [colleague] first, and then requested friendship with me. Although, **she was really good about it. She did go and say, you know, absolutely, if you… Don't worry if you don't want me on there, I completely understand**, and was very genuine about it. And that was an occasion where I felt that if I said, I'd prefer you to not be on my Facebook, it would've been completely fine. So, I really appreciated that, you know, kind of acknowledgement.*" [P10, emphasis our own].

While most examples we gathered in our sample were about keeping work outside of personal domains, or better curating personal channels, the same happened for keeping personal out of work, through company guidelines. In the case of I5 and I6, they were both encouraged by the workplace to not use their personal social media accounts for work purposes, "*I think they told us at the beginning to set up a new work account because there are like hundreds and hundreds of clients* […] *I won't want that mixed*" [I5]. Being part of a marketing team meant they had to reach clients and

customers on several channels, including Facebook, and their company wanted to preserve their employees' privacy.

However, as we saw in Chapter 4, keeping work and personal emails separate can be trickier than just having separate Facebook accounts, especially once multiple accounts are 'leaked' and others get to know about them (see example of P10 in section 4.3.5.2) Therefore, the rest of the chapter will focus on unpacking more in depth how senders and receivers infer and manage availability across multiple channels, not just email.

6.3.5 Choosing a channel to communicate

When initiating a communication, the decision of which channel to use almost always lies in the hands of the sender. This choice may affect whether boundaries are crossed or whether another channel could have been more suitable. For instance, in the following example, as the sender P3 picked a channel to start a conversation but realised too late he should have probably chosen a different one: "*my primary channel is WhatsApp but then if you see something funny on Instagram you'll then send that as a direct message to a group of friends. And then before you know it you're having a conversation on the Instagram chat which would probably easier having had the WhatsApp chat instead*" [P3]. Of course, there are some contextual constraints that may limit the extent of channels one can choose from, for example in work settings. Whereas in personal communication, the choice of the channel is down to the individuals, in work environments this is generally a top-down decision imposed onto employees, as P11 reported: "*when we adopted Slack, some people took longer to switch from email to Slack, at the beginning there was just a mention on Slack. 'Oh, please can you use this channel for communicating?' and then it became more and more abusive, 'Please stop!'*".

6.3.5.1 Sender's assumptions and considerations

When the sender sends a message, he or she often makes a series of assumptions about the receiver. These could be not only regarding response expectations, but also in what context and on what device might the message be read.

We observed several examples of participants picking a channel based on the receiver's context. For instance, this was the case when some channels were more popular in certain countries: "*I've noticed that a lot of [name of home country] friends are using Viber, as opposed to WhatsApp. So, I think it's just the way the markets* [are]" [P9]. Or a sender might take into account what devices are available to the receiver at the time a message would be received, in order to ensure a quicker reply. In the case of P5, she contacted her colleague on Facebook for work purposes because she made some assumptions about what channels could reach the colleague based on what device she had with her: "[she] *had her computer at her desk and I knew she was in a meeting but I couldn't see her*

phone on her desk, so I was presuming that she had her phone in the meeting room. I really wanted to know something, so then I went on Facebook" [P5].

In other instances, the sender chose a channel based on the receiver's preference. Although this decision was sometimes forced by lack of alternatives, "*I don't think* [WhatsApp] *is a good product and I'm surprised people use it. I'm kind of more forced to use it than out of choice.*" [P13], it was also occasionally driven by more altruistic motivations. For example, P14 realised many of his colleagues were introverted and, although walking up to their desk could avoid yet another email in their inbox, he knew they would prefer to not be physically disturbed or interrupted.

"*a lot of people in this type of industry tend to be introverted, and, you know, it comes as second nature to communicate through this [computer] rather than in person, I think, and also, you know, if someone's in the middle of a job that requires their concentration, it's considered rude to interrupt them, and they're going to get interrupted with this* [proprietary IM channel] *thing anyway, but, you know, at least they have a choice to ignore it until later, put it on their list of things to do.*" [P14]

While assumptions and decisions can be driven by selfish motives such as wanting a quicker reply, they can also depend on wanting to respect the other person's boundaries and thus minimize the work-home disruption on the receiver's end. In one example, it was actually features embedded in the channel that helped our participant stop and think about the other person's boundary preferences: "*with Slack, if I saw that they had the Zs next to their name, even if they were online, I wouldn't force the notification through. Because I would think of that as a personal choice. That they may be online, but they may not want to engage in a conversation.* […] *Slack makes you think about it, and makes you think, do I actually really need to talk to this person right at this second? Whereas the others* [channels] *don't have that little barrier to get through*" [P4]. Slack allows users to 'force' a notification through even if the other person has set 'do not disturb' notifications, in order to allow really urgent messages to get delivered. By inserting a pop-up message that asks for confirmation, the user is nudged into rethinking their action. A similar feature is implemented if a message is being sent to a channel whose members are across different time zones (**Figure 9**).
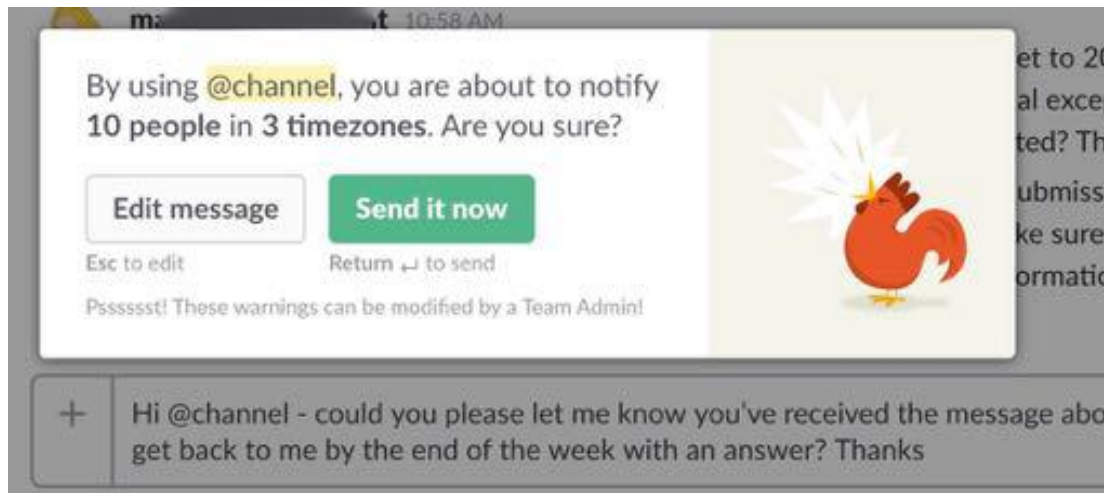
Figure 9 Example of a microboundary strategy that introduces friction and is designed into the interaction of Slack

In another example, I6 would only initiate a conversation with colleagues in the US once their status on Slack turned 'green' (i.e., online): "*with the US team, yes checking Slack if it's early in the morning… our 5pm is their 9am so they don't come to work until 9.30 -10, so Slack will tell me if they are already online and I can start disturbing them*" [I6]. Similarly, P11 reported using two different strategies to respect others' boundaries and avoid interrupting them about work when they were not working. In one case, she set a reminder for herself to postpone the communication to a later date: "*I need to ask something to a colleague, but he is off today. I also know that he is quite overwhelmed all the time so don't want to email him. Instead, I put this as a task on my to-do list (Wunderlist) and I will action it next week when he is in the office*" [P11, diary]. In another case, after accidentally disturbing a colleague on their day off, she changed channel and decided to go for email instead of Slack because a) it was associated with slower responses and b) it would allow to retrieve the message more easily.

"*I get an urgent question from a client. The person that I should ask only works a few days a week but I completely forget that she doesn't work today. So, I post the question on Slack (in a channel) and she replies to it but she also mention that she would have actioned it the day after, when she was in the office. **I feel bad for having disturbed her on her day off**, so when I get the further details from the client I email her instead of slacking her, specifying that it's not urgent. I still email her today because I'm afraid that otherwise I will forget it myself.*" [P11, diary, emphasis our own].

The assumptions and considerations that a sender makes when choosing a channel also depend on awareness cues, which serve the double function of letting the sender know what the receiver is up to there and then (e.g., are they online on a work channel and therefore likely to be working?), as well as creating an awareness of what will happen to their message (e.g. has been read?). In the next section, we will delve deep into how a sender develops an awareness around their messages and the receiver, by inferring their availability.

6.3.6 Awareness management: the sender's perspective

Awareness cues have been shown to be used by people to understand whether someone is available to communicate (Oulasvirta et al., 2007). So, when we talk about *awareness management* – or developing an awareness – we are referring to all the actions that a sender takes before and after a communication is initiated to infer the receiver's availability. We distinguish this from *availability management*, which we refer to the receiver's strategies to manage their own availability before and after a communication is initiated, and that we will discuss in section 6.3.7. Whilst earlier in the chapter in section 6.3.3.4 we focused primarily on *what* types of awareness cues are available across different channels, here we focus on *why, when,* and *how* they are used.

6.3.6.1 Why and when do senders rely on awareness cues?

Within our sample, we identified four main reasons why the sender would like to know whether the receiver is available (be that for a conversation, for work, or for non-work). These were the following:

- To decide whether to send a message in the first place,

"if they're not green then I'll wait for them to appear online rather than send them a message because I know they're not at their desk or they may miss the message. So, if they're away and are offline, unavailable I won't message them" [P3].

- To know how quickly they can expect a reply,

"Yes, I think it's good to know like when someone's online; like if I'm going to message someone on it, then it's nice to know whether they're there or not. So, you almost kind of anticipate whether they're going to respond sooner or later" [P2].

- To choose to send the message on a different channel instead.

"if someone is not available on Slack, I'd better send an email so it would be registered somewhere" [I6].

"It's [the iOS feature 'Find my Friends'] *actually quite good. When I call my parents I always just check where are they, and if the 'dot' is at home, I know I'll call them on FaceTime. If the 'dot' isn't at home, then I'll phone them on their mobile number because they would be more likely to pick up their phone because they're driving. And then depending in certain places I know 'oh they're not going to pick up their phone'. So, I use that as a way to see if they are available or not."* [P15].

- To influence their own current activity, unrelated to communication,

"all of the PhD students are friends on Facebook so we know who is where. So because we organize a birthday surprise for every student [by decorating their desk], there was time when we were not sure whether one girl is in the town or not and we were not sure whether we should decorate her desk because whether she'll come or not. So that was a time when we were checking her availability on Facebook, whether she was here in the city or not. […] we were [reading] *through comments trying to reveal where was she"* [P1].

Although relying on awareness cues happened on almost a daily basis (based on diary entries), overall there were two particular instances when doing so was more relevant: when related to time-sensitive information, or when related to certain people, as the following to quotes exemplify.

"I texted via WhatsApp to my partner to agree on a meeting point and I waited about 30minutes for the answer. I didn't have a way to check if she received the message as the "last seen" feature of my WhatsApp was disabled, but in this case, it would have been useful." [P16, diary].

"my best friend, who has that ['last seen' feature] *turned off, so that's really annoying, I was 'please turn it on!' (laughing) but sometimes just when I'm bored and I want to see if she's online probably, and then I can't see"* [I5].

6.3.6.1.1 How do senders make use of awareness cues?

There are several cues that can be used to gain awareness of someone's availability or current state. Unlike previous research, which focused on how individual cues were used and interpreted (e.g. (O'Hara et al., 2014)), suggesting that one is generally enough to gain useful information, we asked participants to describe how they inferred the receiver's availability, covering any tool or strategy. What we found is that our participants often made use of a patchwork of cues to infer the online status (i.e. whether they were at any of their devices) or the "*life status*" (P17) (i.e. the general whereabouts for that hour, day, or week) of the receiver.

Patchwork detective activity

When analysing our data, it became apparent that participants did not rely just on one cue at a time to infer availability and behave accordingly, but they used a combination of them. For example, I6 combined Slack and Calendar information to infer her manager's availability before interrupting him. She did this to respect his work-work boundaries and desire to have focused time, as well as avoiding imposing by just turning up to his desk:

"One of the things I often do with my manger is to check his availability. First of all, it's easier to go over and speak to him face to face. However, he sometimes hides in the office upstairs so that nobody can disturb him, so if I see quite an important issue that I would like to discuss with him, I will first check his Slack availability. If he's online then I will check his calendar, if he doesn't have a meeting, I'll Slack him asking whether I could come over and discuss something with him." [I6].

Some participants were more aware of this *patchwork detective behaviour*, whereas others viewed the same behaviour as an embedded part of their daily life. The two quotes that follow nicely exemplify how, when waiting for a reply, on one side F4 intentionally checked different channels to see whether someone was currently online, whereas on the other side P3 took notice of someone's activity on different channels to infer their current state as they went about their daily life.

"*Where can I hunt them down? That's normally what it is about!* […] *So, I do go on Slack and if there will be no green dot for you* [points at other focus group member] *and then I go on Skype and I see "online", I go "oh hello!"* [laughing] *so **I do that kinda hunting around like 'are you online somewhere?*"** [F4, emphasis our own].

"***I don't think I'd hunt someone down***. *The most I'd do is like* [check for] *read receipt and see if they're online on WhatsApp or whatever* [channel] *it is. Then maybe throughout the day as I'm browsing social media like Instagram or Facebook and if I see a post up, like, I don't know, if they're on holiday, they're travelling, then I'll put the two and two together and be, like, okay, right, they're busy so that's why they couldn't get back to me.*" [P3].

The difference between the two examples is the purpose of search and the moment of search: in one case F4 wanted to have a conversation there-and-then and before she initiated it, she *hunted down* the receiver; in the other case, P3 was just taking a mental note of what his contacts might be up to as an explanation of why he had not yet received a reply, after the message has already been sent.

Depending on the sender's needs, different cues were used in different patchwork combinations, and not all were necessarily digital cues. P17 reports in his diary how he combines Skype status, calendar information, and physical 'hunting down' to infer one's availability and influence his behaviour. In both cases, he used this patchwork strategy because he needed information there-and-then:

"*…trying to find which room I was supposed to be in! **I used a lot of looking at people's calendars, their Skype availability, and even looking around the building to try to "infer their availability"**. Eventually problem was fixed with a phone call, from a number that I got from waiting for a reply on Skype for Business.*" [P17, diary, emphasis our own].

"*Sent a request yesterday to get Adobe Creative Cloud licence so that I could finish [a project]. Still hadn't received a reply, so went to see somebody in person. That person had passed it on to somebody else, who was in a meeting. **2 hours later, still nothing, so I checked that person's calendar to find when they'd finish their meeting, gave them 10 minutes and then went to their office to ask again, in person.** They hate me, but within the hour I got my license sorted.*" [P17, diary, emphasis our own]

Similarly to P3, P5 used a patchwork strategy to take a mental note of when she might be getting a reply. Specifically, she created an ad-hoc awareness cue for her and her friend using an emoji to

signify important messages that needed an urgent response. However, despite this creative workaround to provide additional meaning to instant messaging, she still had to rely on other cues to infer her friend's availability:

"*I have a friend who is terrible at answering messages so I told her that **If I start the message with unicorn emoji it's a code that it's important and she should really try to answer as fast as she can**. I had a terrible day at work and wanted someone to cheer me up. **She didn't answer back and I check all social media channels frequently if she has been online at all**. Nothing the whole day – later I went to have drinks and forgot about it. She answered at 10 at night.*" [P5, diary, emphasis our own].

What we start to see is a tendency of using different forms of awareness cues – not all necessarily intended as such (e.g. seeing if someone has posted on Facebook) in two ways: one, as a way of detecting the receiver's just-in-time online status generally linked to need or wanting a reply as quickly as possible, and the other one to detect what P17 called the receiver's "life status", i.e. the general whereabouts of someone in a slightly longer term (for the next hour, day, or week) as a way of making a more educated assumption. We discuss both in more detail below.

Awareness cues to infer one's just-in-time online status

In our sample, when the sender tried to infer the receiver's online status, they were generally after the there-and-then availability of the other person. Checking for this online status relied in most cases on more traditional awareness cues, ones that have been designed as such (e.g. read receipts, online status, etc.). Arranging the interviews for this study and finding each other in a public location proved to be an interesting opportunity to see awareness cues in action as a way of detecting my there-and-then availability and whereabouts.

"*The whole WhatsApp as well, it's about awareness, right? I sent you a text on WhatsApp* [telling me, the author of this thesis, "I'm here"]*, part of the reason I did that is I wanted to see, not so much that you had seen it, but 'what if she's still on the tube?' and **if you'd had one tick than I would have thought 'oh she's still on her way'**, or that's how I would make up the story in my head. And then it was like **'ok, not only have you got it, but you've seen it so you must be around here somewhere'**"* [I9]

To know whether the message became received and then read, I9 had to actively monitor the app to see the message status change. This behaviour was common also for non-time sensitive information in other participants, such as P6, who was eager to have a reply from her sister, despite not being an urgent matter:

"*I had asked a question to my sister (if she could still remember the pin code of a bank card of mine that she used to use) and even though it was not urgent I was not entirely at ease not knowing whether she could remember it or not (because I was also not sure of what the pin was). **I checked***

WhatsApp to see if she had read the message yet." [P6].

In the follow-up interview, she explained how her sister did not have 'Last seen online at...'' setting enabled on her WhatsApp, so our participant had to manually keep checking in the app whether her sister appeared online or not[1].

In another example, I9 was trying to find people to attend a last-minute focus group in her company, and relied on people's status on Lync to decide whether to contact them. In this case, not only was she trying to infer their status and availability of being in work or not, but she was also leveraging on the fact that she did not have to ask their permission.

"…so if someone hasn't signed in [to Lync] *for a few days I'm kinda assuming they're on holiday or they don't sign in very much. So, I kinda use that as a proxy for maybe I shouldn't prioritise that person because they might not be around. Whereas if someone is available or away, then at least they are working, whether at home or not I don't know, but they are more likely to be in and attend a focus group.* **This is where it has got stalkerish because I'm using that information to sort of track people without...** *and then I will contact them and invite them. But I guess* **they probably don't know that I've done that little bit of detective work**." [I9, emphasis our own]

By monitoring the online status, the sender can make more educated assumptions about the receiver and the fate of their message. We have seen in the previous section 6.3.5.1 what assumptions the sender makes, and here we provide further exemplification of how awareness cues shape these assumptions. In the case of P12, he explained how the assumptions he made varied based on whether the message was sent, received, or seen:

"So with my wife, it'd be good to know that she has seen it, but then if I was to ask a question like that, she… If I've seen that she's read it and she's seen it, hasn't responded, I'll assume she's busy. And if she didn't respond at all, I'd assume it's a no, or she hasn't. Because if she was going to do it, she would have responded and say, yes, sure, to confirm or verify that. So unless I get that confirmation, I'd assume that she hasn't seen it yet. [...] *It does give a good indication as to whether now would be a good time to give her a call or speak, if I see if she's been online recently or if she's*

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[1] As of Spring 2014, in WhatsApp, the setting "Last seen" can be disabled, but if a user has the app in the foreground, the app will show them as "online" or "typing", even if "last seen" is disabled.

online at the moment, it's just an indication. But if I do need to speak to her about something, then would be a good time to potentially give her a call." [P12].

Contextual cues to infer one's "life status"

In addition to keeping a close eye on awareness cues to have just-in-time information, participants picked up information about their receiver from other sources, which are not necessarily designed as or considered awareness cues. These are for example calendar entries, location-aware apps (e.g. Find my Friends (Apple Support)), any form of activity on social media (e.g. liking a post, commenting, posting, changing a profile picture, etc.), or taking notice of the time an email is sent out. We saw that participants were attentive to others' behaviours and took mental note of their habits and activities, which could become useful information in a later moment. It was through these 'life status' cues that participants became more aware of boundary management and practices in others.

"*I've sometimes tried to infer my girlfriend's **life status** by checking channels that she's been on just to make sure that she's alive if she hasn't responded to me.* […] [Similarly] *I would keep an eye on people's status on a Friday afternoon, sometimes,* […] *on Skype for Business, to see when people went to 'Away', and quite often people go 'Away' rather than 'Busy' or 'Online' when they've gone home. So there have been occasions when I've been, like, having a slow day* […] *and I want to go home* […] *if other people have left – people who might notice if I'm there or not, it doesn't necessarily mean hierarchically better than me, but people I'm working with – if they've gone home then, or I've inferred this from Skype, I might be inclined to do the same.*" [P17].

Similarly, F1 combined information from the real world (taking notice of who is physically in the office and when) to online cues (when people are online on Slack) and tailored their understanding of when each co-worker was likely to be working and from where. During the focus group, other participants confirmed F1's interpretation:

"*I do find the availability on Slack useful. I look at the sort of dashboard of who's in, it gives me a sense of…* […] *I know when there is green light and that means somebody is in. I seem to have built up these rules based on how often I know people are in the office, when they are there [in the office], how often they are 'green' when they are not here* [in the office]. *I use it as a quick gauge.*" [F1].

Being able to gauge this type of information, and using it appropriately, can be valuable, not only when acting selfishly, but also when trying to respect others' boundaries. For example, P1 reported in her diary how she would delay sending a message to make sure it arrived during working hours for the receiver, keeping in mind the receiver's time zone and general working practices:

"*Delaying the email bcoz he will be back to his office on Monday (works 3 days a week). Will send the email on Monday morning so that my email is on top of his inbox.*" [P1, diary].

6.3.7 Availability management: the receiver's perspective

Availability management refers to all the strategies and behaviours that the receiver puts in place to manage their own availability before and after a communication is initiated. This can also be a way of confronting, explicitly or implicitly, any boundary transgressor that challenges them and requires their availability.

As we have seen in the previous section (see 6.3.6), the sender is constantly trying to infer the receiver's availability through various forms of cues. Of course, the same person who fills the role of sender, in another situation will fill the role of the receiver and thus potentially be the target of those patchwork detective strategies. However, receivers also made assumptions about senders. For example, just taking notice of the time a message was sent could be used to make assumptions about their working patterns and infer one's availability: "[interviewer: what happens if you receive a work email late at night?] *I infer many things. Either* [they're] *workaholics, or anxious, or want to be perceived by other people as hard workers. I judge them badly and everyone judges them*" [I2]. I2 explained how she made a point not to send emails past a certain hour, to respect others' boundaries but also to set expectations about herself: "*I don't want them to know I work that late. Recently I've been sending emails up to 10pm. I've done 11 as well. And given that people know now you can be on your phone, maybe they think 'oh I've been commuting and I'll just do this one email'. But generally, I don't like people to think that I'm working late. It doesn't infer a good image. I don't want people to expect that* [I work late]" [I2].

By being both senders and receivers, participants were aware that they needed to regain some degree of control over what the other person could infer about their own availability. To do so, participants admitted hiding their availability and pretending not to be online or having seen a message. For example, P4 had read the message of an old friend on Facebook Messenger and despite intending to reply, she never got around to doing it. As a result, to avoid being seen as ignoring him, she decided to avoid Facebook all together so to not appear online:

"*7:39am I feel I should reply as he knows I've read the message, but I don't have much to say! 19:22 He messaged again so I thought I better say something… 22:28 Feels too late to reply to message. Avoiding FB so the message remains unread*." [P4, diary]

The examples above hint at how participant act differently depending whether they are senders or receivers. Having presented the sender's perspective in section 6.3.6, we now move to the receiver's perspective. In this section, we present examples of how participants managed their availability. First, we report on general boundary management strategies that participants put in place to reduce work to non-work interruptions and non-work to work interruptions. Then, we move on to examining their specific strategies around communication channels and availability and how they have implications for the sender. We have broadly categorised their strategies as explicit or implicit, and as preparatory, if they are used *before* a communication takes place to prevent any

transgressions/cross-overs, or opportunistic, if they are used as damage-control *after* a communication has started. Of note, none of these are mutually exclusive.

6.3.7.1 Managing interruptions

With flexible working practices, managing work-home boundaries can be challenging. For example, P4 and P7 both worked for the same company which allowed very flexible working practices. P7 worked Monday to Thursday but did not communicate this to his line manager (only to human-resources), yet he still kept an eye on work communication on Fridays, as well as he sent emails and occasionally had meetings. P4 explained how this flexibility meant that she was never quite sure when others were working, as there always seemed to be someone working at any given time "*that is really nice to have that flexibility and not be stuck in the office between 9:00am and 5:00pm. But that then does kind of contribute towards this culture of, some people are working at 11:00pm at night, and some people are working at 6:00am in the morning. So, there's no consistency in when emails are coming in, or when people are Slacking each other, or anything like that. So, I think it has its upsides and its downsides*" [P4].

This misalignment of working hours can cause boundary cross-overs and unwanted interruptions. In line with previous work on boundary management (Cousins & Robey, 2015; Kreiner et al., 2009) and some of our findings in Chapters 4 and 5, we observed in this sample how participants managed their boundaries through psychological, temporal, or physical boundaries.

6.3.7.1.1 Work interrupting Non-Work

Two participants (P8 and P5), found that they needed to set very strict psychological boundaries as a result of transgressors in the past. P8's old managers from three different jobs all had expectations of being constantly available, to the point that P8 felt she was not in control. With her current job, she made more of an effort to set strict rules around when she works and communicate them clearly to her current manager:

"*I think, for her [current manager] to, for her to text me on my day off isn't, for her, that wouldn't be a huge deal. But for me, it is a bit of a bigger deal, and the thing is it's not* [her – current manager]. *It's my past work life, and it's the fact that I've had bosses who crossed the line and I've had, I had a boss who would e-mail me on my BlackBerry at 11 o'clock at night on a Sunday night and would expect me to respond within the next half hour. And I would be asleep by then, and there was no way I was going to be responding to her. And she would be irate the next day, so you know, for me, it, my aversion to having my work and my life overlap, my work life and my home life, is based on, you know, stuff that is not* [current manager's] *fault at all.* [Interviewer: So as a result of that, you decided, I want to have more strict…] *Completely, yes. And my last, the two jobs I had right before I went back to school for my master's degree, both bosses were incapable of following, of committing to boundaries, and both of them would just cross lines and expect things that were, you know, outside*

*of normal working hours and all that stuff. I just don't, I don't do that anymore, and I'm not going to do that again. I won't, **I won't let that kind of happen in my work life again**.*" [P8].

I6 instead created manual temporal microboundaries in her channels, by either logging out, or by turning off data to block any incoming messages. She had very strict temporal boundaries around use of channels and was very explicit about it at work: "*emails are more work related when I just don't want anyone to disturb me or I don't want to see what work comes in, normally off work hours. For weekends, I try to block more the incoming messages, especially work related. For personal reasons, logging out of Skype and other Facebook would help.* [Interviewer: when do you turn data off?] *That happens if for example I'm at a party and I don't want to think about anything at all* [outside of working hours]" [I6]. Turning data off was something that we saw in at least another participant in this study (P1). We have highlighted similar strategies developed by participants across devices and channels in the previous chapters (see sections 4.3.4.5 and 5.4.2.3).

6.3.7.1.2 Non-Work interrupting Work

Interruptions can be bidirectional and indeed non-work interrupting work, albeit less frequent, can have negative effects on one's productivity. We found participants created similar rules and strategies to work interrupting non-work.

For example, P4 felt she was already distracted at work, switching between emails, Slack, and Twitter (which she used for work communications), that she wanted to avoid being interrupted by personal communication. Therefore, she relied on device microboundaries making sure her personal communications would appear only on her phone, which she could more easily ignore: "*I think it's my way of dealing with feeling bombarded by so many other things going on. That I don't want to feel compelled to change channel, or to start using something that I hadn't anticipated that I would, kind of in the morning. And especially when I'm at work, I have my emails open, both Slack channel teams open, Twitter open. So it's already quite a lot of incoming stuff. So then I've got my phone going off with WhatsApp and, like, SMS and stuff like that.*" [P4].

In another example, P2 was very strict with herself about her boundaries and set clear temporal boundaries when work and non-work communication could happen: "*And I try not to check* […] *my personal email during the work day, I really try, unless it's on my phone, but it's really hard.* […] *it happens probably more than I want it to*" [P2]. Similarly, I5 had similar temporal boundaries and even made a point of separating devices to help remind her whether she should be working or not: "*During work, I sometimes respond to WhatsApp messages but I don't want to be there all the time because it just takes so much time and then you start taking to someone and I kinda need to separate that to an extent. And when I'm at home, unless I really need to do something on the laptop and I need to search for something, I try not to use the laptop because I'm just using it all day, so I'm kinda sick of it that's why I only use* [WhatsApp] *on the phone.*" [I5].

6.3.7.1.3 Work interrupting Work

When co-located with their colleagues, our participants came up with creative strategies to manage interruptions. We report them here because of how they emphasise users' resourcefulness, as well as their need to be focused and productive during work time so that presumably they do not have to over-work.

At least three participants (P8, P15, I6) reported how either they or someone they knew worked from a different office occasionally "*because you know that people won't actually bother you there*" [P15]. Alternative strategies included wearing big headphones or more creative solutions such as putting a physical object on the desk to signify focussed work: "*We used to have a thing...* […] *if they were working at their computer and they didn't want to be disturbed, they would put a little flag on their computer. [interviewer: a physical flag?] Yes* […] *so that people wouldn't come up to them*" [P14].

6.3.7.2 Explicit Management

By explicit management we mean one where the user explicitly communicates his or her availability to the other party by telling them in person, or clearly stating it in a message. Although prompted to report explicit instances in our questions and when instructed to fill out the diary, participants infrequently reported being explicit with other people about their availability.

6.3.7.2.1 Explicit preparatory strategies

Of the explicit strategies, preparatory ones were more common than opportunistic ones. This often included tailored email signatures, setting calendar events, or out of office messages, which state when the user will be back or available. We have classified out of office messages as preparatory because, although the other party receives this information only after they sent a message (or at the point of writing the message in some cases), the user has to plan the message and set temporal constraints to when it gets sent out and for how long – both of these elements help set expectations of availability a priori. Some participants were also just vocal about their availability when talking to co-workers, friends, and family.

For example, P2 works in an international company and manages teams in different time zones and has explicitly set expectations about her work availability "***I just said***, *I work UK hours*":

"*So, I will answer my emails up until maybe like 7:30pm, but anything, unless it's just checking just to see what's going on, I really try not to respond.* […] *when I was in Asia, it was very different because it was a 12-hour time difference between New York and Singapore,* […] *But I've moved here permanently, so I made that really clear. Like unless it's a project that I'm working on, or like something that has to get done, I tend to not be available US hours during, yes, during UK time.*" [P2].

While in the case of P2, she was managing her general availability, explicitly telling colleagues about one's availability was also used for more ad-hoc situations, such as in the case of P15 who stated he would be ignoring all IM messages on a particular day:

"*Today I was out of the office and yesterday **I stated** that I will not be looking at anything work-related on Slack. So, I ignored the team chat, internal team chat and most things work-related in which I was tagged. I did however 'live-Slack' from this event and share it in the announcements and general channel - I did respond there to a few @reply-s.*" [P15, diary].

Other examples included setting calendar events, email signatures and out-of-office messages, such as what P8 and P17 did. They both have two part-time jobs and found the need to more clearly manage expectations and to avoid feeling overwhelmed set strict boundaries for both themselves and others. They both found that just telling people was not enough and had to take additional measures. P17 has added calendar events,

"*So I recently, with starting back at* [workplace 2] *I'm only working two days a week and I want to communicate to people that I only work two days a week, so one way I've done this is **actually telling people** that I'm only working two days a week and it's a Monday and a Tuesday, but another way is **putting all-day events that are out of office on Wednesday, Thursday and Friday**, let's say my normal working is a Monday and Tuesday.*" [P17].

While P8 set an out-of-office message which she updated periodically, as her working days changed often:

"***I have an out-of-office*** *that says, This week I'm in on Tuesday and Friday. Next week I'm in on Wednesday and Friday. And I try to do it two weeks out every week, so that people, you know, they'll know that these are days I'm in this week and these are days I'm in next week, just so they can kind of plan ahead if they need me.*" [P8].

6.3.7.2.2 Explicit opportunistic strategies

Contrary to what Kreiner et al. (Kreiner et al., 2009) found, where their participants would commonly confront anyone who crossed-over boundaries, we did not find many examples of this happening explicitly in our sample. The only example came from P8, who had two roles in the same workplace, each linked to a different email address and both accessible from anyone in the company. She found it difficult to convince people they do not need to email her on each one because she viewed them as separate projects, each with their allocated time, and asked the transgressors to not do it:

"*I try not to use my personal e-mail for anything that's work-related, so I really try to get people to use those other e-mail addresses.* [Interviewer: how do you do that?] *It's, it's tough. I will tell you. I mean, like* [my manager] *in the beginning, I was using my Gmail [personal] because I didn't have a [work account] yet and there were, there was probably a month where she kept copying my Gmail in and, you know, there's…   And it's the same way with this* [project1] *project as well, is they will always use*

all three of the e-mail addresses that they know that I have. […] *I've asked them not to use my* [project2] *work e-mail address because [...] for me, that's just, you know, I can't be sitting at my* [project2] *job and get an e-mail about this other* [project1] *job and think that… You know, I don't want them to think that I'm going to be able to respond that. So, but because they work at* [same workplace]*, that's a little tricky too, because if they go into our e-mail system, they can see me as* [role1] *and as a* [role2] *member and they can pull both those e-mails up.*" [P8].

However, explicit strategies are not always easy, especially if a power relationship is involved. This was the case of one participant who was honest enough to admit she did not have the courage to confront a more senior co-worker about sending work messages to a personal channel:

"[Interviewer: Have you had a conversation with them?] *I haven't really had this courage. I really wanted to have it and I couldn't*." [P1].

6.3.7.3 Implicit Management

Implicit management of one's availability was far more common in our sample. These often intentionally deceptive strategies include people relying on features built in the technology by moderating how they used awareness cues or delaying responses as a way of setting expectations. It is important to note that implicit management has more to do with one's own settings and rules, which obviously affect the other party too, but the user does not necessarily feel compelled to justify or expose their behaviour. As P8 described them, "*there's definitely a lot of those sneaky ways of kind of workarounds*". Moreover, implicit management includes setting what we define as 'perceived boundaries', whereby a user might keep an eye on work related communication during non-work time and vice versa but decided not to take action as a way of managing expectations, setting precedents, and controlling what the other person can infer.

6.3.7.3.1 Implicit preparatory strategies

Implicit preparatory strategies have to do primarily with how a device is set up, or how the user customises notifications and settings for a channel, in order for them to moderate when they can get interrupted and thus choose to become available for a domain. P10 explains how his smartwatch is used to reduce work interruptions, confirming findings that were presented in Chapter 5:

"*I don't want email on my wrist. I'm already finding the WhatsApp-ness a bit irritating. But yes, I think email because, you know, symptom of professional work nowadays, you get so many emails, so I don't really want all of them popping up on my wrist, particularly as well, I don't have any way of curating them when they get on my wrist*." [P10].

P9 and P12 instead discussed how they relied on built-in features such as read receipts and online status signals to implicitly communicate their availability to others, by controlling to some degree what other people could infer about them:

*"**On iMessage, I've turned mine [read receipts] off, but I see if whoever I'm interacting with has theirs turned on**. It sends me a read receipt. [interviewer: what prompted you to turn it off in iMessage?] Because **the majority of the time, I won't respond at the same time that I read it, so I don't want them to think that, you know, what's wrong with her? You get my message, and you don't read**. And then I sometimes forget for days, so I just don't want it to be a bit awkward"* [P9, emphasis our own]

*"talking about Slack actually, there's times when I'll push it [my status] to away, because you can turn yourself offline. But, again, during working hours, I don't tend to do that, because I need to be contactable. But on a weekend or whatever, sometimes I'll leave Slack on, and that mean it has the green bubble people can see I'm online, which means I… Usually other directors may write messages and then expect me to respond. So, whenever I remember, I just turn it to away, I might still be using the laptop and stuff, but **I don't want people to think I'm… I've got any kind of availability. As far as they're concerned, I'm not around**, because, again, it's about work/life balance. I don't want to show myself as always being available."* [P12, emphasis our own].

Some of the implicit preparatory strategies were cognitive rules that participants set for themselves around when they wanted to be available to others for certain domains. In a couple of instances, these rules came as a result of past transgressors that made participants reflect on what they valued and how they wanted to prioritise time. This was the case of P8 and P5.

*"So I used to **not feel in control** at all because I would always say yes to everything and I was, like, yes, I'm going to work later, yes, I'm going to do that, and then a few other people realise that and they take advantage of it, and now I'm just strictly not doing it anymore, which means, like, not answering emails, unless it's really important and the project is actually really important to me, I wouldn't do it. I'm more selfish now. [interviewer: Was there something in particular that prompted you to do that?] I think,… so I've been working with them for two years and it's my first job after university, and I think I was a bit insecure at first and **I thought I'd have to go the extra mile because I was, like, oh, my god, I have this job, am I good enough, I need to prove myself**, and now I know that I don't have to do this, **it's only a job, like, your life is way more important, like, you should have fun, you shouldn't just work all the time, and now it's less important. It's just, my priorities have just changed, I guess**."* [P5, emphasis our own]

6.3.7.3.2 Implicit opportunistic strategies

Implicit opportunistic strategies were put in place as a result of receiving a message and not wanting to be available for it at the time. We found several examples in this category that were not strictly about work-home boundary cross-over. However, we have included them here because they help exemplify how managing communication is not just about work-home boundaries, and it is indeed far more nuanced.

Most instances of implicit opportunistic strategies were reported in the diary entries and had to do with delaying a response mainly for three reasons: (i) because the participants were not physically located in the related domain (e.g. being, or not being, in the office), (ii) because it was not during certain temporal boundaries (e.g. work time), or (iii) because they were trying to control social implications (e.g. not wanting to offend someone).

P12 decided to ignore a work message because he received it during his non-working time. What is interesting here is that these opportunistic strategies imply the participant was still keeping an eye on work messages despite his non-work day. In the eyes of the sender, P12 had not necessarily seen a message.

"*I had taken the day off but my boss wanted me to do something work related. I ignored the message as it wasn't urgent and I didn't want to get into the habit of work not respecting my time off. I waited until I was back in the office to respond to all work-related messages*" [P12, diary].

P11 had a similar experience, related to work interrupting other work. Unlike the example above, where P12 did not have to do anything to ensure the email sender was unaware of him reading the message, in this case P11 decided to log out of Slack to avoid being perceived as having read the message and ignored it.

"*One of our clients is on Slack and he messaged me again. Since I am about to go into a meeting I don't want to see if he replies straight away to my answer or my attention will be caught by it straight away and I won't be able to leave it (I will feel like I've got to reply straight away). So I go offline for two reasons: 1. To avoid getting distracted by it 2. To show him I am offline so hopefully he won't search for me*" [P11, diary].

She applied this same behaviour in her personal life, avoiding WhatsApp altogether when she did not want to reply to a message.

"*I am very tired because I was at my office hackathon this week-end. My mum sends me a WhatsApp message and I don't open it straight away so she doesn't see the double blue tick sign. However, after a while I forget about it and I open WhatsApp so then I do answer her because otherwise she gets offended if she sees that I read the message but not answered*" [P11, diary].

As mentioned earlier, these strategies are not mutually exclusive. We also found evidence of participants using implicit opportunistic strategies to overwrite transgressors' cross-overs. For example, P17 wanted to keep his personal email free of work related messages. As an implicit preparatory strategy, he had set up his devices to reflect his need for separation, having a work laptop and a personal laptop, each with different accesses to his emails. When his supervisor crossed this boundary to email him on his personal account, this caused P17 to switch devices and avoid the transgression to go further. Therefore, without saying anything to the transgressor, he decided to correct the sender's mistake/cross-over:

"not necessarily intrusive, but sometimes a bit annoying, when one of my supervisors, when she's at home she uses her personal email account, […and] if she sends me a new email rather than a reply for when she's at home she always sends it to my Gmail [personal] account instead, and this means that I have to reply… because I don't want it on my Gmail, I want it on my [work], I have to reply either on my phone or on my personal laptop because then I can change the "from:" and I can eradicate the Gmail from the chain, but I can't do that on my work laptop because I've not got the Gmail one on there, so I'd have to load the Gmail app and reply from Gmail." [P17].

6.3.8 Relevance of Awareness Cues

In section 6.3.6 of this chapter we have shown how awareness cues can be a powerful tool, especially for senders, to determine when and how to initiate a conversation. However, we have also discussed in section 6.3.7 how not everyone – especially receivers – considered all these forms of awareness cues as a positive feature. So, because participants were reporting their experience both as sender and as receiver, it is clear that awareness cues were considered a double-edged sword, that emphasises their different role for senders and receivers, as I9 summarised:

"from a personal perspective, when I want to get in touch with someone they are really useful, if people are trying to get in touch with me they are annoying. It's that sort of double-edged… […] if someone sends me an email and they already know that I'm green, are they going to get annoyed that I haven't replied to straight away? Just because I'm logged into my computer it doesn't mean that I'm actually actively responding to email" [I9].

The double-edged sword effect of awareness cues does not just relate to differences between sender and receiver's perspective, but also to differences between different types of cues. We have seen how awareness cues were useful in certain situations where currently there is no other way of telling whether someone has received or read a message. This is typically – but not exclusively – the case with email, where the interface has not changed much over the last four decades and participants are left with just checking that a message had indeed left the outbox, sending another message, or resorting to "life status" cues whilst they wait, as the quotes below exemplify.

"[Waiting for a reply] **Checking my earlier email if it was sent or not. […] Asked [name of colleague] if she has seen him or if he is on holiday."** [P1, diary, emphasis our own]

"Send over [via email] *final designs to my art director for him to approve. I didn't get a response so I send it again on email in case he didn't see it on Hipchat. Would have loved to see if he read in on Hipchat but it's Friday so I'm pretty sure he just ignored it on purpose"* [P5, diary]

"Awaiting on time sensitive response from someone more senior than me. Already sent one reminder email, feeling quite annoyed at the moment as I'm having to pester (hate to do that). My *senior* boss has said to try again but she didn't want to override. Now the endless wait and see...." [P10, diary]

Overall, our participants' perspective of awareness cues was context-dependent and changed over time, based on the urgency of a message, people they interacted with, and the channel used. As the quotes below demonstrate, the usefulness of awareness cues seemed to move along a continuum, where on one end participants (especially in the role of senders) found them useful to moderate their communication behaviour (i.e. infer availability and response expectations), but on the other end participants (especially in the role of receivers) found them "stalkerish" (I9), giving away too much personal information.

"[colleague and friend's name] *uses Facebook messenger, he used to message me late in the evening, but at some point in the evening I don't really look at the phone anymore, I also go to sleep very early. And for example, he started making fun...* **he realised that I go to bed really early and I find it very strange that someone knows something personal about me through Facebook messenger**. *Because I don't reply and I don't visualise and anything. I don't know why. Why do people need to know at what time I go to sleep based on Facebook messenger?* […] **I just don't like that technology has to tell everyone at what time I do what**. *[laughing]* Why?" [P11, emphasis our own].

"*the one thing I did find a bit weird is... at* [workplace] *if you want to schedule a meeting everyone's calendar is kinda linked up and normally you just see 'busy' or whatever. But* [manager's name] *made a point of saying 'can you share all the details with me?" I thought "why?" That made me feel… I kinda said ok but I did feel a bit* **"why do you need to know?"** *and I think it's because what she wanted to know is things like when I'm working from home or something, which you can't necessarily signify. I might have a chat again with her about it, because I kinda went 'oh yeah' and she said 'oh I can share mine with you' but she didn't. But I was a bit like 'why does she need...?'"* [I9, emphasis our own].

This last example is particularly interesting when contrasted with P12's behaviour, which resembled I9's manager's behaviour, in that he wanted to have full access to his team's calendars. Both I9's boss and P12 wanted access to their employee's full calendar to be more aware of their work progress and be able to arrange short-notice meetings.

"*I actually spoke to the IT manager, because especially people in my team, I was, like, it's important for me to see what they're actually doing.* […] *I check people's calendars when I need to book a meeting that involves them or if I'm… If I feel I'm going to need to get hold of them that day, I'll look to see are they around and what's their availability. When it comes to planning things, I can… If I think that what I need to plan is more important than their thing in the calendar, I can speak to them about it, and say, this is the only time slot, there's five more people that can make this time, I see, for instance, you… That this time, you've got a meeting with this person, which is maybe, kind of, an induction or something, can you move that and we can have our meeting then? So for those kind of reasons.*" [P12]

As a result of this double-edged sword effect of awareness cues, participants either talked about periodically reviewing their own settings to enable or disable certain features or noted observing this behaviour in others.

"*And also the person who I'm avoiding [on WhatsApp], he quite often doesn't have his availability shown, but I've noticed that, like, one day I would talk to him and it doesn't say when he was last online, and then another day it will, so I know that he turns it on and off so that he can play this, and I could do the same but I cannot be bothered.*" [P17]

"*On iMessage, I've turned mine off, but I see if whoever I'm interacting with has theirs turned on. It sends me a read receipt. On WhatsApp, I've disabled that. Have I? No, I haven't. I lie. No, on WhatsApp, it works, so I see when people have responded, and they probably see the same when I have. I don't… I haven't requested the read receipts on my work email. But if there is a really important one that I need to know who's read it, then I would standardly turn it on. Yes.*" [P9].

Alternatively, participants would just leave their settings to an ambiguous status such as 'away' as a way of deterring what others could infer. As F3 summarised, "*if people get to know you've got a habit of setting these things, then people have expectations about it. Whereas if it's green all the time, or hidden all the time and that has no connection to your actual availability then people don't start making any inferences about it*" [F3].

6.3.8.1 Intentionally misleading through awareness cues

Participants also intentionally misled others using awareness cues to protect their time and feel more in control over when to be available, as opposed to feeling pressured to reply because others "*just see my light as green and they think I can actually answer*" [I2]. These could be simple actions such as logging out of certain channels, setting oneself as invisible, or putting a 'do-not-disturb' setting, as the following quotes exemplify:

"*some people like my boss started to always put himself as invisible or offline so he always looks like he's offline but he's not and I find that a bit annoying because I can't check if he's available or not.*" [P11].

"*starting with Slack, I tend to put it on do not disturb. I mean, it automatically goes on do not disturb between certain times. I would sometimes put it on during the day, if I really can't… Don't need any distractions. Because even, like… Because then it lets people know that it's probably better to message me at another point, or it, kind of, gives them a bit more of an indication as to when I'm likely to respond to them.*" [P12].

"*back when I was working at [previous job] it was in the last couple of months, I wasn't enjoying my job. I'd wake up in the morning, open my computer, turn on Lync messenger, and put myself on 'away' or 'do not disturb' as if I'm really busy, and then I'd go back to bed (laughing). […] if you put*

'away' on, people can message you and regardless, they'd always expect a response. So if you put 'do not disturb', no messages would come through, so you'd just put 'do not disturb on', then they'd email you and then if you didn't respond, they'd think 'oh he must be really busy doing something', so you can actually delay the response by a couple of hours, have a bit of a lie in." [P15].

We also observed more creative ways of using cues to intentionally mislead one's availability. This was the case of I6 who knew a colleague in the US was trying to set up a meeting with her and she did not want to reject the invitation. So, after checking the other person's availability on their calendar, she created a fake event in her calendar in one of the two slots they could have had a meeting, almost to guide the other person towards her ideal meeting time.

"*I did once for my lunch*. [laughing] *it was with... I did want to have 1 hour of lunch to just talk to the guys* [her UK colleagues] *and I figured they* [person with whom she was meant to have a meeting] *weren't busy for two days in a row for that specific time, I know that the persons was not busy in other hours because I checked his calendar*." [I6].

Another 'creative' case of misusing cues was to secretly enable read receipts and location cues on other people's phones. This was the case of P15 who helped set up his partner's and friend's phones. In both instances, he enabled iMessage's read receipts and 'Find my friends' so that he could know at all time where they were and whether they had read his messages.

"*I helped my friend set up their phone, I turned it on on [my partner's] phone. I actually helped [my friend] set up her iMessage and I turned it on*. [interviewer: for you? so that when you text them you know they've read it?] *yeah* [laughing] *which is kinda bad* […] *I actually know where she is, and I know where* [my partner] *is. It's a bit creepy but... I turned all that on*." P15

Sometimes intentionally misleading can negatively affect one's boundary management. We saw that some participants in Chapter 4 found it beneficial to check their emails on a Sunday evening or during holiday as a way of mentally preparing to go back to work. However, they did not want to be seen doing so. We found similar behaviours here, "*the good thing with email is that nobody knows that you've read it, so if* […] *I'm on a project and I'm on holidays and* […] *I want to know what's happening I would still read my emails but I don't want my colleagues to know that I'm, like, working, because I don't want them to take advantage of that.* […] *and I just don't answer on the weekend because it's the same reason. I don't want them to think that I would be available*" [P5]. However, when P7 tried to do something similar – checking his work emails (Gmail) on holiday – he did not realise he was also automatically logging into his work instant messaging channel (Google Hangout). A colleague saw him online and decided to contact him about work. This prompted our participant to quickly log out and in addition, to change his behaviour once back from holiday. In this case, his out-of-office email message alone was not enough as it did not get transferred to his work instant messaging channel.

"when I was on holiday, not last week, the week before, and... So, I was in Italy in the middle of nowhere, the person we were staying with didn't have any Wi-Fi or anything like that. So I went to, we went to a local town and you get pinged and say, ah, you've got Wi-Fi, oh, brilliant, okay. So you log on to free Wi-Fi and the first thing I do is get a Hangouts message from someone at work saying, 'hi, have you got ten minutes?' I'm like, no, I haven't, you know, so... And when I got back home I wanted to go into my email to check my emails to make, just to have a, kind of, a sanity check on what had come through and what I can delete and stuff, but I was hesitant about doing so because someone would see I was online and maybe Hangout me." [P7].

6.4 Discussion

In this chapter, we have presented findings from a mixed method study on the role that awareness cues play in boundary and availability management across multiple communication channels. To do so, we first had to unpack how participants viewed channels differently, then we distinguished the sender's perspective (in terms of awareness management) from the receiver's one (as availability management), and finally, we highlighted the double-edged effect that awareness cues can have that interferes with boundary management. By confirming and extending previous work, we evidence how the ways in which communication channels can challenge work-home boundaries is varied and nuanced. Participants engaged in constant monitoring and managing of channels and their features to negotiate their availability to communicate.

6.4.1 A time, space and place for communication

Today, we have access to many communication channels, which make talking to others simpler and less of a private matter. Having lots of channels, and of different types, means there is less of a barrier when trying to communicate with someone. It is not necessary to have someone's more personal details like a phone number or an email address to get in touch, one can just find more public channels (such as in the case of P4 work interactions over Twitter). However, having access to many more channels means that each one of them needs to be managed.

Consistently with what Zhao and colleagues (Zhao, Lampe, & Ellison, 2016) found to be true for social media, we found that each communication channel – not just social media - has its own norms in terms of when, how, and with whom it should be used. Participants specialised how each different channel was used, allocating each of them to either work or personal use. The allocation for a channel was sometimes consistent across participants, particularly if the channel was marketed for a particular purpose. However, we did see exception: for example, P11's personal use of Slack to communicate with old colleagues. But even in these cases, participants created additional accounts, dedicating each one for a specific life role or domain.

Nouwens et al. (Nouwens et al., 2017) suggest that users may create idiosyncratic communication 'places' within the 'space' of the same app, adjusting rules based on the person they are

communicating with. While their findings are confined to social use of mostly instant messaging apps, our findings extend them to both work and personal use of many more communication channels. We found evidence where participants separate work from more social or personal channels as a means for curating their own identity and keeping the two domains separate. In addition, especially when separation was not possible, the same channel or account was used idiosyncratically for different people. For example, both response expectations and reliance of awareness cues varied. However, norms for one channel were not necessarily consistent across users (e.g. when should a reply be expected), making it harder to understand their appropriateness. This is when boundary cross-overs are more likely to happen and cause disruption, because channels are not designed to support tailored features for different people.

6.4.2 Social construction of availability

Having multiple channels at our disposal has made the notion of being online 'anytime, anywhere' ever more salient. While some argue that this is just a rhetorical notion and that users indeed are incapable of being online anytime and anywhere (Oulasvirta, 2008; Perry, O'hara, Sellen, Brown, & Harper, 2001), we argue that it is the social context, the expectations associated with each channel, and the *possibility* of being online at any given moment in time and space that put a strain on users. In addition, the strain becomes more stressful when there is an expectation of being available across domains. Most research around availability and awareness considers only one of the two: work or social realm (e.g. (Marmasse, Schmandt, & Spectre, 2004; Mellner, 2016; Quan-Haase & Collins, 2008; Wiberg & Whittaker, 2005)). By considering the cross-overs between work and personal domains we have uncovered many instances where communication can become intrusive for one life domain at the wrong time.

Churchill and Wakeford (2001 in (Perry et al., 2001)) talk about 'reliable rhythms' as a way of ensuring effective collaborations. Indeed, when one is trying to complete a task that depends on several people, perhaps even across different time zones, it is necessary to coordinate and establish these reliable rhythms that allow for progress. However, managing awareness and availability are not just necessary when collaborating. When using the lens of work-home boundary management, reliable rhythms take on a more nuanced meaning: it is about understanding when work times align and thus choosing appropriate channels. In the case of P4 and P7, they both worked for the same company which allowed very flexible working practices, making it difficult to be aware of when one might be working or not. This uncertainty and lack of consistent schedules is what makes 'reliable rhythms' difficult to establish across work-home boundaries.

6.4.3 Maintaining control through perceived boundaries

We found that work-home boundaries were crossed in several ways when trying to infer availability: for example, senders would rely on cues that belonged to the other domain to infer availability. Additionally, we found that as a message got more urgent and a reply appeared delayed, the

message gets escalated to additional channels, including switching to more personal ones if it is a work communication.

To prevent unwanted cross-domain interruptions, participants came up with several strategies that would allow them to hide their own availability and delay the moment a receiver had to switch between domains, or at least mitigate the social expectation of a quick reply. Building on our findings so far in this thesis, these strategies are a form of microboundary. What this study adds to our current understanding of microboundaries is that these are often temporary strategies that can be easily picked up and used either in a preventative way, or more opportunistically as a way of limiting the interruption effect of a boundary cross-over.

Moreover, rather than being just for the user, microboundaries around availability management are put in place to communicate to the other person what one's boundaries might be. We therefore categorise these as strategies for *perceived boundaries*: participants would create the appearance of having set firm work-home boundaries but would in fact still work during supposedly non-work time, for example to catch up on work or keep an eye on incoming emails. Any exceptions were dealt with by relaxing boundaries. This would allow them to feel more in control of their availability, whilst still taking advantage of flexible working practices and not feel expected to be available anytime, anywhere. There is a general understanding that people lie about and hide their availability, but it was not clear when this would happen and in what context. Previous work suggested that users lie about their availability, such as pretending not to have seen a message, to get out of socially awkward situations on instant messaging platforms (e.g. (Birnholtz et al., 2012; Quan-Haase & Collins, 2008; G. Venolia, Tang, & Inkpen, 2015)). We found participants being deceptive about their availability, not just in social instant messaging, but also in work contexts and across all forms of communication channels, especially as a way of protecting work or personal time and space.

This deception should not come as a surprise if we think about how communication channels are giving away an increasing amount of information about ourselves. Just like P11 who did not like her colleague knowing at what time she goes to bed, users cling on to a sense of agency by deceiving others about when they see a message, when they are working (e.g. adjusting calendar entries) or hiding from any digital online channel. As communication possibilities grow, technology is also pushing towards more transparent conversations, giving away where we are, when we are online, when we read messages. In our sample, users wanted transparency, but only if it was bidirectional, as the example of polarising views on read receipts for email and instant messaging conveys.

The desire to preserve agency through perceived boundaries also meant that participants could control the self-image they were conveying to others around their availability and responsiveness. The theory of self-presentation (Goffman, 1959, p. 222) suggests that people employ impression management strategies to "*control access to back regions and front regions* […] *and save their own show*". By creating perceived boundaries, participants were able to maintain work-home boundaries, even if cross-overs happened. This explains also how channels which have historically been

considered to be, or are marketed as, synchronous or asynchronous are now used in more peri-synchronous (Tyler & Tang, 2003) ways, depending on the formality of a channel, the presence of awareness cues, the relationship with the receiver, the self-image one wants to convey, and the domain they relate to. Previous work showed how users are keen to maintain a certain responsive image (Tyler & Tang, 2003), but we found this to be true as long as it did not cross work-home boundaries, at which point participants developed perceived boundaries.

6.4.4 Rethinking boundary theory

Our findings point towards a limitation of boundary theory: to date there has been little consideration of how boundary management strategies depend on the relationship between people, especially in the context of today's technology. Despite taking a social-constructivist approach, boundary literature considers primarily the individual's point of view. By taking into account how boundaries can be crossed through communication technologies, we are able to really see how boundary management is shaped when interacting with other people. Distinguishing between senders and receivers has allowed us to unpack where challenges might occur and where users can use technology to support their boundary management. Participants were generally receptive to other people's boundary preferences by keeping a close eye on awareness and contextual cues, and thus more carefully choosing when, where, and how to communicate. This is evidence that unlike what technology determinists claim, technology is not inherently good or bad, but rather it is how people make use of it (and arguably how it is developed through social influence) that affects how technology challenges our boundaries. However, this reciprocal attentiveness was not always possible for various reasons and this is when our participants encountered boundary cross-overs. Indeed, perceived boundaries only work if others are aware and respectful.

6.5 Conclusions

Being connected anytime and anywhere can be challenging for boundary and availability management. In this chapter, we have taken a mixed method approach to understand how senders and receivers implicitly negotiate availability and boundaries through the use of CMCs. In doing so, we have confirmed and extended a number of previous findings. We have seen how having multiple communication channels to choose from can help create more defined boundaries by specializing how each channel is used. However, the norms around how a channel should be used are not always shared. In addition, awareness and contextual cues are used by senders to bypass boundaries, gain access on the whereabouts and current status of another person, and increase expectations of quick replies. In response, receivers intentionally used those same cues to mislead others, regain control, and create perceived boundaries.

Our findings have allowed us to strengthen our own definition of microboundaries and enrich our current understanding of boundary theory. In order to better understand the extent to which microboundaries can be a useful resource to manage work-home boundaries around communication

technology, in the next chapter we will present findings from multiple case-studies where we asked participants to adopt microboundaries and evaluated their use over time.

Chapter 7

Understanding the Role of Microboundaries

7.1 Motivation

The work in this thesis so far has uncovered a series of strategies that are user-led, technology-based, and help users manage boundary work around communication technologies, by reducing the negative effects of boundary cross-overs. In Chapters 4, 5 and 6, we have provided examples of a range of these user-generated strategies that we characterize under the umbrella-term of *microboundaries* (see section 4.4.4 for a first definition). However, from the data we presented so far, it is unclear whether these strategies actually help users feel more in control, and if so, to what extent.

As Morganson et al. emphasise, previous work around boundary management has "*repeatedly called for practical interventions and individual strategies*" (Morganson et al., 2015, p. 683). This call has also been echoed by HCI researchers Chen and Karahanna (A. Chen & Karahanna, 2014, p. 31), who stated, "*given that cross-domain technology-mediated interruptions are unavoidable for today's knowledge workers, a concerted effort is needed by technology designers, organizations, and knowledge workers to provide tools and techniques to alleviate negative effects*". To the best of our knowledge, there is little work that has looked at what strategies are most effective or evaluated interventions around work-home boundary management. Most work in the area focuses on mindfulness, resilience, and coping training (e.g. (Morganson et al., 2015; Tetrick & Winslow, 2015),

which is not strictly related to boundary management. While we do not undermine the value of teaching mindfulness or resilience strategies, we argue that these tools are not specific to the role that technology plays in our everyday life. In addition, there is no evidence to suggest that if appropriated, they would increase users' boundary control, which is critical for effective boundary management.

There has been work at government and company level that has tried to improve users' and employees' work-home boundary management. As we mentioned in the Introduction (see Chapter 1), the Swedish government trialled a six-hour work day between 2014 and 2016 with a handful of employees in the city of Gothenburg. The analysis of this intervention showed that although the city municipality had to hire more people to maintain the same level of productivity, costing approximately £1.4 million, employees' performance and mood improved considerably (Bernmar, 2017). However, the role technology plays in a reduced working day is not considered, and workers might still feel they need to be on call outside of working hours. To this end, in early 2017 a law was passed in France to give employees "the right to disconnect" from emails and other communications outside working hours (Agence France - Presse, 2016). This is similar to the anti-stress law that Germany has been considering for a few years (Stuart, 2014) but has yet to pass, or the policy that Daimler-Benz introduced where employees could delete any work emails received whilst on holiday ("Should holiday email be deleted? - BBC News," 2014). Whilst these solutions are a step in the right direction, they rely on individual organisations or governments to take charge through top-down interventions. They are also generally a one-size-fits-all solution, and as shown in the previous chapters, there are a lot of individual differences that these interventions are not taking into account or catering for.

Therefore, we were interested in understanding how we can support knowledge workers through a bottom-up pragmatic approach that could take into account individual differences when managing communication technologies and availability around work-home boundaries. To do so, we developed an intervention around digital behaviours using microboundary strategies to help users shape their interactions with technology in a way that better aligns with their values and beliefs. Through these, we were particularly interested in understanding:

- What influences the participants' choice of microboundary strategies?
- What aspects of microboundaries do participants find useful, challenging, and why?
- How does the physical and social context impact the use of microboundaries over time?
- Do microboundaries actually help increase boundary control and reduce stress?

To gain a rich understanding of how microboundaries are used over time and their impact on boundary control and stress, we took a multiple-case study approach. To the best of our knowledge, this multiple-case study is the first to: (i) evaluate an intervention of boundary strategies, (ii) measure

boundary control over time, and (iii) provide an in-depth understanding of how microboundary strategies for communication technologies can improve boundary control.

In the next section, we will introduce what a case study approach is and why it is a useful method to evaluate interventions. Then, we will move on to present details of our method, including selection of cases, how they were recruited, the materials we used, the procedure we followed, and how we analysed our data.

7.2 Multiple-case study approach

Case studies are "*in-depth investigations of an individual, group or organization where data is typically collected from across a variety of sources over an extended period of time*" (Iacovides & Cox, 2015, p. 2). They create a thick description, which explains not only a phenomenon, but also the context in which it unfolds, in order to make it relatable to others (Stake, 2003). As Stake explains, what is being studied is a case (or a series of cases), regardless of the methods chosen. As such, data can come from multiple sources, including both qualitative and quantitative enquiries. Moreover, case studies can cover a single case or multiple cases, but either way, the focus is on the importance of considering a particular phenomenon within its real-world context. A multiple-case study approach, however, has the advantage of increased validity as data are collected from multiple sources and they allow to draw conclusions "cross-case" (Yin, 2003). We refer the reader to Yin (Yin, 2003) and Stake (Stake, 2003) for further guidance on how to conduce case study research.

While this methodology is common in social sciences, it is far less popular in HCI, despite some exceptions (Iacovides, Cox, McAndrew, Aczel, & Scanlon, 2015), where ethnographies are more common. However, ethnographic data can sometimes be hard to gather, particularly when it requires the researcher to follow participants in multiple places (e.g. home, office, pub, train). Following our participants for an entire day to understand their boundary management practices would be impractical and could be seen as an invasion of privacy. While some work has tried to obviate this problem by using video diaries (Chong, Whittle, Rashid, & Siang, 2015), it still does not provide an understanding of how particular strategies can affect boundary management. Moreover, other typical in-depth approaches, such as interviews and diary studies, are aimed at finding common grounds across participants, who are generally recruited to be a homogeneous sample. In contrast, even when cross-case analysis is presented, case study research is scoped around a particular contextualised phenomenon.

The majority of boundary management research has relied on qualitative methods and primarily interviews (e.g. (Kreiner et al., 2009)), along with quantitative data from surveys (e.g. (Kossek et al., 2012)). One exception is the work by Köffler et al. (Köffer, Anlauf, Ortbach, & Niehaves, 2015) , who have presented a multiple case study across four organisations and uncovered three aspects of boundary separation using technology, and another three aspects related to boundary integration using technology. However, their work, based solely on interviews, focuses on creating a deeper

understanding of *existing* strategies, rather than evaluating interventions. A more detailed critique of this paper is presented in the next chapter (see section 8.2.2).

Case study research is particularly suited for evaluations and according to Yin (Yin, 2003) , there are at least four applications: *to explain* causal links in relation to an intervention that would otherwise be missed; *to illustrate* particular topics of an evaluation; *to enlighten* situations where there is no single set of outcomes from an intervention; and *to describe* an intervention in its real-world context. Given the lack of research that looks at interventions for boundary management, there is a need to create an in-depth understanding of what strategies might help increase boundary control by means of an intervention. As a result, we have taken a multiple-case study approach that would allow us to *describe* of how microboundaries are used in context over time and *enlighten* practices of microboundary use and non-use, where we already know individual preferences will prevent us from having a single outcome.

7.3 Method

In this section, we outline our mixed methods approach comprising of multiple-case studies to evaluate our intervention. We developed a series of identical creative workshops, followed by two stages of follow-up enquiries about participants' use and non-use of microboundary strategies: one after two weeks and the other after two months from the workshop. We incentivised participants with a £50 Amazon voucher, which was sent to them after they took part in the two-week follow-up, to ensure that we could collect at least some follow-up data. When signing up, participants were not aware about the two-month follow-up, however the consent form did mention we would keep their contact details for further data collection. We also collected data from standardized questionnaires before the workshop, after two weeks, and again after two months. All data were collected between December 2016 and March 2017.

7.3.1 Selecting cases

Overall, we selected 17 cases made up of 17 knowledge workers (10 women), whose average age was 38 years old (min: 29, max: 51) to take part across five workshops. Five participants took part in the first workshop, two in the second workshop, five in the third workshop, three in the fourth one, and two in the last one.

Participants were recruited through social media ads, word-of-mouth, mailing lists, personal contacts, snowball sampling, and flyers in local bulletin boards [Figure 10]. The workshops were advertised as an opportunity to reflect on one's own work-life balance issues, share experiences, and take concrete action. We targeted our recruitment ads to knowledge workers who felt they lacked or wanted to improve their control over their current work-life balance as a result of communication technology. As a result, we expected that the only common trait between cases would be their interest in improving their use of technology in relation to "work-life balance", as well

as being knowledge workers (to keep within scope of this thesis). We would like to point out how, unlike in the rest of the thesis (see section 2.1), in this study we use the expression "work-life balance" because it has become a buzz phrase that participants were likely going to recognise and understand. As such, where relevant in this chapter, we use it in our write up because it captures what participants expressed.

Figure 10 Example recruitment flyer for workshops

The final 17 participants were selected from 28 who expressed interest, based on their occupation and place of work, flexibility of work, and use of technology, to ensure the widest possible variety between cases. Prior to the workshop, participants filled out a survey which collected demographic data and information about their use of technology. We used this information to screen participants and maximise the differences between cases. For example, we made sure to include participants who had a long-term full-time job, as well as people who had been in their current role for a shorter time, or who were juggling more than one job. We wanted knowledge workers that had flexible working practices, and the latter varied based on work place and family, meaning that participants reported working at home, in coffee shops, in libraries, during commute or travel, and all had varied working hours. A summary of these differences can be found in **Table 6**. To make sure that the strategies we were going to propose in the workshops could be applicable, we also screened participants based on their use of communication channels and devices.

Table 6 Demographics for each of the 17 cases.

#	Occupation	What are your usual working hours?	Where do you usually work?	How long have you worked under your current manager?	Do you have any employees working for you?	What is your current household composition? : Selected Choice
1	PhD student	10-6pm ish	mostly at the office at the moment, but usually I work from home more	up to 6 month	no	I live with one or more flatmate, I live with my partner
2	Post-doc	Straight week 8.30-9.45am, 10-15-11.00am, 11.30-5.30pm (including lunch) then maybe 9.10pm	home three days a week, office 2 days a week. Recently I've been doing field work which has home, workplace – meetings etc. train + public transport, library occasionally	3 years or more	no	I live with my family
3	Researcher	9-6pm	mostly office but sometimes (up to 1 day per week) from home during the week. Typically at least half day on weekends and then mostly from	3 years or more	yes just one	I live with my family
4	Research Associate	08.30-6.00	At university 2 to 3 days a week.	up to 6 month	no	I live with one or more flatmate
5	Lecturer	9am - 6pm, but they are fully flexible. I work evenings and week-ends, too.	At home, coffee shops or library the rest of the time.	3 years or more	Yes, a few (2-5 people)	I live with my family
6	Senior Lecturer	8.30-5 + 2 mornings/week when no major deadlines, otherwise lots of evenings + weekends	home 1 day/week + evenings office 5 days	3 years or more	yes a few (2-5 people)	I live with my family
7	Communications consultant	9am -3pm (or later)	office 4a days per week, home 1a day per week	3 years or more	no	I live with one or more flatmate
8	research assistant	M-F, 3 days per week, no weekends - hours vary	home 2 days, office 3 day, train on office day	Up to two years	No	I live with my partner
9	Post-doc Fellow	9 to 19	office 4 day/week; home 1 day/week	Up to 6 months	No	I live with one or more
10	English teacher + PhD student	8am - 10pm	school 2.5 day. Work 4.5 day. On the bus to uni	up to 6 months	No	I live with my partner
11	Post-doc	all day though offical 9-5	office closer to home rather than my original	3 years or more	No	I live with my partner
12	Senior Teaching Fellow + Speech and language therapist	Monday-Wednesday but hour are very flexible	office 2 days a week, home one day a week, but this is variable	3 years or more	no	I live with my family
13	Consultant	9-5.30 (ish)	office 3 days a week, home 3 days a week (studying as well)	I don't have a manager	no	I live with my partner
14	UX designer & researcher	9-5.30	home 1-2 days a week	up to a year	no	I live with my partner
15	Post grad with work experience in UX and ergonomic design	Differ according to project. Normally up to 45 hours per week.	home and library 2 days; office 3 days.	I don't have a manager	no	I live with one or more flatmate
16	Librarian	I work .8 FTE - so I get every second Monday off. On the days when I'm in I work 9 - 5 mainly - there is an element of flexi time so I can alter my starting and finishing time within some boundaries	I come into the office for all my work.	I have two roles and two managers; one has been my manager for just off for 5 years, the other for about 6 months	yes a few (2-5 people)	I live with my partner
17	Researcher	9.30-6	office 5 days a week	I don't have a manager	yes a few (2-5 people)	I live with my family

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7.3.2 Materials

Workshops were divided into two parts: first, we planned an introduction and brainstorming session, followed by a more hands-on intervention session. For the brainstorming sessions we relied on two activities that would help participants discuss any issues they might have experienced around work-life balance and communication technology: (i) Reflection Cards and (ii) Future Self scenario.

Reflection cards. Vines and colleagues (Vines, Dunphy, & Monk, 2014; Vines, Wright, & Olivier, 2014) used reflection cards to get users to discuss complex issues and explore specific challenges and opportunities by offloading their concerns to the cards. Inspired by this technique, we created a series of 14 reflection cards. In our study, each card showed a picture of critical elements (e.g. apps, devices, features, behaviours, places) relating to work-life balance and communication technologies [**Figure 11**]. Pictures were chosen based on issues and topics that emerged from previous studies in this thesis, and were deliberately left ambiguous and without a description, to allow participants to interpret them freely.

Figure 11 Reflection card images

Participants were instructed to select any cards they related to and tag them as "something I can't live without", "something I want to get rid of", and "something I would like to improve", using coloured sticky dots [**Figure 12**]. Not all cards had to be used and the same card could belong to different tags.

Figure 12 Reflection card packs for each participant

Future Self scenario. Vines et al. (Vines, Wright, et al., 2014) also developed a Future Self scenario where users were instructed to develop a scenario they might find themselves in now and in the future, articulating aspects of their life they wished to change and how this might come about. We used the same technique to ask users to envisage how the issues such as those they might have identified using reflection cards could be overcome [**Figure 13**, left]. Visualising positive outcome is one effective way in positive psychology to "*reduce goal conflict* […], *as well as bring greater awareness and clarity to one's priorities, motivations, and values*" (Sheldon & Lyubomirsky, 2006, p. 75).
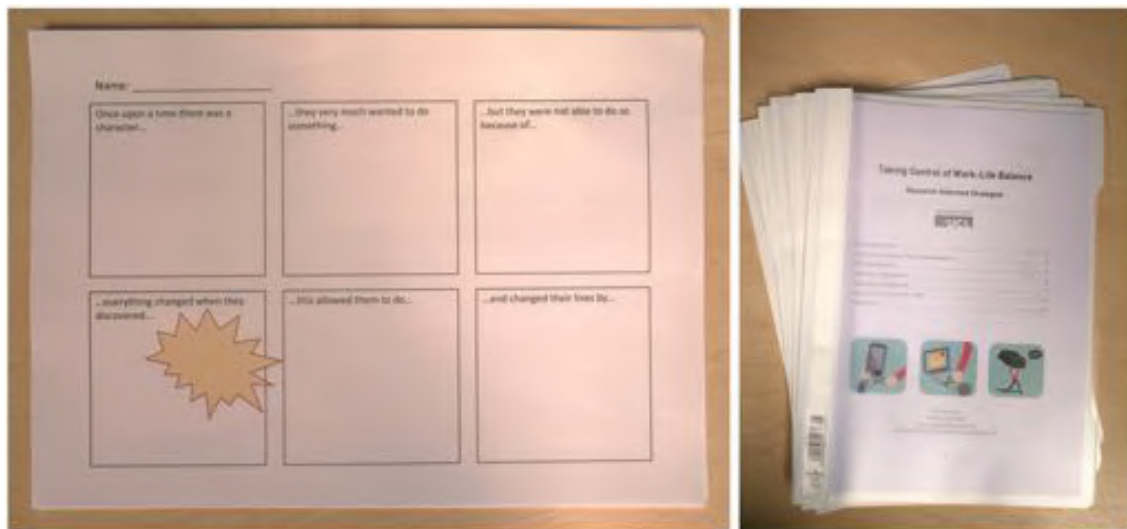
Figure 13 Future Self scenario (left) and microboundaries booklet (right)

For the second part of the workshops, we created (i) a booklet of strategies (**Figure 13** right, and in Appendix E.1) which included microboundary strategies from which participants could select at least one that (ii) they would commit to trying out over the following two weeks, using a commitment card.

Booklet of Microboundary Strategies. Using examples of microboundary strategies we uncovered in Chapters 4, 5, and 6, and other research-informed strategies found in literature around the use of devices, applications, notifications and features, we created a booklet that could inform participants

of what possible strategies they might want to consider to feel more in control. We organised these in five management themes: (i) email management, (ii) other communication channels management, (iii) notifications management, (iv) time management, and (v) expectation management. Each of the five sections contained a brief explanation of what type of strategies one could adopt and what is the research behind them, followed by step-by-step instructions on how to implement these strategies based on different devices and operating systems (i.e. laptop, Android phone/tablet, iPhone/iPad, Windows phone/tablet). Participants were free to take a copy of the booklet home.

Commitment cards. To help users stick with their intentions in a non-binding way, we asked them to select at least one strategy they were willing to try out and write it down on a card [**Figure 14**]. Previous research has shown that creating an *implementation intention* (that can specify when, where, or how to implement a behaviour) increases the chances of the intention becoming an actual behaviour, regardless of whether is it specific or more generic (Ajzen, Czasch, & Flood, 2009). While we were not interested in necessarily producing a behavioural change in participants, we wanted to make sure they were explicit about their intentions. After we took a picture of each card for our own record, participants were free to keep the commitment card and use it as a reminder of their intentions after the workshop.
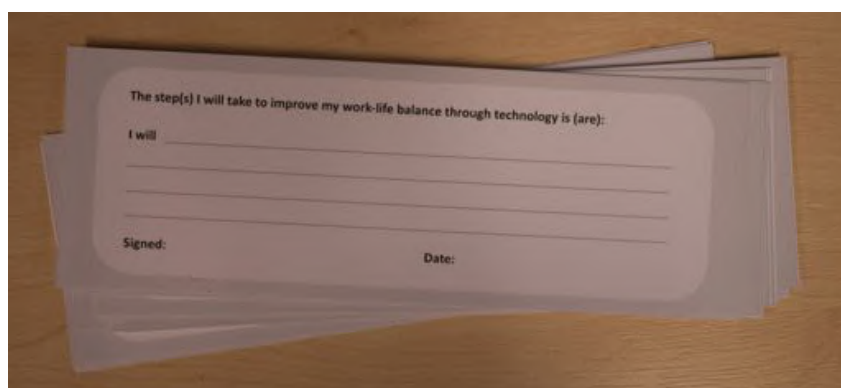
Figure 14 Commitment cards

7.3.3 Procedure

Data collection for this multiple-case study comprised of four stages: pre-workshop survey, workshop, 2-week follow-up and 2-month follow-up. Overall, these workshops and follow-ups were organized to allow us to understand any limitations or constraints in such strategies and thus the extent to which they are useful. We describe each stage in more depth below.

Pre-workshop. Prior to attending the workshop, participants were asked to fill out a short survey which included two standardized questionnaires, the Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983) and the Work-Life Indicator (WLI) scale (Kossek et al., 2012), in addition to a number of demographic questions and information about their general use of devices and communication channels.

Workshops. A pilot workshop was run with three volunteers to calculate timings and to get feedback on the activities and the presentation. Following the comments we received from the pilot, we organized five identical workshops, to accommodate for availability and limit the number of participants in each session. **Table 7** reports example timings and activities. Two researchers were present at every workshop: one (the author of this thesis) was in charge of managing the sessions and moderating the discussions; the other researcher was in charge of taking pictures of participants' reflection cards, Future Self scenarios and commitment cards, as well as help out with any practical issues (e.g. keeping an eye on time, making sure recordings worked). Each workshop was capped at six participants to ensure that enough time was dedicated to each participant when strategies had to be implemented (e.g. helping them change settings, tailoring suggestions, etc.) and lasted approximately two hours. Participants were provided with refreshments to facilitate a relaxing environment.

The purpose of the workshops was twofold. Firstly, we wanted to gather participants with different experiences to share their struggles and issues around work-life balance and use of technology. Secondly, we wanted to understand to what extent microboundary strategies could be useful in regaining a sense of control over boundary management, so we asked participants to choose and adopt at least one new strategy for two weeks.

At the start of each workshop, the moderator (i.e. the author of this thesis) gave a brief introduction on the workshop, the agenda, and the purpose of the workshop. Participants were then given a set of reflection cards each and had a few minutes to familiarize themselves with them and select which ones they wanted to keep, get rid of, or improve use of. Prompts were displayed on the projector in the form of questions. Participants then took turns in sharing how they had interpreted the cards, which ones they had picked and why. Except for those in the first workshop (due to delays at the start of the workshop), participants were then asked to fill out a Future Self scenario, thinking about themselves or a character who struggles with work-life balance around communication and how they might overcome those issues. This activity ended the first part of the workshop.
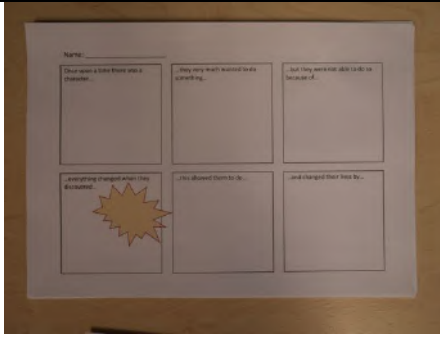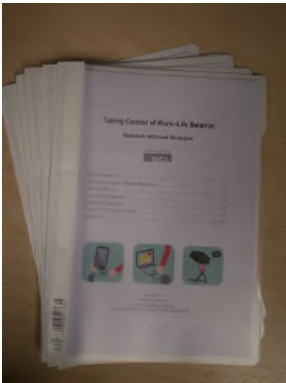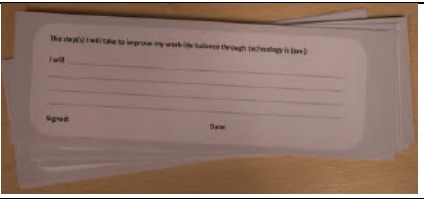
After a short coffee break, the moderator (i.e. the author of this thesis) presented the booklet of microboundary strategies, by explaining the research behind each of the suggested techniques. At this point, participants were left to discuss which of these they thought could work for them, which ones they might have tried, and which they were willing to adopt over the following two weeks. The moderator went around helping participants change settings, download apps, and giving advice to individuals. Participants were instructed to select at least one strategy they had not yet tried, that could be listed in the booklet or a similar version that could work for them. Once participants had set on at least one strategy, they were asked to write it down on their commitment card, and then were free to leave.

Two-week follow-up. Approximately two weeks after the workshop, each participant took part in a short follow-up structured interview over Skype (n=15) or in person (n=2), which lasted on average

41 minutes (min: 26min, max: 63min). The purpose of this interview was to investigate which of the initial strategies reported on participants' commitment cards were still being used, which ones were abandoned and why, which ones were still not adopted, and whether there were any others that participants had added in the meantime. In addition to the type of strategies that people used or did not use, we were interested in knowing what influenced their decision and what kind of impact the social, professional, and physical context might have had on their experience. At this stage, participants were also asked to fill out again the two standardized questionnaires on Perceived Stress Scale (PSS) and the Work-Life Indicator (WLI) scale. After this interview, participants received a £50 Amazon voucher as a thank you for their time.

Two-month follow-up. Approximately two months after the workshop, we contacted participants again to ask them further follow-up questions through an email interview (Braun, Clarke, & Gray, 2017). Email interviews "*are a great way of generating rich written accounts of participants' experiences and memories*" (Braun et al., 2017, p. 221), they are more flexible than face-to-face interviews for both the researcher and the participants, as well as being time-efficient for the researcher because it produces textual data that do not need to be transcribed. Participants did not expect this email and it was not made explicit in the consent form that they would be contacted two months later, although it was made explicit that their contact details might be retained for future contact. We purposefully decided to not tell participants about this follow-up because we wanted to make sure that any behaviour we noted at this stage was not dictated from taking part in a study, especially given the financial incentive we provided. To limit the amount of effort required on participants' side, we preferred an email interview to a in-person one, with similar questions to the 2-week follow-up. We also asked participants to complete the same survey comprising PSS and the WLI scale. Because this was not explicitly part of the study participants signed up to, three participants [P7, P8, P9] did not reply to the email, although P9 did fill out the two-month survey as it was linked in the email.

Table 7 Example structure of each workshop with suggested timings.

Timings	Programme	
18:00	Welcome and introductions (including signing consent form)	
18:20	**Brainstorming Session** *Reflection cards and discussion:* What do you love? What do you want to get rid of? What do you want to improve? Followed by a slightly broader discussion: *How does technology impact your work-life balance? What does it mean for you to be available? What does it mean for you to be online or offline?*	
18:40	**Brainstorming Session** *Scenario of Future Self:* how would technology work for you in your ideal world?	
18:55	*Short break*	
19:00	**Finding Solutions Session** Presentation of microboundary strategies	
19:15	**Group discussion** - What have you tried? What worked? What didn't work?	
19:30	Individual selection of strategy and sharing it with the group	
19:40	Implementing new strategy	
20:00	Participants free to leave with their booklet.	

7.3.4 Analysis

Audio recordings of the workshops were transcribed, while the two-week interviews were partially transcribed and later combined with the two-month email interview answers. For each case (i.e. participant) we then combined all transcripts with any handwritten notes, pictures of artefacts produced in the workshops (i.e. the Future Self scenario, the commitment cards and the choice of reflection cards), answers from the pre-workshop questionnaire, and individual responses to the two standardised surveys. This allowed us to build a comprehensive picture for each of our cases. From that, we then constructed a timeline based on each data collection stage (at workshop, 2 weeks after, and 2 months after) to define the journey of how each case adopted and adapted strategies over time,

Once each case was defined by all its relevant data across the three points in time, we proceeded in analysing our data across-cases. This helped us unpack in detail the differences and similarities between participants over time and based on the type of strategies, which in turn would allow us to better contextualize their use and non-use of microboundaries. There are several ways in which cross-case data can be analysed. Following Eisenhardt (Eisenhardt, 1989), we divided data based on data-source: all qualitative data were analysed using thematic analysis, while survey data were analysed statistically. We identified four themes using both an inductive and deductive approach: (i) issues and factors that influence the choice of microboundary strategy, (ii) differences and similarities in how microboundaries are adopted and adapted over time, (iii) contextual factors that affect use and non-use of microboundaries, and (iv) overall perceptions of microboundaries' usefulness. To support our qualitative findings around perceptions of microboundaries' usefulness, we integrated results from our statistical analysis.

Ultimately, we will present findings from our cross-case analysis following a chronological narrative from when participants selected their strategies, to how they used them over the two months to provide a thick description (Stake, 2003) of the differences that emerged between cases. We have chosen to report our findings in chronological order, among many other possible narratives for case studies (Yin, 2003), because it is the most appropriate when trying to understand whether microboundary strategies can increase boundary control and reduce stress over time.

7.4 Findings

In this section, we will start by introducing our cases. We then proceed in our chronological narrative to show how microboundaries are adopted and adapted over time, starting from uncovering issues and factors that influence the choice of strategy participants end up committing to, moving on to understanding how microboundaries are adopted and adapted over time. Here, we will compare cases based on the five categorizations of strategies we used in the booklet. Finally, we will conclude with participants' overall impressions of using microboundaries after two months of use, supported by our quantitative results. Throughout the findings, we will highlight how the social and

physical context have affected the use of microboundaries. We conclude our findings section by discussing how participants decided to share their new-found strategies with others.

7.4.1 Introducing the cases

As part of the pre-workshop survey, we asked participants information about their devices and communication channels, and specifically how they used them, what notification settings they had on their phone and what kind of communication channels they used. This information was used as baseline data to compare with the changes they made (or did not make) over time. Findings from this section of the pre-workshop survey show consistent findings with the previous chapters in this thesis (see sections 4.3.3; 4.3.4; 6.3.1; 6.3.2) in terms of number and type of devices, number of work and personal email accounts, and number and type of other communication channels. All participants had at least one smartphone, while two had two smartphones (one for work and one for personal reasons); all but three had at least one laptop, with two of those participants having two laptops (one work and one personal) and one having three laptops (two work ones and one personal); 11 participants had at least one desktop PC, six of which had two of them; 11 participants had a tablet and three had a smartwatch. On average, participants had 1.82 work email accounts and 1.69 personal email accounts, ranging from minimum 1 to maximum 5 for work accounts and 3 for personal accounts. In addition to email, on average participants used 5 different communication channels each (min: 3, max: 8). All participants used WhatsApp, 14 used traditional SMS, 13 used Facebook Messenger, 11 used iMessage (now called Messages), phone calls and Skype, seven used Facetime, two used Twitter DM, two used Slack, and four used other channels (including: Snapchat, Couple, Glide, Lync, and Workplace). A summary of participants' use of devices and channels can be found in **Table 8**.

Starting from the following section, we will present our cross-cases findings following a chronological order in which participants experience microboundary strategies. Throughout, we will highlight how the social and physical context affected participants' use.

Table 8 Participants use of device and communication channels (*3 of the 5 work email accounts are "dormant", P2).

7.4.2 Issues and factors that influence the choice of strategy

In this section, we will first discuss issues that participants experienced around work-home boundaries and their use of technology, as reported during the workshop brainstorming sessions using reflection cards. Beyond confirming specific issues around devices and channels uncovered in Chapter 4, 5 and 6 which we review in the next section, these include feeling overwhelmed and being unable to prioritize. We then move on to discussing potential solutions participants considered, such as setting explicit expectations, to using devices for separation, and making interactions more effortful. Finally, we examine the commitments that participants chose at the end of the workshops.

7.4.2.1 Specific issues around devices and channels

Overall, we found that all but three (P4, P8, P9) participants could not live without their devices, and particularly their smartphone, because "*my whole life is in there*" [P3], "*It's so integrated*" [P2], and it is used "*to access information*" [P10]. In fact, smartphones were seen as a very positive tool to keep in touch with friends and family across the world, as P13 explained: "*I like being with my smartphone […] there are all these different ways in which you can contact people*". Despite the bad reputation that smartphones might receive in popular press, as distraction machines that we should get rid of through digital detoxes, P11 summed up the general feeling across all participants, where rather than removing technology all together the solution might be around improving its use: "*it's not that I want to get rid of mobiles and things, but I want to become more efficient at using them*." [P11].

However, as we identified in Chapters 4,5 and 6, there are several issues related to technology and work-home boundaries. Here we found further evidence of how participants considered email being both a source of valuable information but also a distraction – for example, "[Email] *I found really interesting, because I don't think I could live without it because it's so central in having these notifications and messages, but in one sense, I don't like all the red notifications because I'm addicted to trying to get rid of them.*" [P2] – confirming what we found in section 4.3.5.1. Several participants also listed having to manage multiple communication channels as a nuisance and an intrusion, confirming what we discussed in section 6.3.3.5. For example, P5 reported how all these different communication channels are intruding his personal life, "*I have more channels of communications… I didn't do too many of them until recently, and they seem to take over your whole life, to appear at any point. […] at midnight, after midnight… yeah. I'm not a big fan*" [P5]. Others, such as P2, decided not to bother with keeping up with all the channels, even if it is at the cost of losing valuable information: "*Slack… I don't really understand it, I don't use it, but my workplace has started to adopt it, so I might be missing out on stuff that I don't know about*" [P2]. Slack in particular was something that we reported as being a cause of IM overload in section 6.3.3.5.1 and we found more evidence here, when P14 expressed his dislike of it: "*Slack has ruined the last 8 months of my life - maybe not that bad. You go on holiday, you come back and you've got more than a thousand*

Slack messages and it's not just emails and email chains, it's also lots of random stuff you have to sit through a whole load of Slack conversations to find out what is actually important, what's relevant, and what is chit chat among people" [P14]. We discussed in section 6.3.8 how awareness cues were seen as double-edged swords, with many participants having negative feelings towards them. Here, we found similar ambivalent feelings: on one side, there were people like P13 who felt even more pressured to give prompt replies, "*WhatsApp it's quite good for family groups, but the read receipts* […] *I don't want to reply, but you risk reading it and then you can see the two ticks and then the pressure is on!*". On the other side, we found people like P17 who described the blue ticks as "*a relaxing thing*".

7.4.2.2 Feeling overwhelmed and unable to prioritise

In addition to confirming previous findings, during the discussion using reflection cards and the Future Self scenario activity, we also identified new issues that participants experienced that were not specific to particular channels or devices. At least nine participants felt overwhelmed by the number of tasks and daily demands they had to battle against, with two of them [P6 and P17] drawing the deluge of messages and responsibilities as "*all these things pushing down*" [P6] [**Figure 15** and **Figure 16**].
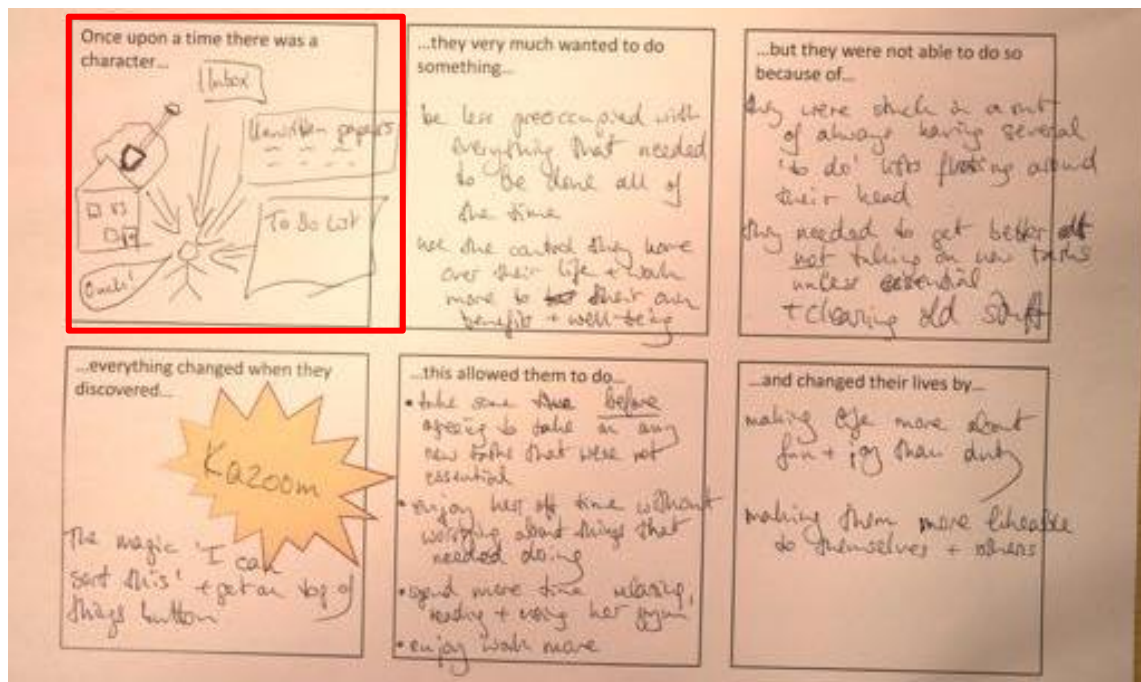
Figure 15 P6's Future Self scenario.

Figure 16 P17's Future Self scenario.

Similarly, P15 felt as if he was being pulled in different directions, with "*different pressures associated with them*", and as a result drew his persona as having "*waves* [pushing outwards] *to symbolise* […] *lots of 'do this', 'be here'*" [P15] [**Figure 17**].

Figure 17 P15's Future Self scenario.

This feeling of being overwhelmed made it hard to prioritise their activities and make sure they could complete their tasks on time. As a result, this lead to feelings of failure, as P11 explained she could not keep up the self-image of being the best at everything: "*she wanted to do something great in her*

career, and she'd always been at the top of whatever she did, in classrooms, education […]. *At the same time, now she had another challenge in her life of being a mum, and she wanted to be the best in that as well, but there are limited hours in the day, because of what she feels she is not able to do* [anything]." [P11].

In addition to issues, participants identified "*aspirational things*" [P2] such as doing more physical activity, relaxing, and reading that they would like to become better at and find time for, but struggle to prioritise in their busy lives. These behaviours, however, are generally non-technological. We notice a tension here between participants wanting to spend time doing activities without their devices, whilst at the same time not being able to live without them.

7.4.2.3 Coming up with potential solutions

To overcome these issues, participants thought of possible solutions and workarounds, ranging from setting explicit expectations, to using devices for separation, and making interactions more effortful. For example, P8 had previously worked for a very demanding boss who wanted her to be contactable at all times. She did not appreciate work spilling over in her personal time like that and during the workshop she explained that after that experience, she made a point to set clear boundaries at the start of every new job. In her words, "*back in 2009 I had a boss that would expect me to be online and available to her at 11 o'clock at night on a Sunday and I'm not kidding. So, I worked for her for about a year and a half and then left that job and have never allowed myself to get into that situation again, because it just sucked away everything. […] It was hard to go through but at the same time I'm glad I went through it because now I've always sat down with bosses and said, 'this is the way that I am, and I don't check email at night, and I don't this and that.*" [P8]. Moreover, P1 explained how he used his smartwatch to create a separation between work and personal life and used the wearable to be notified only of really important messages, confirming what we found in Chapter 5. He described, "*I'm one of the people that uses a smartwatch as a boundary, it separates all notifications on my phone, so the more important ones are actually on my wrist*". Two participants explicitly mentioned the idea of purposefully making something more difficult to access, in order to help exercise self-control. In one case, P4 mentioned "*if I start to make an effort to go online on my phone to check everything, it would be a little more barrier*", in the other case, P17 mentioned mindfulness eating as inspiration for reducing the time spent on his phone: "*I once read a book with the idea of mindless eating, where if you make something harder to get to you won't eat it. So, what I've thought of doing is putting* [a] *box in the hallway, leave your phone in the hallway, but you're interacting with your kids in the room. And only if you go in the hallway and you open box* [you can use your phone]. *I haven't done it yet, but I'm thinking of doing it, otherwise any spare moment I'm just checking the phone.*" [P17]. We would like to remind the reader at this point that we targeted our recruitment to participants who struggled with issues of work-life balance and/or wanted to improve their boundary management so we did not expect participants to have put many strategies in place to improve their boundary management.

We used the Future Self scenario exercise to help participants creatively visualise what a solution to their issues might look like, with two main categories emerging: a priority filter and a new way of working. Other possible solutions included creating a more rigid boundary between work and personal life [P12], wishing for "*48-hour days*" [P11], and using an imaginary "*kazoom*" [P6, inspired by Marvel comics, see **Figure 15**] to help "*make life more about fun + job rather than duty*" [P6]. Two participants [P9, P13] did not come up with any potential solution, because "*if I knew what to do I would do it!!*" [P9]. To be noted, no participant suggested to remove technology as a potential solution.

Over half of the participants came up with creative solutions to address the two main issues of feeling overwhelmed and being unable to prioritise tasks and ultimately make them feel more in control, less stressed, and able to find time for more leisurely activities. Four participants suggested some sort of technological solution that acted somewhat like an app or a digital personal assistant. P10 wanted an app that told him "*you have time here*", to help him allocate resources and energies; P14 envisaged a personalised bot, which would "*keep an eye on everything so I can zone out and chill*"; P15 thought he could benefit from a "*value identification and direction filter*" that filtered out "*anything that […] doesn't have any real value to me, it would allow me to commit to my actions and thoughts and not be distracted and go for those things that I actually do really believe and want and really aim for*" [P15]; and finally, similar to P10, P17 wanted a "*priority filter*". All four of these solutions could be easily integrated into a next generation digital personal assistant system as some form of priority filter, suggesting where users might want automation to take place in their daily tasks. It also suggests that current solutions to prioritise messages and information are not of satisfaction to participants, as we had already hinted in section 5.6.

Although not explicitly technology-related, three participants mentioned changing their way of working as a key factor in improving boundary management. One participant, P7 – who worked for a corporate bank, was very explicit about her boundary issues being related to her current workplace culture, which fostered long hours and constant availability. As a result, her solution was to change job [**Figure 18**], because although she wanted to have more separation, if she wanted to survive in her competitive job, she felt she was not allowed to separate. Interestingly though, she also reported how her company had put in place a "leadership program" to help employees better manage their time, for example by reducing how often they checked email. However, despite this top-down approach, P7 felt the program was not successful because there was not a supportive culture among peers. These findings link back to what we discussed in section 4.5 where company policies should take into account personal differences and thus consider carefully how guidelines are introduced. In her words, this is what P7 reported "*I looked at it, but I personally didn't feel it was practical for me and I never really tried it. But one of my colleagues did try to do it and she put an out-of-office on her email and say 'hello, I've received your email, I look at emails between x and y and I will respond to you within 24h'. So,* [with] *every email she sets expectations as to when they can expect that she would read the email and then get back to them. She gave it a good go, but it's gone*

now. It depends on the environment in which you work. Some environments there is an expectation about your availability and how quickly you 1) read and 2) respond to an email. Even when the organisation appears to sanction this kind of separation of email time, she actually wasn't able to make it work, even though she had the support of the organisation to do it and in theory other people in the organisation should have also tried and accept it." [P7]. P7 was concerned about the competitive nature of her job and that not checking emails would harm her career. Although we discussed in the workshop that she could state one thing in the signature but then actually check her emails, for this current job she felt the need to maintain a responsive image with her co-workers.

P8 and P16 felt that a solution should come in a new way of being productive "*with the same amount of hours*" [P8], that "*allowed him to keep on top of their emails work and freed up time to do more interesting and valuable things than writing emails*" [P16]. These participants have identified how rather than playing catch up with information, they should change how they work and more specifically how to better prioritise tasks. We have access to an increasing amount of information, yet we are given the same amount of time to process it, suggesting that the way of working is not adapting to how quickly technology is changing. In order to do so, though, one needs to know how to use technology to help them and have the time to make that happen.
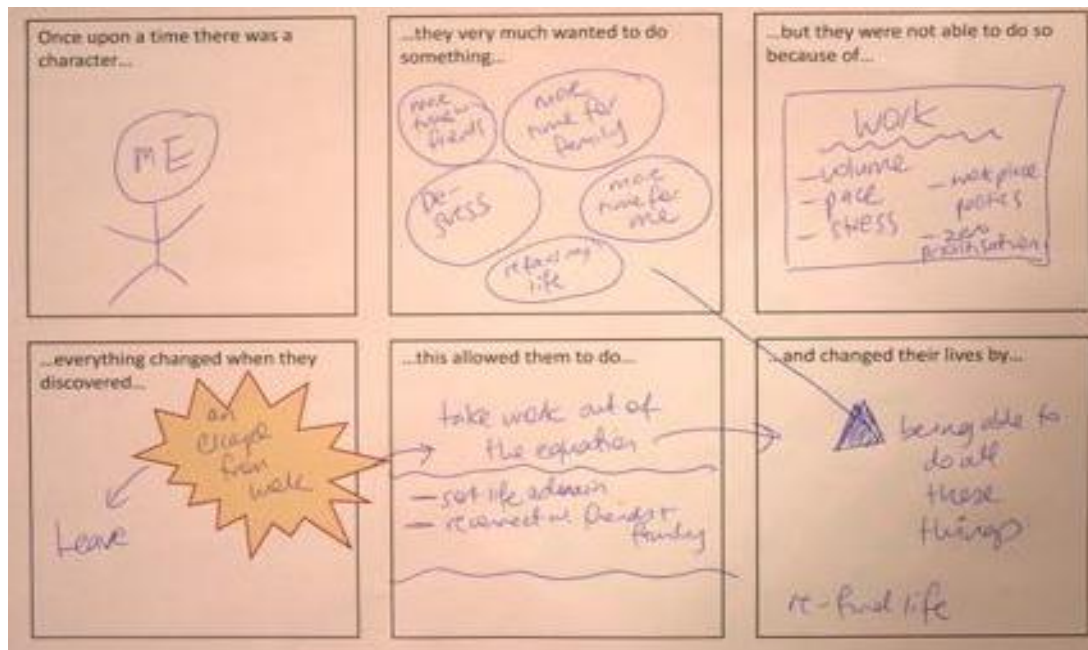
Figure 18 P7's Future Self scenario.

However, sometimes intentions are not enough, "because life happens" [P9]. So, in the subsequent workshop activities we helped participants identify potential solutions that could work for them and help them adhere to them through implementation intentions (Ajzen et al., 2009). We discuss these in the following section.

7.4.2.4 Commitments made

Through the previous sections we have highlighted a number of issues that prevent participants from feeling in control of their boundary management. We have also shown how not all proposed solutions are implementable or feasible (e.g. days will never be 48hrs long). Thus, making a commitment is hard and not a straightforward process, because the practicalities of putting a strategy into practice can make it too difficult to adopt so participants had to sometimes think of alternatives. In this section, we will focus specifically on the commitments chosen at the end of the workshops.

Following the reflection cards and Future Self scenario activities, participants were introduced to microboundaries and other research-informed strategies, through an introduction to the booklet. They then were given some time to discuss strategies they might have already tried out and review the ones they were interested in, before being asked to write down at least one strategy on their commitment card, which they had to sign and date, and share their intentions with the rest of the group.

During the discussion that followed participants explored what possible strategies would work for them, considering their needs and any technological limitations. For example, P4 had initially mentioned being interested in separating her Facebook account into a work one and personal one, and potentially even between devices. However, she did not want to ask people to friend her on a new account, as she saw that as too big of a barrier for them. She had also considered a different sorting system for her emails (she used Gmail client), but after some deliberation during the workshop, she decided she wanted to prioritise other strategies as initial commitments [**Figure 19**]. As she reported at the end of the workshop, "*I changed the WhatsApp notifications. I did change it before* [the workshop], *and then I changed it back, and now I'm sticking with it, so people don't get read receipts. And I changed my message frequency so it's only every 4h during working hours, for my emails. And I set up RescueTime to have a look at how I actually spend my time on.*" [P4].
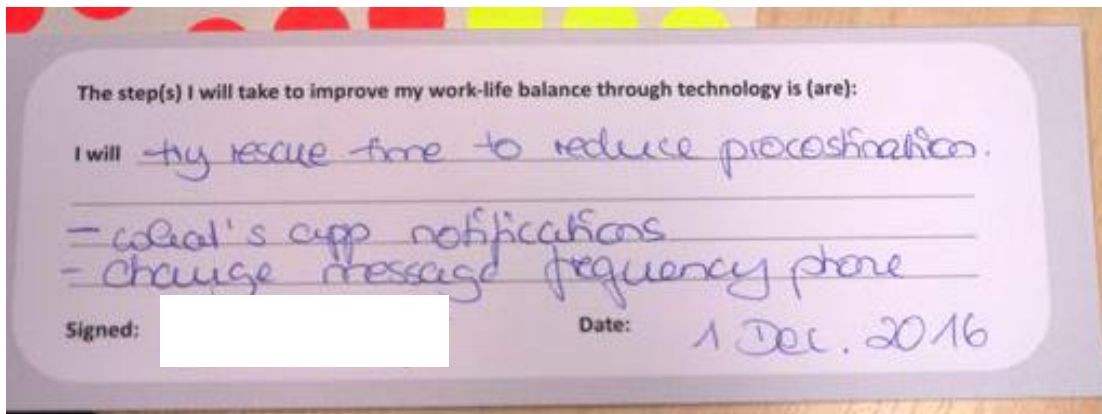
Figure 19 P4's commitment card. The handwriting reads: 1. try RescueTime to reduce procrastination, 2. WhatsApp notifications, 3. change message frequency phone.

Some participants were more hesitant to fully commit to some of the strategies and instead showed intention to try it out by using terms such as 'maybe', or 'might' in their commitment card [**Figure 20**]. For example, this was the case of P11 who was not sure about using RescueTime, a logging tool for laptops and mobiles that keeps track of how much time is spent on various apps and then labels activities as 'procrastination' or 'productive' time. She mentioned "*I wasn't too sure if I will or will not use it because I'm afraid I might waste more time self-tracking*". However, we did not see these hesitations are an issue, because we encouraged participants to explore different strategies, even after the workshop, to understand what would work for them.
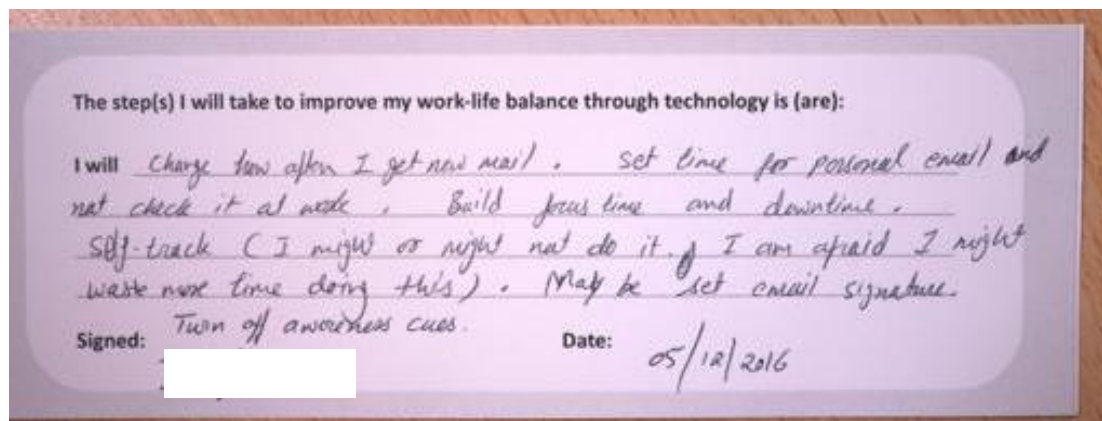
Figure 20 P11's commitment card. Handwriting reads: 1. Change how often I get new email. 2. Set time for personal email and not check it at work. 3. Build focus time and downtime. 4.Self-track (I might or might not do it, I am afraid I might waste more time doing this). 5. Maybe set email signature. 6. Turn off awareness cues.

Participants were free to leave the workshop when they had implemented their new strategies on their devices. We had asked participants to bring along their devices to the workshop for this activity and provided Wi-Fi passwords, so they could download apps if needed. However, although not everyone was able to implement all the strategies there and then based on the nature of the strategy chosen, we did get participants to implement at least one of them during the workshop. This was encouraged to reduce the effort and the chances of coming up with excuses later on.

Ultimately, participants selected on average 3.6 strategies each during the workshop to commit to (min:1, max:6). After two weeks, participants were using on average 2.8 strategies each (min:1, max:4), and after two months, the average number of strategies per participant was 3.3 (min:1, max:5) [**Figure 21**]. It should be noted that participants might have not chosen certain strategies because they had already integrated them into their daily practice, or upon reflection, they decided it would not be suitable for them, or again, because they wanted to focus on a smaller number of strategies at a time.

Using the classification in the booklet, the majority of strategies that participants initially selected during the workshops were related to email management (n=19), time management (n=19), and expectation management (n=15), followed by other CMC channels management (n=5) and

notifications management (n=5). We did not constrain participants in choosing only strategies that were listed in the booklet and participants were free to pick and adapt strategies that could suit their circumstances. In the following section, we discuss the strategies that participants chose, what they thought worked and what challenges they found.

	# people with 1 strategy	# people with 2 strategies	# people with 3 strategies	# people with 4 strategies	# people with 5 strategies	# people with 6 strategies
total # strategies at workshop	2	0	5	7	1	2
total # strategies at 2 weeks	1	5	8	3	0	0
total # strategies at 2 months	1	1	6	5	1	0
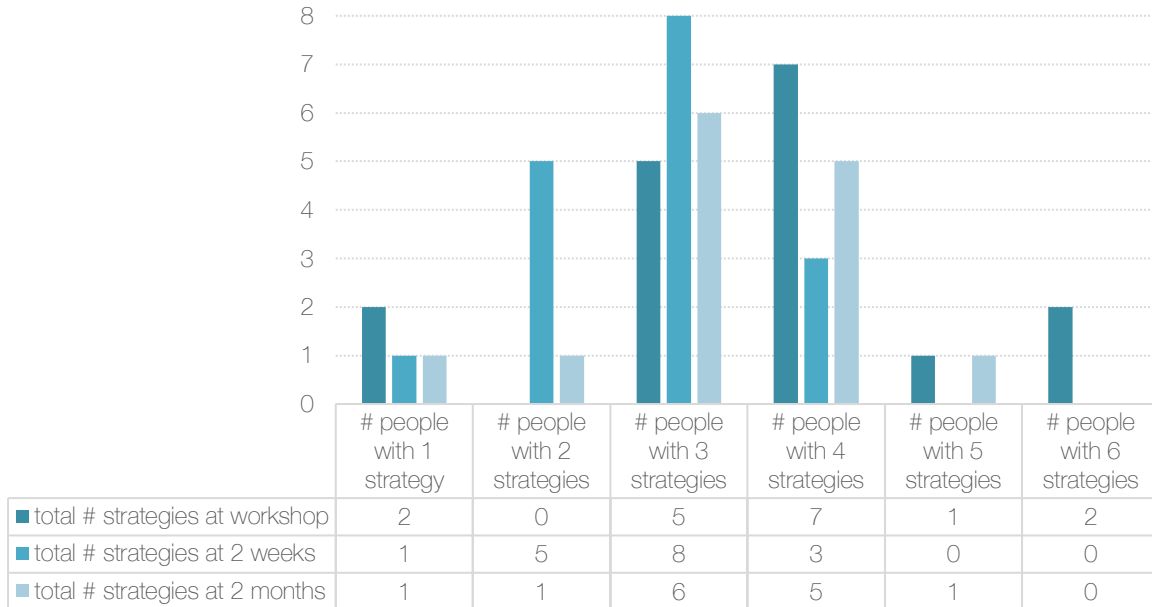
Figure 21 Number of strategies used per participant at each of the three stages.

7.4.3 Adopting and adapting strategies over time

Having presented the thought processes behind participants choosing their strategies, we now move on to discussing how they are actually adopted and adapted over time. Using the classification that is presented in the book, we present each of the five categories of strategies (email-, other CMC-, notification-, time-, and expectation management) in order to determine the predominance among our sample and discuss how participants adopted and adapted them over time. Finally, we will discuss additional strategies that participants adopted over the course of the study and did not fall into any of the five categories we had initially proposed. When reporting on participants choices, we also discuss what prevented participants from using a strategy, and how they decided to put them in place.

7.4.3.1 Email management strategies

All participants bar one (P10) adopted at least one strategy related to email management. In total, 19 email management strategies were adopted at the workshop, and an additional 3 were adopted after that. These strategies fell under five main types: (i) wanting to separate work and personal accounts, (ii) decluttering the inbox from unimportant messages, (iii) setting temporal boundaries for when to check work and personal email, (iv) change the frequency of push email notifications, and (v) disabling notifications. We discuss each below.

Participants who wanted to separate their work and personal accounts did so by dedicating separate devices to one life domain or the other. In one case, P1 – who had one job (job1) but was about to start a second one (job2) – committed to "*having Mac as a personal device, just with personal email, so divide emails on laptops as: on* [job1] *laptop (*[job1] *email,* [job2] *email), on* [job2] *laptop (*[job2] *email), on personal laptop (*[job1] *email,* [job2] *email, personal email)*". After two months, he was still able to keep the email separation he had planned, however, he adapted the strategy slightly to suit his daily life: "*The email division has gone mostly as planned, although I added my* [job1] *email to my* [job2] *laptop too, as I found that I was reasonably happy for this occasional interruption. I'm very happy to not have my personal email on either work laptop – I can still check these emails through the Gmail web app if I so wish (and on occasion have), but I don't have them disturbing me as I used to. Great success.*" [P1]. In another case, P14 wanted to "*separate work and home Mac (uninstall Slack / Outlook)*", but when interviewed after two weeks, he had got rid of Slack from his personal laptop but kept his work email. After two months, he had changed jobs and was now working for a company that used a particular social media website [anonymised] as one of their internal communication channels, so he found his boundaries were being crossed even more. However, he decided to overcome this by "*set*[ting] *it so I cannot view work-related stuff out of hours or over the weekend unless I actively go searching for it*" [P14].

Five participants (P2, P6, P8, P13, P16), who felt overwhelmed by emails, were interested in reducing the number of "*unwanted email subscriptions*" [P13] by using Unroll.me (unroll.me, n.d.), a web service that allows users to unsubscribe in mass from newsletters. One of them, P6, decided to create instead a separate email address "*just for all purchases*", and P16 considered doing something similar in the future when asked at two months how he felt about Unroll.me: "*unroll.me has been good too.* […] *My partner has a scheme where she uses a separate email address for any internet transaction that tend to develop spam emails. This works well for her, so I may consider it in future*". Participants were keen on fine-tuning strategies to make sure they worked best for them, even if this meant putting some effort into adjusting strategies as the context changed.

Four participants [P5, P6, P9, P11] relied on temporal boundaries to separate when they would check work and personal emails. To do so, they relied on conscious effort and manual strategies to make sure their email application was closed, by "*switch*[ing] *my professional accounts off during the weekend*" [P9]. P6 tried using TimerLoop app, an application that helps manage tasks by ordering different timers and playing them in sequence, to help her constrain when she could check emails, and work on other tasks. After two weeks, she reported that "*Based on the TimerLoop experience, I'm actively trying to not check Outlook. It's easier on Monday when working from home*" [P6]. In her case, she found that working from home allowed her to stick to her commitment more consistently because she had fewer interruptions compared to the office environment. Relying on a manual strategy such as remembering to close an application to avoid looking at it, can be demanding and hard to remember at times.

Similarly to those who set temporal boundaries, other six participants [P2, P3, P4, P6, P11, P13] changed the frequency with which they would get new email notifications. This strategy could be applied by either changing the settings in one's email client, or by manually switching to 'offline' mode. P3 decided to use a specific plug-in for Gmail, Pause Inbox, that allows users to work offline and stop push notifications from the web client, by just clicking a button. However, after two months, she admitted having used it only "*a couple of times*" [P3]. Instead, over time she found that creating filters for her emails was a better strategy: "*But what I have found has really helped is reorganising my email folders and filters by topic so that emails come straight in there and I do not get disturbed by alerts. Also, it helps to keep me focused on one topic.*" [P3]. Whilst setting up filters required slightly more effort than downloading the plug-in, the process was then automated and P3 did not have to rely on remembering to switch to offline mode, and the end result was still an inbox that received fewer new messages. P2 had not initially committed to changing how often new emails were synched, but at the two-week interview he explained he had implemented that strategy: "*I changed email sync on laptop for every hour instead of every 20min - didn't notice much*" [P2]. Similarly, after two weeks P6 didn't notice a difference when she changed her email synching frequency: "*changed Outlook sync - no obvious difference but didn't cause issues (other than 2 occasions where I checked)*". This *set-and-forget strategy* required some initial effort to change the settings, but then worked automatically and participants had to rely on their own memory to know that emails were being delayed. P6 found she had to build some trust in the system and manually checked for new emails to make sure she was not missing anything urgent. However, after two months, she was still using this strategy and was happy with it.

Finally, two participants [P7, P12] decided to turn off email notifications altogether. This again is a strategy that could be implemented manually (by turning on the 'do not disturb' function on a device at ad hoc moments) or automatically (by setting timers and modes, such as night mode). P7 had originally set out to "*turn off push notifications in my Outlook* [on laptop]", but during the first two weeks, she found that "*the unread number of emails set me back, so I turned them back on*." [P7]. In her case, what she had actually implemented was turning off the pop-up message for any new email, but had left the number of unread messages displayed on the app's icon, suggesting that even the number of messages (without any information about sender or subject) was enough of a curiosity trigger to make her self-interrupt. P12, on the other hand, had correctly disabled all notifications from her personal email on her phone, and after two months was still very happy with this change: "*I'm still using this one. I've not turned the notifications back on and I don't plan to. I have found that it's enabled me to be less on my phone: on reflection, most of the alerts that I had for my personal email were spam anyway!*" [P12].

7.4.3.2 Time management strategies

Time management strategies were the second most popular type of strategies that participants chose to adopt, with all bar two (P1, P7) wanting to become more effective at how they spent their

time. Participants were curious to get a better understanding of how they spent their time on their devices, as well as making sure they could schedule focused time with no distractions, to overcome the issue of being unable to prioritise tasks identified in the brainstorming session. To do so, they used a combination of automatic and manual strategies.

In the spirit of the popular expression "*what gets measured, gets managed*" (Prusak, 2010), seven participants [P2, P3, P4, P5, P11, P13, P17] either installed RescueTime (www.rescuetime.com) during the workshop, or committed to trying it out at some point as a way "*to reduce procrastination*" [P4] and gain "*more insight into my working patterns*" [P2]. Those who installed RescueTime at the workshop and used it, found that – despite being automated and working in the background – it acted as a subtle reminder to stay focused, especially if participants received weekly reports on their productivity. For example, P3 installed it on her laptop and had it running throughout the study, admitting after two months, that despite "*refer*[ring] *to it infrequently, knowing it is there is enough to keep me more focussed!*" [P3]. Similarly, P5 found that after two weeks of using it, it "*showed all the procrastination, very depressing*" and "*would need a lot of customisation*" in order to train the system to know what was considered as actual procrastination as opposed to productive time. She in fact went on to explain "*knowing how I spend time is not a problem - I don't have a choice.*" [P5], yet after two months from the workshop, she still had it running in the background: "*RescueTime is still not my thing, but the - rather depressing - weekly reports help me think about my time and what I do with it. So, it has some use after all*" [P5]. In this case, RescueTime worked automatically in the background, and after the initial barrier of having to install it and making sense of the data, the weekly emails acted as a gentle reminder that it is working in the background.

However, not everyone found RescueTime easy to use and there were some concerns that the information it provided would act as a further distraction. For example, P13 mentioned at the two-week follow-up that she was thinking about self-tracking because she found it an "*interesting*" [P13] concept, however had delayed it for that time because she "*want*[ed] *to try one thing at a time*". At the two-month follow-up she admitted that not knowing exactly what purposes it would serve did not justify her efforts of installing it and learning how to make sense of the data – overall, it would have been too much of a barrier for her: "*Not bothered with self-tracker. Wasn't sure that I really needed to know what my activity was, and also wasn't sure how useful it would be – partly because I tend to carry out different activities on different devices. When on my laptop – I use the search function for a reason, whereas if I have my iPad out – that's when I faff.*" [P13]. One participant, P2, who tried it out and even paid for the premium version, was not fully satisfied with its features and after two weeks decided to "*go back to Tyme2 app [another time-logging tool] to experiment with levels of granularity in tracking hours*". This app, which he had used prior to the workshop, allows users to manually enter the current task into 'categories' and then creates a detailed report on how time was spent. After two months, he provided further details: "*I cancelled the pro version* [of RescueTime], *have the lite version running in the background, perhaps for a longitudinal use but I don't pay attention to it, and don't understand it really. Not much use found in this so far. I have been*

trying to use [Tyme2 app] *and find it useful for tracking my time. It was too granular before and got out of hand, I am much more relaxed about the categories, I tried have only one category initially: 'working' but then was dissatisfied with this so got more granular, e.g.* [project name] *Phase 1 activity*, [project name] *Phase 2 activity*" [P2].

Many participants felt the need to build focus time into their schedule, to reduce the opportunities for interruptions and help them prioritise their activities. Some of these decided to rely on manual scheduling of events in their calendar or in a time-keeping app and found that this helped reduce their sense of overwhelm, as P15 stated: "*blocking out time made me feel less anxious*". For example, P8 – who works on contracted hours – decided that as a way of building focus time in her schedule she would "*book gym before [working] hours to prioritise personal stuff*", and P9 "*schedule*[ed] *the week in advance on Friday or Sunday. Set aside 2h a day only for* [focused] *work (writing/analysis). Didn't build down time in schedule*". However, these manual strategies are hard to keep up and rely on conscious effort. After two months, P15 admitted "*this has slipped a little, although I have tried to continue to block out personal time where I cut off any reference to work communication i.e. after 7pm*". As P16 summarises, "**manual [strategies] always require a small amount of will power**" [emphasis our own]. At the workshop, P6 tried to lessen the burden of manual scheduling, and committed to a reduced effort throughout the week to "*put task scheduling in place at least 3 days/week, scheduling clear time windows for different tasks*". To do so, she decided to install TimerLoop (which she also used to help her constrain when she checked her email – see section 7.4.3.1) and tried it for three days, "*but found that using tech to deal with tech overloads is not useful.*" [P6].

Using technology to block out uninterrupted time was not something that participants appreciated, although there are some specific applications that allow to do so in chunks of 25 minutes at a time, using what is called the Pomodoro Technique (Cirillo, 2006), for which there are numerous apps available. Six of our participants [P8, P11, P12, P13, P14, P16] decided to try out this strategy. There are different ways in which this strategy can be adopted: one can simply create a mental rule to not get distracted for the next 25 minutes, or they can use one of many specific Pomodoro applications that prevent a user from accessing any content on a phone whilst the 25minutes are ticking. Moreover, the timer used can be a digital timer on a phone or laptop, or a physical, non-technological timer. P10 explained how using a kitchen timer for this helped him avoid technology: "*I have a physical kitchen timer for Pomodoro intervals which means I can be a bit more of a purist when not using tech*". Unlike manually planning the week ahead, using a timer (be it a physical or digital one) in ad hoc situations, although still a manual strategy that had to be remembered, seemed to work well for our participants. For example, after two weeks P13 described how this manual strategy was really making her focus: "*have been using 25min timer regularly, sometimes to time a specific piece of work, sometimes to stop me from looking at any messages. **Having a manual strategy keeps you in the zone**" [P13]. P16 echoed these feelings: "*it makes me feel less guilty*". After using this strategy for two months, both participants were still satisfied with it and had actually

gained insights on what tasks it works best. P13 stated, "*The 25minute timer is good in terms of providing focus. I like the way it helps me to ensure that I save 'small tasks' for the breaks, as well as email/message checking*". P16 instead explained, "*I find this useful. It's maybe more limited than I hoped - I find it difficult to use when I'm doing more diffuse work, or thinking based work - but for repetitive or administrative tasks, I find it really useful. I'm trying to adapt it for other purposes - one of the problems for non-repetitive tasks is maybe that 25 mins can be too long: I'm experimenting with shorter periods for different tasks*" [P16].

Finally, another way participants found to help them focus, was to install plug-ins that would block certain websites or apps. These strategies were all automated, with different levels of friction to implement them. For example, at the two-week follow-up P10 explained he had wanted to create a rule using IFTTT (a web-based service that chains together simple conditional statements to link different apps and services) to block distracting websites whenever he entered a certain location. Using IFTTT requires some basic understanding of computer programming and some technical skills, so there is a fairly large barrier to implement this but would then run automatically in the background as a 'set-and-forget' strategy. Because of this initial hurdle and the fact that P10 did not get the rule to work, he decided to adapt the strategy by downloading a Facebook blocker for his browser. When we followed up after two months, he was pleased to say that after some more effort, he "*got it* [IFTTT rule] *working. The complete block on one of the Chrome profiles is really effective*" [P10]. Similarly, P17 was keen to integrate IFTTT with RescueTime, to block any website labelled as 'procrastination'. However, after two months he admitted he never did it because the learning curve was too steep. In another example, P16 had decided to download the Chrome Blocks app (i.e. a plug-in to block certain websites), but after only two weeks, he removed it because he realised that his issue was "*not so much that it's available to me (Facebook or The Guardian), it's that I look at things at the wrong time. I still want to access them, I just want to access them in a more appropriate way*" [P16]. In his case, he did not want to entirely block certain website, he would have preferred having something that would block them only at certain times.

7.4.3.3 Expectation management strategies

As we have mentioned throughout this thesis, boundary management is about managing boundary cross-overs, which across communication technologies can be particularly challenging and thus we have found participants coming up with strategies that help manage expectations of availability (see sections 6.3.7 and 6.4.3). Through the multiple-case study presented here, we found further evidence of most participants (with the exception of P2, P6, P10, P13) setting implicit and explicit expectations of availability.

Implicit strategies included turning off read receipts and/or presence status on WhatsApp and not signing into work IM channels. Six participants committed to disabling awareness cues on their communication channels and were very happy with their decision, because – in line with what we

found in Chapter 6 – it "*takes away some of the stress to respond immediately*" [P4]. However, for a couple of participants the current settings were not fine grained enough to meet all participants needs: in the case of P7, she wanted to disable read receipts for Facebook Messenger but (at the time of writing this) it is not a supported feature; in the case of P11, she only wanted to enable it for certain people, like Apple's Messages app: "*was going to do turn off awareness cues but decided against it because of husband*" [P11]. Here the initial set up has minimal friction by means of changing one setting, and then works automatically. In the specific case of WhatsApp there is a peripheral reminder that awareness cues are disabled because information within the app is displayed differently (read receipts) or not displayed at all (presence status).

P7 had also tried another form of implicit strategy: during the first two weeks following the workshop, she "*tried not to sign in to Lync, tried to be invisible, but don't have the option. Got emailed anyway*". In this case, she hoped that by not appearing as 'online' on Lync (now, Skype for Business) her colleagues would assume she was not available and thus would avoid emailing her, without her having to explicitly mention when she would be able to respond (such as by using the leadership program her company was trialling where employees were encouraged to share when they checked emails). This strategy is an ad-hoc manual one with minimal friction that works in the moment but relies on the user remembering to apply it.

As part of more explicit strategies to manage expectations, participants explicitly shared with their interlocutors how often they checked their emails or when their working hours would be, by either setting an out-of-office message or adding a customised email signature. Two participants, P1 and P12, decided during the workshop to use out-of-office messages to share their availability. P1, as mentioned previously, was about to start a second job and had envisaged setting up "*for the days when I'm not in the office/working, set up auto-response on* [job2] *account for non-working days*" [P1]. However, after two months, when he had started his second job, he admitted not having set the auto-response up, but rather adapting the strategy to better fit within the current company practice of sharing each other's calendars: "*I didn't ever setup the auto-response on the* [job2] *account on non-working days, although I* […] *made calendar entries showing my availability and made my calendar public*" [P1]. P12 instead worked part-time and wanted to have an out-of-office message between Thursdays and Mondays every week. After two weeks of trialling it, she felt that the auto-respond did not reduce the amount of emails she got, "*but it changed how I feel about* [email]" [P12]. Despite liking the strategy and feeling less overwhelmed as a result, after two months she admitted she struggled to use it consistently every week: "*I'm still using this one, but not consistently as I often forget to set it when I leave on Wednesday. However, on the occasions when I have forgotten, I have generally gone into my email on Thursday or Friday and turned it on then. I am trying to remember because I have found this to be very useful for my own peace of mind. Knowing that people who contact me on Thurs/Friday know that I can't/won't respond until Monday as eased my worry about their expectations.*" [P12]. The difference between these two examples and their success rate is that the former is a manual set-and-forget strategy, where P1 has to set calendar entries only once,

whereas P12 had to manually turn on the out-of-office reply every time she did not want to be available. To help her remember, she could have set up reminders, but that would only add to the barriers of setting up the strategy.

Five participants [P1, P3, P5, P8, P11, P12] tried out email signatures to communicate their working hours or how often they checked their emails. While this strategy has some initial friction (i.e. changing settings and thinking of the message to write), it could work automatically by appearing on any new message or reply and thus also serving as a peripheral reminder to the participant of their commitment. Despite requiring minimal effort overall, participants developed strikingly opposing views to this strategy. In one case, P5 never got around to adding the signature and realised within the first two weeks that although it could be useful for managing other people's expectations of when she checked her emails, she thought it also implicitly set an expectation that she would answer as soon as she saw the message. Similarly, P3 initially set an email signature to state she occasionally worked offline (using Pause Inbox) [**Figure 22**], but "I removed this after 6 weeks because I was not sure how it was coming across professionally to colleagues. I did find it helpful at time. ([this was] Just my worry)" P3.

Please note: I sometimes work offline but will check emails at least once per working day.
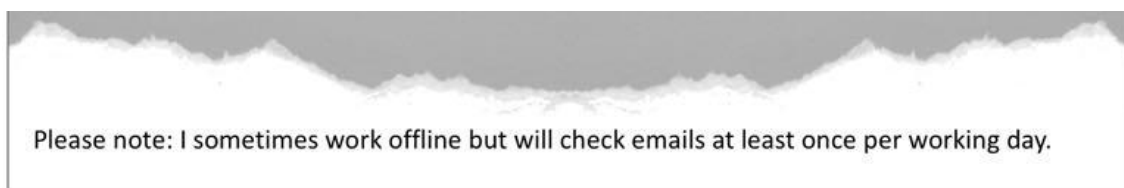
Figure 22 P3's email signature.

Another participant (P11) framed their signature slightly differently to P3 and found that it helped her be more mindful of how much time she spent in the inbox [**Figure 23**]. In addition, she also started "*replying to close collaborators with just 1 liner emails*" [P11], and felt that this made her overall save time spent in the inbox and dedicate it other tasks.

"I respect your time as well as mine, that's why this email is brief."

Figure 23 P11's email signature.

In a similar manner, P12 added the Email Charter (www.emailcharter.org) to her email signature, after P8 shared her view of it during the workshop: "*I had an email from somebody at* [work] *and she only responded with a couple of words and at the end there was a standard thing that said 'too brief? here's why: __' and there was a link to the Email Charter. I never heard of it so I went into it, and it has completely changed how I write my emails now, just from reading it from someone else's email.*" [P12]. The Email Charter is a list of 10 commandments for best practices when emailing. One participant, P14, committed to sharing the Email Charter with his colleagues. He decided to share it

on Slack because he had hoped some of the best practices (e.g. 'Do not reply-all') would apply to the IM channel too, but when we asked after two weeks what the reaction was, he said it did not work as hoped: "*I did but nobody at work seemed to care about it... Really weird. Also, I think the thread feature when it was launched was good but after a while people went back into their bad habits of just posting stuff on Slack*" [P14]. To be noted, between the time P14 took part in the workshop and when he was interviewed at the two-week follow-up Slack had introduced a new feature, called Threads, where it threaded conversations, as an attempt to reduce message overload.

7.4.3.4 Other communication channels management strategies

Despite participants using several communication channels for both work and personal purposes (see **Table 8**), only five participants chose strategies that helped them manage specific communication channels, and primarily social media apps. This might be because they felt that other types of strategies were already addressing some of the issues of being interrupted or distracted. Two of these participants were successful in their strategies and reduced their access and notifications from social media websites: P2 "*turned off social network notifications (twitter, Facebook birthday notifications, second Facebook account)*" and found after two months that there was "*Less disruption, so it* [was] *good.*" [P2]. P15 commented at the two-month follow-up that he had "*stopped to a much larger extent referring to social media apps*" [P15]. He had never intended to reduce his social media access, but perhaps found that by better managing his time and distractions (as per his commitment card, which read "*build focused time in my schedule to better manage my time and application of my attention*" – **Figure 24**), he was less drawn to social media.

Figure 24 P15's commitment card. Handwriting reads: 1. turn off awareness cues as a means of better managing expectations 2. build focused time in my schedule to better manage my time and application of my attention 3. change how often I get new emails.

The other three participants had committed to strategies that presented a larger initial barrier. In one case, P3 wanted to create two separate Facebook accounts, one for personal reasons and one for work purposes. That would require setting up a new account, asking some of her friends to friend her on the new account and removing them for the first account. However, after two weeks she

decided she did not want to do it and instead unfriended certain people and left one of the work groups she had joined which was causing her distraction and boundary cross-over.

Similarly, P16 also wanted to create separate accounts. He initially thought of creating separate phone profiles on his Android smartphone, but after two weeks he admitted this was "*too complicated*" [P16] as it required setting up a new Gmail account and then downloading all his apps on the new phone profile. After two months, however, he was still thinking about how to adapt this strategy in a less complicated way and but had still not found the perfect solution, "*I am considering whether to take up IFTTT but feel it may require a bit of thought and planning before I do*" [P16]. When a strategy requires a considerable amount of effort to set up and get working, even if after it becomes automated, participants were keen to make sure they got it right the first time.

Finally, P14 was motivated by his dislike for Slack and its overwhelming messages and planned to create a channel for his co-workers integrated with an IFTTT rule where colleagues' availability would be automatically be posted whenever they left the office. However, during the two weeks following the workshop, he shared his plan with the team but their response was negative, "*spoke to team about integrating IFTTT to manage availability on Slack (by creating an automatic rule when you leave office) but no need because not co-located*" [P14]. Here, despite P14 being willing to put in the extra effort to set up the rule and the channel, rather than a technological barrier, he faced a social one, whereby his colleagues did not accept the strategy. One could speculate that the negative reaction could be caused by others thinking it was more of a monitoring strategy that took away some of their freedom (although there was no power relationship), whereas P14 had thought of it as a way of letting people know when not to be disturbed. Similar feelings of not wanting to be monitored were expressed by participants in Chapter 6.

7.4.3.5 Notification management strategies

From the pre-workshop survey (and as shown in **Table 8**), we know that most participants were already accustomed to not having sound or vibrating notifications enabled at all times on their smartphone, with three of them having it always on mute, and another seven of them completely blocking notifications at certain times (e.g. in meetings, at night, whenever they arrive home). During the workshop, an additional five participants decided to remove notifications to reduce the number of distractions per day.

For example, P3 committed to "*switch*[ing] *off SMS notifications on phone*", but at the two weeks follow-up she explained she had disabled even more notifications on her phone, including birthday notifications from Facebook, Apple updates, Facebook Messenger, Trello, and Glide (a video messaging app). Similarly, P5 wanted to turn off email pop-up notifications and WhatsApp group notifications, and extended this to all her devices, as she explained at the two-week follow-up: "*No more pop-up notifications for email, no push email on laptop and phone. Muted mum's group on WhatsApp*". Participants who disabled their notifications were very satisfied with the strategy, even

after two months, because they found it "*very useful and less distracting*" [P5], and "*very useful especially outside working hours, will keep*" [P7].

Two of our participants were keen to have more nuanced settings when disabling notifications. In the first case, P16 wanted to experiment reducing personal notifications during working hours, and after two weeks he reported "*Now I get them only from WhatsApp and Messenger, but turned off personal Gmail. It's subtle but it's been really good*." He was really pleased with his solution and planned to continue long term even after two months: "*This has been really good. In fact, as evidence of this, I switched my Gmail notifications back on briefly (I was anxiously awaiting an email!) and found it pretty annoying*". In the second case, P9 was interested in turning off notifications at certain times, using IFTTT. However, after two weeks, she admitted that it did not work "*tried some but didn't want a hard rule, I wanted flexibility. Switching data off at certain times would be better if it had a better sensor*". Despite there being a larger technological barrier in setting up this strategy, P9 did try but ultimately found that what was being offered was not to her satisfaction.

7.4.3.6 Additional strategies

In addition to the strategies listed in the booklet and the adaptations that participants came up with during the workshop, some participants also devised strategies that would help them keep work and personal life more separate or remind them to do so. These strategies were not necessarily tied to a specific communication channel or settings.

Two participants were keen to have more device separation: P1, who had three laptops – a personal one and one for each of his jobs – found that separating their usage helped with managing boundaries and interruptions: "*I've almost entirely divided my computer usage, keeping my Mac for personal, along with two separate computers for* [job1] *and* [job2] *work. This has occasionally not worked, for example when using commercial software which I only had available on a particular device.*" [P1]. P10 instead decided to separate his use of the browser, by using two separate ones for work and personal reasons. He even created "two shortcuts with different photos" to help him distinguish between them. He found that when at home it was hard to maintain the switch between the browsers: "*It's been good, although I probably need to learn to stop using the work [browser] at home*" [P10]. This strategy relied primarily on a manual ad-hoc switch, which we have seen in other strategies being hard to carry out.

Another boundary strategy was wanting to reduce their general use of technology, especially when at home. In one case, P10 had a long-term goal of having a digital Sabbath. Although he had not committed to it during the workshop, after two months he mentioned he was still interested in trying it at some point, although he struggles to make it work because "*it just isn't working out right not. I feel like I need to catch up with stuff before I can do it*" [P10]. Similarly, P17 had a "*long-term goal of taking phone outside the bedroom*", but felt he was not capable of implementing this strategy until he got a bedside table where he could rest a book. During the workshop, he had mentioned that he

wanted to find a box where he could store the phone to make it harder to access it when at home. However, he found a temporary solution to that, by means of "*put*[ting] *my personal phone on max volume, but leaving in my jacket (so I replicate the box effect) until going up for the night*".

7.4.4 Microboundaries for increased boundary control and reduced stress

By taking part in this intervention, participants had the opportunity to reflect on their practices and explored new strategies that made them learn more about themselves and increase awareness of their own work-home boundary strategies. Ultimately, it gave them more control over their work home boundaries and reduce their overall stress. These findings are supported by both our qualitative and quantitative data.

Throughout the data collection, participants shared their feelings towards the study, what they appreciated and what they thought they gained through it. All participants found the booklet extremely useful, with one of them even commenting, "*it's worth its weight in gold!*" [P3] and recommending it to friends, one of whom singed up to a later workshop. One participant even used the booklet and her commitment card "*as a reminder to not let work interrupt home*" [P6], by keeping them on her desk, whilst another one put her commitment card on the fridge [P8]. A few participants mentioned how the workshop gave them some guidance on how to go about thinking about work-life balance issues, which they felt they lacked otherwise. For example, P2 mentioned in the two-month follow-up: "*your workshop was a nice space to do this, don't have the time/motivation to do this generally*". They admitted that just the thought of having to manage work-home boundaries can be very overwhelming and the first big struggle is figuring out a starting point, as P17 commented, "*sometimes you need that extra push to do something, and now I got a push*". These reflections were still present after two months, when for example P16 admitted, "*I would say that the session has made me a lot more conscious of habits I may have and to be able to look at those critically*".

Ultimately, participants were able to reflect on their overall practices in context and gain a deeper understanding of their own preferences. We would like to emphasise that we were not advocating for participants to separate or integrate their boundaries, but rather to feel in control of how they were managed and to provide them with tools to do so. P12 and P11 present interesting cases to exemplify a preference for separation and for integration, respectively. None of P12's initial strategies were explicitly about separating accounts, channels, or devices, however, together they helped her reduce the number of cross-overs caused by technology [**Figure 25**]. With the exception of one strategy (using a Pomodoro timer), she continued to use the remaining three strategies ever at the two-month follow-up, when she commented: "*As I've said before, the strategies all taken in the context of the overall theme of technology and work-life balance have made me reflect on how important technology is to me and has challenged me to be less reliant on my smartphone at home.*

Overall, when I am at home, I am trying to use my phone less (for both work and personal uses) and focused on the 'here and now' more" [P12].

In contrast, P11 had originally set out to try out six strategies [**Figure 20**], yet after two weeks she was only using one strategy, which was an adaptation of one of the original six. Instead of setting up an email signature as stated on her commitment card, after two weeks she had "*been replying to close collaborators with just 1 liner emails*" [P11]. During the two-week follow-up interview she revealed how she "*Always thought that integrating was bad, but actually being an integrator helps me keep on top of things, I feel less guilty.*" This realisation made her feel more confident about her choices and even after two months, she explained, "*I am still combining work and personal responsibilities and it seems to work OK for me*" [P11].
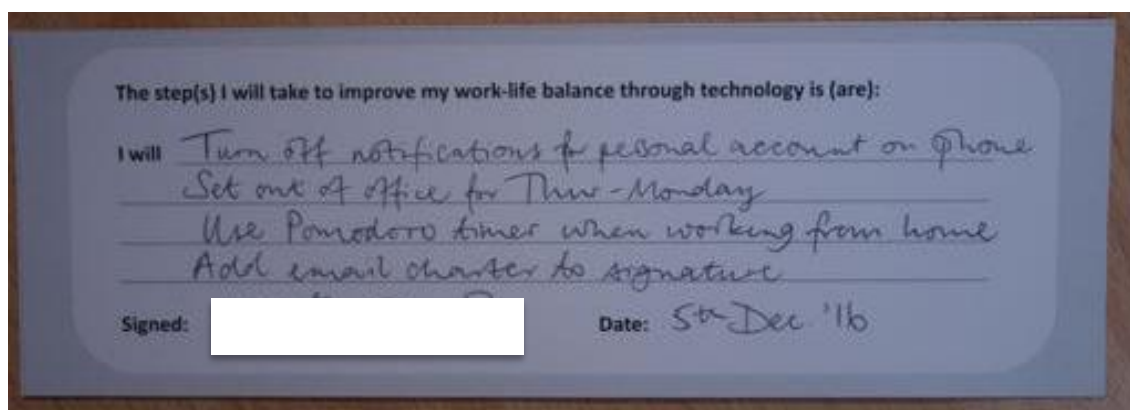
Figure 25 P12's commitment card. Handwriting reads: turn off notifications for personal account on phone; set out of office for Thur-Monday; use Pomodoro timer when working from home; add email charter to signature.

Participants were conscious that keeping up boundary management would take effort and adjustment over time, as the context changed, as P9 voiced: "*you have to do it week after week. it's a constant challenge, which is a thing I like and also makes me very tired*". For example, P17 explained at the two-month follow-up that he was "*still using what I said I was using when we last talked. Just haven't done what I said I was planning or thinking about. Combination of being busy and probably feeling that what I have done so far is working*". He added how he felt that for these strategies to work, they had to be "*low barrier-type solutions that could provide quick results*" [P17].

Overall, over the course of the study, participants reported higher feelings of control over boundary management. Although we are cautious about attributing higher feelings of control solely to the workshops and use of microboundaries, as other factors may have influenced, participants could see quick results from making small changes in their daily practices. P17 nicely summarises this: "*when you see low barrier type solutions and they are very quick to implement, and you see quite quickly the results, they kinda convince you… it helps change your behaviour in a way. It's low cost, low effort initially. You see the results. Then you feel good. You've decided something, done an action, invested time on it, and it's worked*" [P17]. Ultimately, this led to higher sense of control, and

reduce stress, even when workload did not change, as P4 explains: "*At the moment I'm feeling quite good, even though it's still a high workload, I'm feeling more in control of things*" [P4].

This data is supported by our statistical analysis of the two standardised questionnaires – the Work-Life Indicator (WLI) scale, and the Perceived Stress Scale (PSS) that participants filled out before the workshop, two weeks after the workshop, and again two months after the workshop. Below, we report findings from the statistical analysis of each. Because both questionnaires use Likert scales and produce ordinal data, we used more conservative non-parametric tests to analyse the data because there is no way of knowing the distance between the categories. In addition, because we measured the same variables at three different times, we ran a Friedman test for both datasets. The Friedman test is the non-parametric alternative to the one-way ANOVA with repeated measures. It is used to test for differences between groups when the dependent variable being measured is ordinal. All responses from participants P7 and P8 were removed from the dataset as they did not complete the two-month follow-up survey. All tests were run using SPSS. We report effect size using Pearson's *r*.

The WLI scale measures four factors: boundary control (BC), work interrupting non-work (WINW), non-work interrupting work (NWIW), family identity (FI) and work identity (WI). For the WLI scale, we hypothesised that the use of microboundary strategies would increase participants' sense of BC over time. We had not planned for other comparisons over time.

There was a statistically significant difference in BC over time, $\chi^2(2)=6.500$, p=0.039. A Wilcoxon signed-rank test showed that boundary control increased significantly between pre-workshop and two weeks after (Z=-2.506, p=0.012), and between pre-workshop and two months after (Z=-2.934, p=0.003), both having a large effect size (r=0.647 and r=0.758, respectively). However, there was no significant difference in BC between the 2-week follow-up and the two-month follow-up (Z=.713, p=0.476). Participants' scores are calculated by averaging items for each factor, which can range from 1 to 5. Median scores show that BC increased from 2.7 out of 5 (min:2, max:4) before the workshop, to 3.7 (min:2, max:4.3) after two weeks and stayed consistent at 3.7 even after two months (min:2.6, max:5) [**Figure 26**].

We ran post-hoc tests also on the other four factors to see if there were any other differences over time. However, because these comparisons were not planned, we applied a Bonferroni correction to our Wilcoxon signed-rank tests. This resulted in a significance level set at $\alpha=0.017$. There was no significant difference for NWIW, FI, and WI between any of the three stages. However, there was a statistically significant reduction in WINW before the workshop and after two months (Z=-3.149, p=0.002), and this had a large effect size (r=0.813). Median values for WINW pre-workshop, after two weeks, and after two months were 3.6 out of 5 (min:2.3, max:4.8), 3.6 (min:1.8, max:4.4.) and 2.8 (min:2, max:4.6), respectively [**Figure 26**].

For the PSS, we hypothesised that stress would reduce over time. There was a statistically significant difference over time, $\chi^2(2)=12.473$, p=0.002. A Wilcoxon signed-rank test showed that stressed reduced significantly between pre-workshop and two-weeks after (Z=-2.944, p=0.003), and between pre-workshop and two months after (Z=-3.241, p=0.001), both having a large effect size (r=0.76 and r=0.84, respectively). However, there was no significant change between the two-week follow-up and the two-month follow-up (Z=.839, p=0.401). Participants' scores for PSS are calculated by summing across all 14 items (accounting for reverse scoring of seven positive items), leading to a possible range of 0 to 56. Median scores show that perceived stress reduced from 30 out of 56 (min:15, max: 37) before the workshop, to 22 (min:7, max:31) after two weeks and stayed consistent to 21 even after two months (min: 4, max:38) [**Figure 27**].
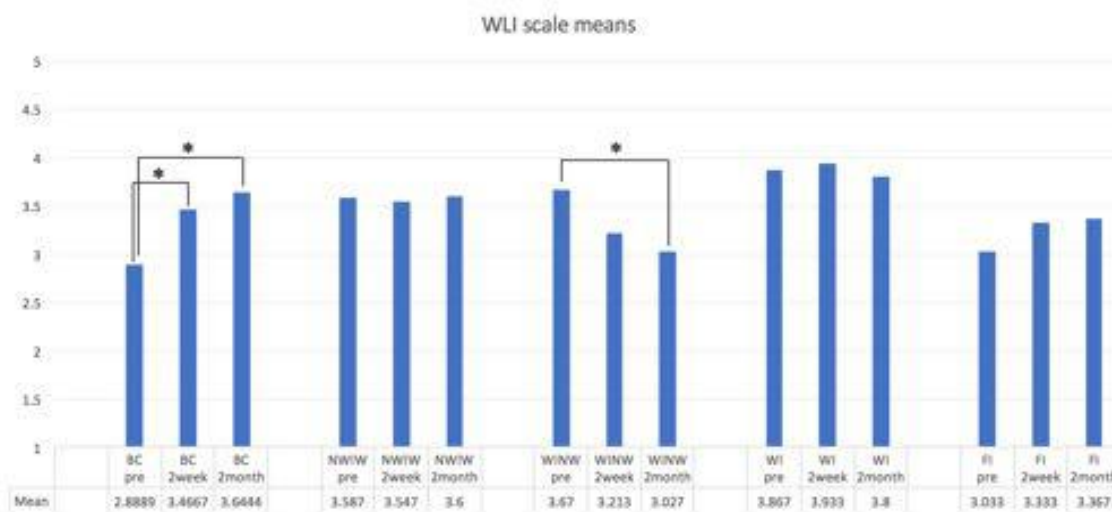
Figure 26 Work-Life Indicator scale mean values.
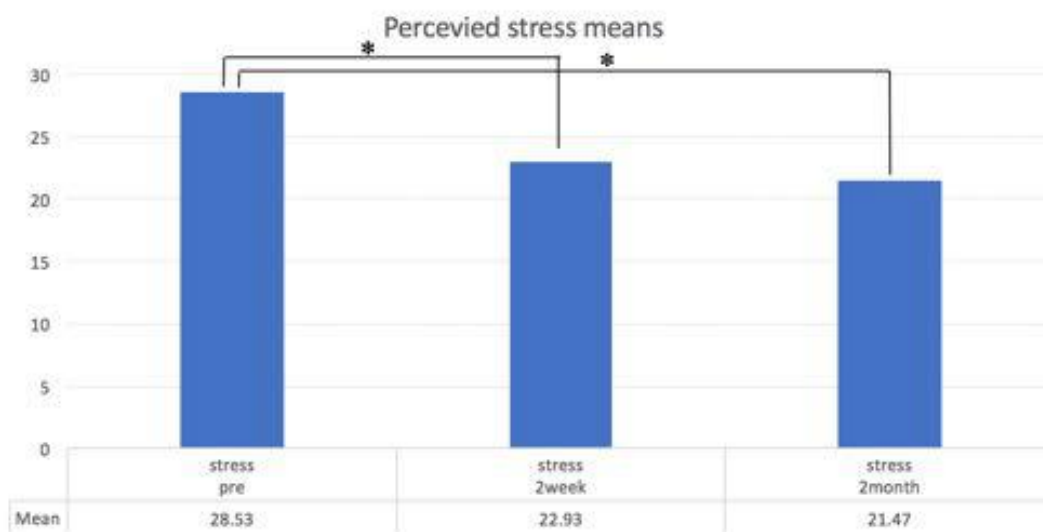
Figure 27 Perceived Stress scale mean values.

7.4.5 Sharing reflections on the workshop experience

In this final section we discuss how at least some participants' strategies where shared (or not) with friends, family and colleagues. This emphasizes how participants saw the benefits of using microboundaries and as such some were even keen to help out others who might have been struggling with similar issues. Other shared their strategies as a way of informing other people about their new practices which might have affected their availability.

Not everyone was keen on discussing work-home boundaries and the use of technology, as P2 stated "[it's a] *bit boring for discussing down* [at] *the pub*". However, most participants shared their strategies, what they learnt, or aspects of the workshop with friends, family and colleagues. They did this in hopes that it would help them too, or to make them aware of participants' new practices, or simply as an exchange of experiences. For example, P10 told his secondary school students "*to create separate accounts so they can actually do some work rather than having every revision session turn into YouTube*". Although the power relationship between P10 and his students might have an impact on how successful the strategy is, others also shared tips and insights with people that might benefit. In another example, P12 had "*several conversations with friends and husband about the nature of work/life balance and technology within this*" as a result of the workshop. Specifically, P12 discussed her strategies with a friend "that does a lot of working at home" and reported in detail what they discussed: "*She finds it difficult to stay focused when working from home, so I told her about the Pomodoro timer (which she said that she'd find very useful). We also discussed the Email Charter. She personally was already using many of the points of advice in this charter, but she felt that many of her colleagues could do with this advice, because in her opinion, the biggest problem for her productivity was the volume of unimportant emails that she receives/is copied in to*" [P12].

Others thought of sharing their strategies as a way of explicitly managing expectations of availability. In one case, P1 explained that among the many people he talked to about this, "*I've also mentioned my strategies to my line managers (in both jobs) and some of my colleagues. I guess I feel like by making them aware of this, that they will be more understanding of my practices*" [P1]. Similarly, P17 wanted to reassure his wife that if he ever took longer to reply to a message, that was due to his reducing notifications and other new strategies: "[I told] *just my wife. So that she knew. I haven't had anyone in the family notice that I look at the phone less*" [P17].

Finally, one participant was keen to share her insights and new-found practices with her husband because "*1) he's been the most affected over the years when I feel work is taking over my life; and 2) despite also having a successful career, he is generally much better than me at making home time me time* [...] *So helpful to exchange insights and discuss my versus his strategies!*" [P6].

7.5 Discussion

In this chapter, we presented a multiple-case study of how a diverse group of knowledge workers chose microboundary strategies during a creative workshop and how they made use of them over the course of two months. Despite previous work calling for more practical interventions, to the best of our knowledge, this is the first intervention case study to evaluate how ad-hoc boundary strategies can help reduce the impact of technology-mediated interruptions and increase boundary control. As a result, we contribute to the existing literature in a number of ways.

According to Kalman (Kalman, 2016), it is hard to understand whether the cause of information overload is in work, information, or communication and failing to understand this prevents us from findings appropriate solutions. Findings from Chapters 4, 5 and 6 have shown how people perceive communication technologies as one of the causes of work-home boundary issues and of feeling lack of boundary control. In this chapter, we have provided evidence that they can help increase their sense of boundary control, reduce work interrupting non-work, and reduce their overall sense of stress. Overall, by providing insights on what participants saw as the benefits and challenges of microboundaries, and what role the social and physical context play in adopting and adapting these strategies, we extend previous literature on boundary theory and strategies. Our findings also have implications for how communication technologies should be designed and how policies should be formulated around training.

7.5.1 Negative barriers and positive frictions in boundary management

Managing work-home boundaries requires effort to balance the demands, attention, and resources between different life domains, especially when unwanted cross-overs might occur. Previous work (Olson-Buchanan & Boswell, 2006) have identified these as struggles that can hinder boundary management. In line with these claims, our participants identified feeling overwhelmed and being unable to prioritise as the two main issues they faced when managing work-home boundaries. By following the journey of 17 knowledge workers who reflected on their current technology-related boundary management issues and seeing how ad-hoc strategies could (or could not) help them, we identified a number of hurdles that participants came across in the process. We distinguish these between *barriers* and *frictions*.

We characterise boundary management *barriers* as anything that gets in the way of users being able to think about or put in practice any boundary management strategies, and as such have a negative connotation. These barriers can be big or small, depending on how they are perceived on an individual level. In this chapter, we found examples of the following, but there could be others:

- *time barriers*, when users struggle to find the time to manage their boundaries or other events get in the way;

- *knowledge barriers*, when users are unaware of how to manage their boundaries or implement certain changes;
- *social barriers*, when the social environment is not supportive or conducive to effective boundary management;
- *technical barriers*, when the technology does not support changes that users would like to implement and workarounds might not be possible;
- *adherence barriers*, when users have to rely on their memory to use a strategy or fail to adapt it when contextual factors change.

By providing the workshops, our aim was to reduce at least two of these barriers: time and knowledge. First, we provided participants with a time and space to sit down and make any changes that could help improve their boundary management. Second, we provided them with a booklet that had instructions on how to implement any strategy they chose. Whilst we could not always change the hardware or software of their devices, we did our best to help participants come up with suitable alternatives to overcome any technical barriers and to suggest workarounds for adherence barriers.

We characterise boundary management *frictions* as any hurdle that users introduce as part of their strategy that allows them to stop and think about their interaction and make sure it aligns with their boundary management values. While barriers occur *before* a user implements a strategy, frictions are one of the intrinsic properties that a boundary management strategy can have. To put it differently, boundary management frictions are small hurdles that slow down the interaction and make it harder for a user to complete a certain behaviour that favours unwanted boundary cross-overs. For this reason, frictions have a positive connotation. We have seen several examples of these frictions throughout the thesis and this chapter, such as using a browser to check work email on one's phone by having to type out the email address and password, thus forcing the user out of habitually tapping on an app icon. To be noted, the amount of friction used in strategies varied on an individual level based on preference.

However, not all microboundary strategies include a friction. In this chapter, we have seen that participants came up with strategies that do not always make a certain interaction or behaviour more difficult, such as setting an email signature to state one's email checking practices. In this case, participants were not trying to discourage certain practices, but rather strategies that lacked friction were put in place to encourage more positive behaviours. To exemplify the distinction between friction-*full* and friction-*less* strategies further, we compare two different strategies that have similar outcomes. For example, to avoid or reduce interruptions, a microboundary strategy that includes friction could be one that uses a notification blocking app, making it more difficult for users to be notified at inopportune moments. Contrarily, to encourage more focused time, a microboundary strategy that does *not* include friction could be taking time to schedule focused time ahead of the week and then at those timeslots rely on the Pomodoro Technique to focus. However, in this case,

the friction-*less* strategy has the added barrier of a user having to remember what those focused timeslots are and to use a 25minute timer.

While our study cannot distinguish when, if ever, a friction-*full* strategy is better than the friction-*less* one, we have provided evidence that making interactions more conscious can be a viable way to make participants feel more in control of their boundary management over time.

7.5.2 Microboundary strategies are put in place along an automatic-manual continuum

Previous work (Jahn, Klesel, Lemmer, & Weigel, 2016) has introduced the distinction between automatic and manual boundary strategies that relate to technology. In their paper, Jahn et al. (Jahn et al., 2016) identify six individual tactics (i.e. push information, pull information, dynamic filtering, boundary app, automatic response, physical detachment) that sit along a "technological implementation" continuum, which extends the integration-segmentation one identified by Ashforth et al. (Ashforth et al., 2000) [**Figure 28**]. However, Jahn et al. have only started to scratch the surface and there are several limitations in their work. In fact, some of the tactics of strategies they identified are applicable only to certain apps (e.g. automatic response to an email) and do not take into account how quickly these tactics can become obsolete as technology evolves.

Our findings build on Jahn et al.'s work and extend it in several ways: in addition to distinguishing between barriers and frictions that relate to strategies, we propose a more nuanced understanding of how microboundaries can be used automatically or manually across different technologies. Throughout this chapter we have emphasised when participants preferred fully manual strategies, such as P17's desire to hide his phone in a wooden box when at home, or more automated ones, such as P10's use of an IFTTT rule to automatically set when and where one is allowed to access social media website. In particular, we have emphasised how the same strategy can be adopted in a more manual way or in an automated way. We found that some participants appreciated having to physically implement the strategy every time as a way of keeping them committed, whilst others actively sought for a way to automate it so they did not have to remember it. The choice depended on personal preference and contextual factors, such as when and where the strategy was being implemented.

Manual and automatic strategies come with their own set of barriers. We found in our sample that those who picked manual strategies, such as checking emails only a few times a day, faced the adherence barrier of having to remember what they had committed to. Similarly, those who picked automated strategies, such as using IFTTT rules, might encounter a knowledge barrier of not knowing how to go about implementing it. However, we found that participants were generally keen to learn or find workarounds to their own strategies, adapting them to their particular circumstances or, ultimately, dropping them in favour of others.

In addition, depending on how automatic or manual the strategy was, participants could have or not have a visual cue that reminded them of their strategy. For example, once an email signature is set, it automatically appears on every email, reminding the participant of their intentions. Contrarily, once a participant changed how often emails were synched in the inbox, they had no cue that could remind them long term about the strategy, unless they made a mental note.

Ultimately, we propose a matrix which combines the manual-automatic continuum and the friction*less*-friction*full* continuum as a way of enriching our understanding of how microboundaries can be constructed. The two dimensions are not mutually-exclusive and provide details of how a strategy can be put to use (manually or automatically) and for what purpose (to prevent or encourage a behaviour). We report examples of microboundary strategies along these two continuums in **Figure 29**. In contrast to Jahn et al. (Jahn et al., 2016) [**Figure 28**], we did not plot the integration-segmentation continuum because we are not advocating for a particular boundary style, but rather to help users reflect on how they can increase their sense of boundary control.
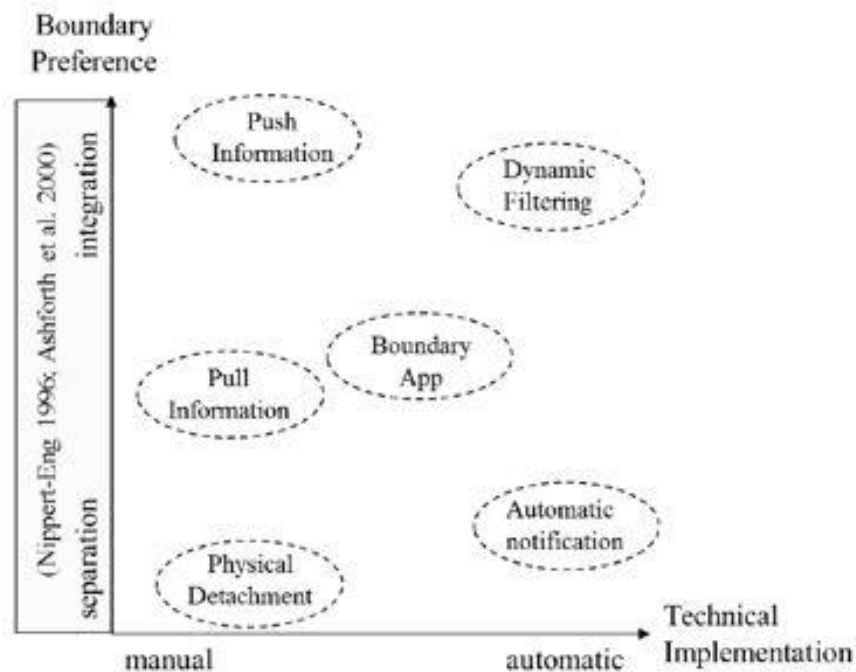
Figure 28 Jahn et al.'s (Jahn et al., 2016) classification of boundary tactics
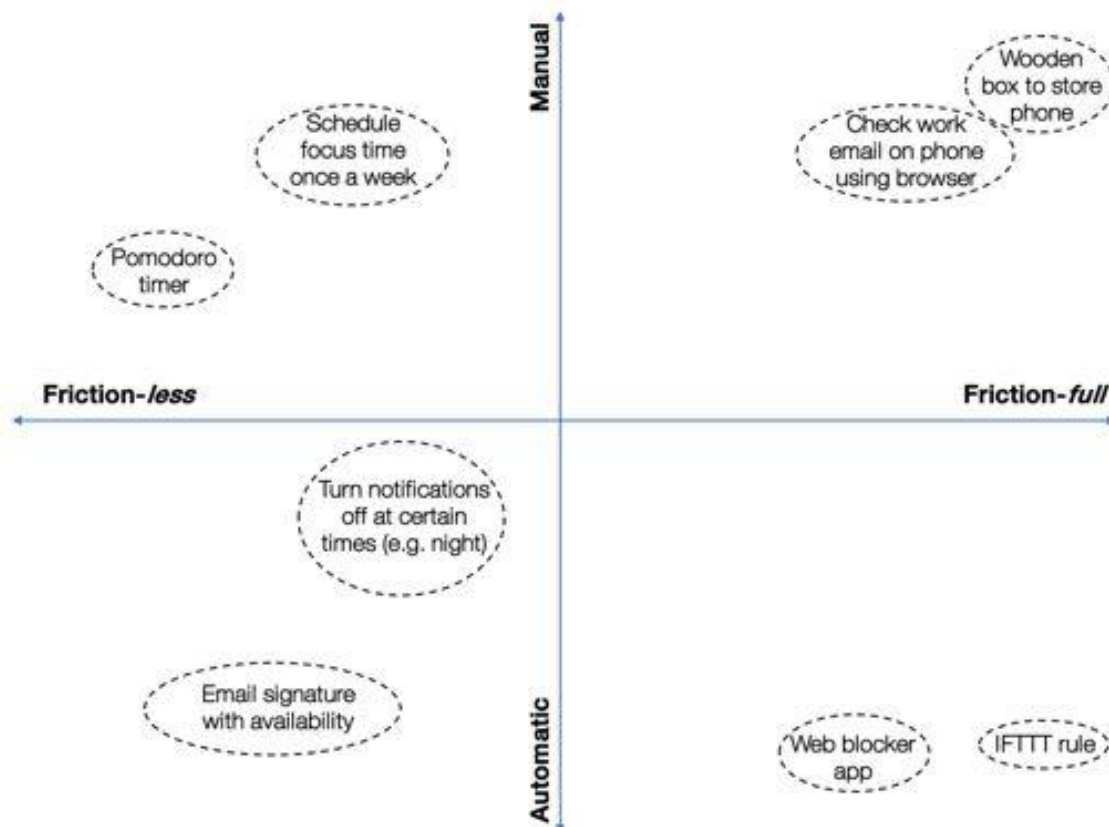
Figure 29 Our extension of Jahn et al.'s (Jahn et al., 2016) classification to include friction*full*-friction*less* continuum.

It is important to note that just like there is not right or wrong between a friction-*full* or a friction-*less* strategy, we have no data to suggest that automatic strategies are better than manual ones, or vice versa. In fact, we found evidence that participants like both, and it really depends on the individual preference and context in which they are used.

7.5.3 Context matters: microboundaries can be long-lasting, but are not forever

When it comes to boundary management, we found that context matters. In addition to making sure strategies were easy to adopt and use over time, participants also had to make sure that they could work within their social and physical environment. To this end, participants had freedom to pick strategies that work with their lifestyle and work patterns, as opposed to being told what strategy to use.

While we are not aware of any evaluation study that investigated the use of work-home boundary strategies in general, one recent study did evaluate the role of turning off notifications for one day (Pielot & Rello, 2015, 2017). Whilst the focus was put on users' perceptions of responsiveness, productivity, stress, and social connectedness, the authors Pielot and Rello did find by the end of their study that almost half of their sample was intending to continue suppressing notifications in the long term. When they followed up with participants two years later, they found that of these, almost

60% were still following through with their intentions. Given that at least some of our participants had similar intentions and that they carried them out for two months, one could speculate that these strategies could be used for much longer.

However, we build on Pielot and Rello's findings by providing a more in-depth qualitative understanding of how users' intentions are carried out, what challenges might prevent users from continuing certain strategies, and how the context affected their choices. In addition, we focused on a broad range of behaviours that went beyond just the use of notifications. For example, when getting a new phone, we found that old strategies were not carried over. In that case, P4 had set an automatic rule whereby she delayed how often her emails were synched. This specific strategy had no cue that could help her remember her intentions and the new phone did not import her previous settings not prompted her to think about how often she wanted to receive new emails. We argue that there is potential for technology to be better designed to import these settings across devices or guide users at first use to choose settings that align with their values and boundary preferences.

Overall, our findings point towards the idea that users do not want to adopt one-size-fits-all strategies, but instead carefully choose them based on their own individual needs and preferences. Although during the workshop we provided examples of strategies participants could adopt, and these were listed in the booklets they took home, participants proved they were not tied to them and actively engaged with their issues. In particular, we found that all participants appropriated at least one of their strategies at some point, for example as a result of starting a new job, or based on interactions with other people. By treating these strategies as a work-in-progress, participants made sure to adapt to the physical, social and technical context changes. Our findings capture the dynamic nature of boundary management (Allen, Cho, & Meier, 2014). As a result, we argue that nation-wide policies such as "the right to disconnect" implemented by France in early 2017 (Agence France - Presse, 2016), have the positive effect to encourage the conversation about boundary management and preferences, but it should be made clear that these are not rules, but rather optional guidelines.

7.5.4 Limitations and future work

The multiple-case study presented in this chapter is not without limitations. Firstly, case studies are often criticised for not being generalizable. In Chapters 4, 5 and 6, we have uncovered a set of user-generated strategies and in this chapter set out to understand to what extent these strategies can actually help increase boundary control and reduce stress. Whilst we cannot generalise to an entire population, or even to all knowledge workers, our goal was to expand the current understanding of boundary management in relation to communication technologies. As Stake states in his chapter on case study research, "*the purpose of the case study is not to represent the population, but the case*" (Stake, 2003, p. 156). However, case studies can still be useful to practitioners and policy makers thanks to the extension of experience they present. As we have mentioned previously, there is a

need for research that focuses on understanding boundary tactics. We have used a multiple-case study as a form of evaluation of microboundary strategies where there was "*no clear, single set of outcomes*" (Yin, 2003, p. 19) and described the real-world context in which they were used.

Secondly, because of the approach we took, we have no a way of exonerating individual factors that contributed to the increase of boundary control and reduction of perceived stress. However, we argue that a controlled experiment with a control group would not have been able to uncover the in-depth qualitative findings we gained through our multiple-case study, nor would have we been able to control for all factors that could have influenced participants during the study. For example, in early January almost all news broadcasters and media reported on the French law about "the right to disconnect" that had just been passed and it is likely that all – or at least most - participants saw this information and might have been inspired to change their habits. However, this law passed at a time when participants from the first three workshops had already completed their two-week follow-up, and participants from the last two workshops had yet to take part. We did not see any obvious difference between participants as a result of this.

Finally, our follow-up data only extend to two months post workshop intervention. We have no evidence about what participants did after two months, whether their boundary control remained high or not. However, we tried to minimise any possible Hawthorne effect ("The Hawthorne effect," 2008), i.e. participants changing their behaviour as a result of being aware of taking part in a study, by not communicating to them they would be contacted for a second follow-up. In addition, based on Pielot and Rello's (Pielot & Rello, 2015, 2017) findings, using some of our participants' strategies, we can assume that at least for some participants, these changes could last a long time, until contextual factors change.

7.6 Considerations for policies and design

Whilst our findings are not representative of the whole population, they do provide useful insights on how microboundaries can be used across individual preferences, across multiple social and physical contexts, and across different communication technologies. As more research should continue to investigate boundary strategies and the role technology plays, we believe that our themes and insights can provide useful pointers for both policies and the design of communication technologies, in addition to implications for individual boundary practices. Some suggestions and ideas for future investigations are as follows:

- **Policies should focus on training, rather than fixed rules**. We have shown how one-size-fits-all solutions do not take into account individual differences, nor any contextual changes that might occur (e.g. getting a new device, working from a different office, etc.). In addition to proposing top-down guidelines or policies on how to manage time, resources and attention, companies should also offer bottom-up training to their employees to empower them to better

understand their own current issues and take charge. In addition, when training includes also some brainstorming sessions, the insights gained from the discussions could be used by the company to improve any issues that emerged. Ultimately, this could foster an environment where issues around work-home boundaries and communication technologies are discussed freely.

- **Interaction designers should allow for more positive friction**. We have shown how introducing friction is not always seen negatively, but rather helps users align behaviours with their values (e.g. when they want to be available). Currently, users are responsible for introducing this friction by using workarounds, but this friction could easily be designed into the interaction. For example, designers could introduce more nuanced settings for getting notifications or build app-blocking functions within the application itself. Whilst we understand that from a commercial point of view, software designers might fear a decline in user engagement, users might feel more satisfied with their use and thus be actually more engaged when they decide to use an app. Future works should investigate how to best introduce this friction.

- **Users' technology preferences should be transferable across-devices**. One of the barriers that users might face when adopting boundary strategies is having to replicate them across devices, or having to re-program settings when getting a newer device. Hand-over experiences across-device has still a long way to go to improve. We suggest that users' setting preferences are saved on the cloud as part of their user profile, and that when setting up a new device or at pre-set intervals, they are prompted to review their current preferences. In time, these prompts could occur whenever the system detects a significant change in context (e.g. noticing the user had changed workplace location).

7.7 Conclusions

We have presented a mixed methods study comprising of multiple-case studies that evaluated how 17 knowledge workers made use of microboundary strategies over the course of two months. After taking part in a creative workshop, where participants were presented with research-informed boundary strategies, they were free to choose at least one strategy that could help with their boundary management issues. We followed-up after two weeks and again after two months and found statistical significance that overall participants' sense of boundary control increased, work interruptions during non-work time were reduced, as was their sense of stress.

Our in-depth qualitative findings show that people adopted and adapted strategies over time to suit their needs. Despite encountering barriers prior to adopting a strategy, we found that participants were not afraid to make them work for them, try new things, discard and change strategies. Strategies chosen introduced friction in the interaction whenever participants wanted to discourage a particular behaviour or were friction-*less* when they wanted to encourage an outcome. We also

distinguish between strategies that have to be manually set every time, and others that work automatically after the initial setup. Ultimately, findings presented here show how microboundaries are flexible strategies that can take into account personal differences and should be treated as a 'work-in-progress' that need to be revisited as contextual factors change.

In line with the approach in this thesis, the intervention presented in this chapter was aimed at supporting participants through a bottom-up approach. To the best of our knowledge, this is the first study to measure changes in boundary control over time and builds on existing boundary management literature by providing evidence on what strategies can help improve boundary control and reduce stress.

This chapter concludes the second part of our thesis, *Data Collection*. In the following and final part, *Synopsis*, we discuss in detail the three contributions this thesis makes as well as directions for future work. We then conclude with a summary of our research.

Part III

Synopsis

Chapter 8

General Discussion

This chapter first summarises the main findings from the studies presented in this thesis and highlights how they help answer our overall research question by identifying how communication technologies challenge and support boundary management in knowledge workers. We then move on to discuss the main three contributions of this thesis and conclude with limitations and directions for future work.

The primary contribution of this thesis is a taxonomy of microboundary strategies, where we define what they are, why they are important, how they differ and how they can be classified. The secondary contribution spins out of our primary contribution, as a contribution to practice for individuals and organisations who want to improve boundary management across devices and channels. The third contribution is a set of implications for design that are drawn from our overall findings and point towards the idea that seamless interactions are not necessarily always ideal when designing interaction with technologies, especially if these affect users' values, and that cross-device interaction should be therefore designed around activities, rather than devices.

8.1 Research findings summary

In this section, we summarise the main contributions from our findings chapters. For each one, we highlight the issues we uncovered and how participants found communication technologies could support them in boundary management. Together, the individual contributions of each findings chapter build our understanding of microboundary strategies, which is the primary contribution of this thesis and will be discussed in the next section.

In **Chapter 4**, we presented our study on how email is managed across devices and accounts and we make three contributions of its own. First, we showed that not just individual differences, but also professional context has a large impact on email practices: when, where and how people manage emails and the impact these have on work-home boundaries. Moreover, we emphasised how technology does not always support boundary preferences or convey these to others. Second, we described the novel finding that some users rely on self-created *microboundary practices* to support their role transitions between work and personal life through technology by applying them to devices, accounts, and software. These findings informed the third contribution, which are a set of recommendations to improve email software design to help users manage their email and work-home boundaries. In particular, we stress the importance of better understanding notification differences across domains and how these might challenge one's availability.

In **Chapter 5**, we addressed the need to investigate further the relationship between notifications and boundary crossing by focusing on multi-device experiences that include always-on-the-user devices: smartwatches. Whilst our findings support the idea that we are experiencing more and more "notification overload", as characterised by Pielot and Rello (Pielot & Rello, 2017), we found that using smartwatches can help cope with the deluge of incoming alerts. In fact, we show how smartwatches were used to create and maintain boundaries through notifications, as well as identify points where other devices and applications challenge users' boundary management styles. Expanding on our notion of *microboundaries*, we started grouping these strategies based on physical, digital, social, and temporal boundaries. These findings hint at the importance of understanding how to give more control and agency to users, for example through notifications and expectations of response, by ways of better managing their availability to others.

To better understand the challenges of availability management and how this impacts boundary management, in **Chapter 6** we compared the sender's and receiver's perspective and distinguished between awareness and availability management. We found that to prevent unwanted cross-domain interruptions caused by others, participants came up with several strategies that would allow them to hide their own availability and delay the moment a receiver had to switch between life domains, or at least mitigate the social expectations of a quick reply. Building on our findings so far in this thesis, these strategies fall under our characterisation of *microboundaries*. What this study adds to our current understanding of microboundaries is that these are often temporary strategies that can be easily picked up and used either in a preventative way, or more opportunistically as a way of limiting the interruption effect of a boundary cross-over facilitated by technology. Moreover, rather than being meant just for the user, microboundaries around availability management are put in place to communicate to the other person what one's boundaries might be. Therefore, we categorise these as strategies for availability management as implicit or explicit, depending on how transparent individuals are at communicating to others their boundary preference. To this end, we defined perceived boundaries, as strategies that participants would use to create the appearance of having set firm work-home boundaries but would in fact still work for example during supposedly non-work

time to catch up on stuff, keep an eye on incoming emails, etc., without feeling the pressure to be always available.

Finally, in **Chapter 7** we presented a multiple case study on how microboundary strategies are actually adopted and adapted over time by knowledge worker, with respect to issues of feeling overwhelmed and being unable to prioritise tasks which led participants to feeling unable to manage their boundaries successfully. Through this chapter we refined the notion of *microboundaries* by detailing how they can be implemented: these strategies can be automated or used manually. Moreover, they can also introduce friction during the interaction to make participants stop and think about their action when the desired outcome is to prevent a certain behaviour, or they do not add any interactional friction when they are meant to encourage a behaviour. Our quantitative findings also show that using these strategies helped participants increase their sense of boundary control and reduce their sense of stress and work interruptions during non-work over time. Finally, we emphasised how these strategies need to be constantly revisited by participants as contextual factors change.

In the following section, we will combine the understanding of microboundaries we have built so far through our findings in order to present our contribution to knowledge. To do so, we will discuss our definition of microboundary strategies, why they are important and how they differ from existing strategies identified in the literature. Then, we present our taxonomy of microboundary strategies.

8.2 Contribution to knowledge

At the beginning of this thesis, we set out to answer the following research question:

> *How do our current communication technologies (i.e. devices and channels) support and challenge boundary management in knowledge workers?*

By identifying the challenges and how participants overcame them as summarised in the previous section, we extend the current understanding of boundary theory in organisational psychology to reflect the role of existing technologies.

According to the social constructivist view of technology, technology is not seen as inherently good or bad, but it is how it is built and later used that determines its connotation (Kalman, 2016). As such, we have emphasised how communication technologies can both challenge boundary management, identity, roles, and availability, for example by creating more interruptions, or by giving away information participants do not always want to share (e.g. whether they have read a message). However, we have also shown how participants can make technology work for them through the use of microboundaries, which can increase boundary control, reduce stress and work interruptions during non-work. In particular, we contribute a taxonomy of microboundary strategies and attributes of how to implement them, which we set out to present in the following sections.

8.2.1 Defining microboundaries

In light of our overall research findings, the primary contribution of this thesis is the concept of microboundaries and its classification, which we first introduced in Chapter 4 and repeat its definition here:

> *A microboundary is a strategy to limit the impact of micro-role transitions*
> *caused by cross-domain technology mediated interruptions.*

Based on the understanding we have built in this thesis, we add to this definition a series of six characterisations of what microboundaries are:

- **Microboundaries are 'micro' because they relate to micro-role transitions in the digital age.**
- **Microboundaries help define the behaviours and cultural norms for *physical and digital places.***
- **Microboundaries are not prescriptive of integration or segmentation preferences.**
- **Microboundaries are technology related, but not necessarily technology-based.**
- **Microboundaries are not mutually exclusive.**
- **Microboundaries are dynamic in nature.**

Throughout the next sections, we will highlight in the text how these characterisations have emerged. To start unpacking this concept and its six characterisations further, we need to first contextualise it within the current understanding of boundary theory.

As we mentioned in section 2.1.1, micro-role transition have been defined by Ashforth et al. (Ashforth et al., 2000, p. 472) as "*frequent and usually recurring transitions, such as the commute between home and work*" and differ from macro-role transition, which are "*infrequent and often permanent changes, such as a promotion or retirement*". Therefore, the micro (i.e., small) and macro (i.e., big) connotations refer to the scale of transition between life roles and the amount of impact this might have. Let's take the example of transitioning from being single to being in a relationship, and to becoming a parent, or from changing jobs, to getting promoted, to finally retiring: these macro shifts in roles come with *new* responsibilities, demands and resources and last for a long period of time. In contrast, taking the children to school as a parent, then entering a meeting as a line manager, meeting a friend for lunch, and later volunteering at the local charity are all smaller transitions between life roles that happen throughout the day, each one with *different* responsibilities, demands and resources. Therefore, one could argue that macro-role transitions generally occur within a life domain, whereas micro-role transitions occur across different life domains.

People have always had multiple roles to juggle on a daily basis, however nowadays communication technologies have made micro-role transitions more prevalent, more frequent, and easier to occur,

as exemplified in the vignette "A day in the life of a modern woman" at the beginning of this thesis. Let's take the example of being on holiday. Fifty years ago, a knowledge worker, such as an academic, would be laying on a beach, reading a book and enjoying the sun undisturbed and unable to do any work, unless he or she had brought it with them on purpose. Twenty-five years ago, that same academic might have had a work mobile phone and whilst sunbathing could have been interrupted by a work phone call or a text message. Fast-forward to today, the same academic is likely going to be sitting on the beach receiving work emails on their tablet, whilst reviewing a paper and at the same time keeping an eye on his/her kids. This comparison can be applied to other scenarios too, such as being in a meeting. In the past if the phone in the office rang during a meeting, unless a secretary came to notify the person, the call would be missed, and the meeting would proceed undisturbed. Now, we carry our phones with us at all times and we might even be wearing a smartwatch, potentially both alerting us of every incoming notification. By reflecting on how, not only the way we work, but more generally our daily lives have changed as a result of technology, we highlight how these micro-role transitions are no longer bounded to specific times or specific locations but can potentially happen at any time and in any place. As such, ***microboundaries are 'micro' because they relate to micro-role transitions in the digital age.***

What the examples above show, is that over time the number of places where we can work from has increased thanks to technology. The reader may remember how in section 2.1.5.1 we discussed this shift in more detail, using Harrison and Dourish's distinction between space and place, where the former is defined as "the structure of the world" and the latter as "*a space which is invested with understanding of behavioural appropriateness, cultural expectations, and so forth*" (S. Harrison & Dourish, 1996, p. 2). In particular, in that section we critiqued Dourish's (Dourish, 2006) lack of deeper analysis around the concept of place when introducing the distinction between physical and digital space, ten years later: whilst he recognised that virtual communications form new spaces, he did not acknowledge the challenges of collocated digital and physical spaces, each defining different places with their own set of behaviours and cultural expectations, which might not always be congruent with each other. Through our findings, we have provided evidence of how communication technologies challenge these the spaces and places where we work and not-work: for example, P7 from Chapter 6 (see section 6.3.8.1) was on holiday abroad (physical space: non-work) and was using his phone (digital space: non-work) primarily as a navigation tool (digital place: non-work), but the moment he found an Internet connection he received a message from his colleague asking him a work-related question (digital place: work). We argue that there are now more opportunities for incongruent overlaps between work and non-work spaces and places, where users appear to have little control over. The incongruence comes from the different behaviours and cultural norms that are associated with different places, be they digital or physical.

As a result, we argue that the current understanding of boundary theory is not sophisticated enough to understand the complexity of people's life, and especially how it has changed since the advent of technology. When talking about physical boundaries, current classifications (which we will discuss in

the next section) are ignoring the role of digital spaces and places play. As such, ***microboundaries help define the behaviours and cultural norms for physical and digital places.*** In the next section, we discuss in more depth the existing boundary strategies that have been identified, what the limitations of these classifications are and how microboundaries differ and add to this understanding.

8.2.2 Comparing microboundaries with other boundary strategy classifications

Despite a lot of previous work calling for more research to investigate current boundary strategies and how to better support boundary management from a bottom-up perspective (e.g. (A. Chen & Karahanna, 2014)), there is still very little work in this area. Most interventions that have been evaluated are about top-down approaches such as policies (e.g. (Kossek et al., 2011)), which, in this thesis, we have critiqued for being very limiting and not considerate of professional differences or individual preferences. We have identified only five papers (Cousins & Robey, 2015; Jahn et al., 2016; Köffer et al., 2015; Kreiner et al., 2009; Sturges, 2012) that have started to classify boundary strategies and how these might be affected by technology. All five studies relied exclusively on qualitative interviews to uncover boundary strategies, and all bar one, recruited workers from different industries. Kreiner et al. (Kreiner et al., 2009) instead recruited only priests, ending up with an all-male sample. Of these studies, the work by Kreiner et al., Jahn et al. (Jahn et al., 2016), and Cousins and Robey (Cousins & Robey, 2015) are the most relevant for this thesis and what we specifically build on. However, for purposes of completeness, we will discuss each below in chronological order of publication and highlight how they define these strategies, as well as the limitation in these current classifications. A summary of these classifications and relative examples can be found in Table 9.

As we already introduced in section 2.1.3.1, in their paper from 2009 Kreiner et al. (Kreiner et al., 2009, p. 2009) talked about "*work-home boundary work tactics" and defined them as "social practices* […] *to decrease work-home boundary incongruence, boundary violations, and work-home conflict*". To create their classification scheme (see Table 1), they built on Clark's (Clark, 2000) work, who had originally distinguished between temporal, physical, and psychological work-home boundaries. Kreiner et al. renamed psychological boundaries as behavioural boundary tactics and added social boundaries tactics. Despite this work being published in 2009 when mobile technology was already mainstream, there is very little mention about the role technology plays in creating and using these boundary tactics. The authors labelled a type of behavioural tactic as "leveraging on technology" but did not provide detailed examples of how their participants actually leveraged on technology, other than relying on caller ID and voicemail. We argue that this "leveraging on technology" strategy needs to be further unpacked and that our taxonomy of microboundaries does just that.

Three years later in 2012, Sturges published a paper which unearthed "*unofficial techniques and activities* […] *that individual use to shape their own work-life balance*" (Sturges, 2012, p. 1540). They too used Clark's framework of boundaries, but they combine it with a job crafting typology framework (Wrzesniewski & Dutton (2001) in (Sturges, 2012)) to group the strategies identified in their sample, ending up with: physical (which includes temporal), cognitive, and relational techniques. In doing so, they emphasise the dynamic and flexible nature of these crafting techniques, such as "location crafting" where users would manage where they spend their time working. Whilst this paper is relatively recent, location crafting is the only technique that mentions the use of technology, as a way of allowing work to happen even outside the office but does not offer much in the way of further understanding.

It is only very recently that the role of technology for boundary management has been taken more directly into consideration. As introduced in section 2.1.5.3, in 2015 Cousins and Robey (Cousins & Robey, 2015) presented two studies carried out in 2004 and 2008 where mobile workers were interviewed about their use of devices for boundary management. The strategies that were identified were then mapped out using Clark's framework (physical, temporal, and psychological boundaries) against five affordances of mobile technology: mobility, connectedness, interoperability, identifiability, and personalisation. By comparing the technological capabilities available in their two datasets (e.g. smartphones were not available in 2004), they were able to identify how technology enables new types of strategies which can be adapted to users' needs. Although their examples provide more insight into what Kreiner et al. (Kreiner et al., 2009) call "leveraging technology" strategies, this classification does not take into account how strategies are communicated or used in relation to others, nor does it unpack the implications of managing physical boundaries, which our microboundary classification instead does.

More generally, the three classifications presented so far do not provide actionable strategies that other users can pick up and use. Rather, they are a more abstracted way of arranging boundary management behaviours. The next two classifications we discuss do, instead, present more actionable strategies, and both rely on Ashorth et al.'s (Ashforth et al., 2000) integration-segmentation framework to identify strategies.

In 2015, Köffler et al. classified "*six technology-related aspects that describe the intensifying role of IT consumerisation in terms of blurring boundaries*" (Köffer et al., 2015, p. 1). They identified three aspects for integration, and three for segmentation, which we argue is too limited. These primarily refer to the use of company devices for only work or both work and personal reasons, and similarly the use of personal devices just for personal use or also for work purposes. The authors emphasised the number of issues that users still encountered in fulfilling their boundary preferences, and in particular how those who tended to integrate work and personal life included also users who would prefer to segment the two domains but were unable to do so because they were unable to manage their technology.

Finally, in 2016 Jahn et al. classified IT-related tactics as information-technology "tactics to manage the boundaries between work and private life domains using information technology" (Jahn et al., 2016, p. 8). What they contributed is the how these tactics are put in place using technology: they can be automated or implemented manually. Just like Köffler et al., they used Ashforth et al.'s framework and organised strategies along two continuums: boundary preference (integration-segmentation continuum) and technical implementation (automatic-manual continuum) (see Figure 28). Interestingly, Jahn et al.'s work builds explicitly on the findings we presented in Chapter 4 and that we published in 2015 (Cecchinato, Cox, et al., 2015b), by extending the notion of microboundaries beyond email communication. Our findings from Chapter 7 have further extended their classification (see Figure 29) to include the degree of friction that a microboundary strategy may or may not include. However, there is an important distinction to make: while Jahn et al. only categorise strategies that make use of information technology, our microboundary taxonomy extends this to include any strategy that limits the impact of technology-mediated interruptions, and thus may not necessarily be technology-based strategies. As such, we can say ***microboundaries are technology related, but not necessarily technology-based.***

Table 9 Existing classifications of boundary strategies

Authors	Year	Method	Sample	Label used for boundary strategies	How they define boundary strategies	Categories of strategies and examples
Kreiner, Hollensbe, and Sheep	2009	1. open ended survey 2. interviews	1. 229 (all M) 2. 60 (all M) priests	work-home boundary work tactics	"social practices [...] to decrease work-home boundary incongruence, boundary violations, and work-home conflict" (p.2009)	physical: adapting physical boundaries, manipulating physical space, managing physical artefacts (e.g. calendars, keys, post mail) / temporal: controlling work time (e.g. building focused time, finding respite boredom, retreat) / behavioural: using other people, leveraging technology (personal color #), email, invoking triage, allowing differential permeability / communicative: setting expectations in priori, configuring relations (a priori/post)
Sharpe	2012	interviews	34 (20M, 14F)	tactical techniques and activities	"work-life balance crafting behaviour [...] that individuals use to shape their own work-life balance" (p.154)	physical: including temporal crafting, location crafting, choosing a job, reducing travel time / cognitive: defining work-life balance, prioritising work, making compromises / relational: managing work relationships, managing out-of-work relationships
			1. law firm 2. public sector organisation 3. retailer 4. IT consultant 5. professional services firm 6. petrochemical company 7. actuarial firm			
Cousins and Robey	2015	1. interviews in 2004 2. interviews in 2008	1. 11 (9M, 2F) 2. 14 (8M, 6F)	boundary management strategies	"used to establish, maintain and modify [...] boundaries between work and family (Nippert-Eng, 1996)" (p.36)	physical: selecting space, configuring space / temporal: scheduling, converting dead time to productive time, multi-tasking / psychological: technology designation rules, boundary permeation rules, connection and disconnection rules
				Mobile workers (including office based, home-based, and self-employed workers)		
Köffer, Anlauf, Ortbach, and Niehaves	2015	multiple case study based on interviews	53 (38M, 15F)	technology-related aspects	"six technology-related aspects that describe the intensifying role of IT consumerisation in terms of blurring boundaries" (p.1)	when striving for integration: 1. dual use of company IT for private tasks 2. dual use of private IT for work tasks 3. remove access to work data / when striving for segmentation: 1. distinct devices for private and work purposes 2. separate private and business accounts 3. quality of company provided IT
			1. industrial manufacturing company 2. consultant organisation 3. public sector organisation 1 4. public sector organisation 2			
Jahn, Kliestik, Lemmer, Weigel, and Niehaves	2016	interviews	15 (10M, 5F)	IT-related boundary tactics	"Tactics to manage the boundaries between work and private life domains using information technology" (p.8)	Integration: 1. push information 2. dynamic filtering / Mediation between separation and integration: 3. pull information 4. boundary app / Separation: 4. physical detachment 5. automatic response
			1. industrial sector 2. financial sector 3. IT-business 4. public sector			

8.2.2 A taxonomy of microboundary strategies

In this section, we present our taxonomy of microboundary strategies. The word taxonomy comes from Ancient Greek, τάξις (taxis, meaning *arrangement*) and -voμία (-nomia, meaning *method*). Taxonomies were first used in biology to group together organisms based on shared characteristics and the concept has since been adopted in several fields as a way to classify things, concepts. First, we specify the frameworks we use - and build on - to create our taxonomy, and later we describe its organising categories, followed by the attributes that define how microboundaries can be implemented.

Our taxonomy uses Clark's (Clark, 2000) boundary framework to build on Kreiner et al.'s (Kreiner et al., 2009) classification of temporal, behavioural, communicative, and physical tactics. The categories we use differ from Kreiner et al.'s as follows. We identify strategies that relate to technology-mediated interruption and fall under temporal strategies. To better reflect their nature, we rename behavioural strategies as cognitive ones, as used by Sturges (Sturges, 2012), and communicative strategies as social strategies. In addition, we refine the notion of physical boundary tactics that Kreiner et al. and Cousins and Robey (Cousins & Robey, 2015) use to take into account Dourish's (Dourish, 2006) space and place distinction. As a result, we distinguish between spatial microboundary strategies that help define *physical places* and others that help define *digital places*. We summarise our taxonomy with examples in **Table 10** and provide a detailed description of its categories below.

- **Spatial microboundaries**: these strategies relate to how users' actions and experiences unfold in the physical and digital world, and can be divided into strategies for:
    - o **Physical places**: strategies that define behavioural rules of a particular physical space (e.g. relegating any devices used for work outside of a particular room in the house);
    - o **Digital places**: strategies that define behavioural rules of a particular digital space (i.e. a communication space, such as separating social media accounts to reflect different life roles).
- **Temporal microboundaries**: strategies that set temporal boundaries to certain technology-related behaviours (e.g. disabling notifications in the evening).
- **Cognitive microboundaries**: strategies that set cognitive rules about how work and non-work are defined and constrained (e.g. making a commitment to check emails less frequently)
- **Social microboundaries**: strategies meant to directly impact others' behaviours, expectations, and boundary cross-overs (e.g. turning read receipts off).

We have chosen Clark's framework as opposed to Ashforth et al.'s (Ashforth et al., 2000) integration-segmentation framework to organise our taxonomy because depending on how these microboundaries are adopted, they could help either integrate or segment life domains, but regardless of the purpose, they still help increase boundary control. As such, ***microboundaries are***

not prescriptive of integration or segmentation preferences. In fact, we found evidence of participants using these strategies to both integrate and segment. For example, P8 from Chapter 6 strived to keep work and non-work domains separated and made sure anyone she worked with knew about this preference, yet she too had kept work and personal emails separate on her phone. Contrarily, P14 in Chapter 4 did not see a distinction between work and personal life and thus interweaved the two on a daily basis. However, she still had separate applications for work and personal email on her phone, suggesting that despite leaning towards the integration end of the continuum, she still segmented certain aspects. We have emphasised throughout this thesis how boundary control is key to effective boundary management and we have provided evidence that microboundaries help increase boundary control.

Table 10 Taxonomy of microboundary strategies

Categories		Strategies	Examples
SPATIAL MICROBOUNDARIES FOR...	**...PHYSICAL PLACES**	Separating devices	*Having a work phone and a personal phone*
		Creating distance with device	*Hiding a device in a box*
	...DIGITAL PLACES	Separating applications	*Having personal email on an app, but work email is accessed on browser tab*
		Separating accounts	*Having a separate email account for purchases/junk mail*
		Disconnecting from Internet	*Turning on airplane mode*
		Enabling / disabling all or selected apps or notifications <u>between devices</u>	*Getting only priority emails (from both work and personal accounts) on smartwatch*
		Filtering information within an app	*Having a dedicated folder in work email to filter personal messages*
TEMPORAL MICROBOUNDARIES		Enabling / disabling apps or notifications <u>temporarily</u>	*Removing app from phone during holiday*
		Enabling / disabling apps or notifications <u>periodically</u> (at regular interval)	*Setting up night mode, during which no or selected notifications come through*
		Disabling **all** apps or notifications <u>indefinitely</u> for a particular device	*Turning off push notifications*
		Scheduling focused time for an activity	*Using the Pomodoro technique to help prioritise activities without getting distracted*
		Changing notification frequency	*Changing how often new emails are synched*
COGNITIVE MICROBOUNDARIES		Making a commitment	*Decide to check email less frequently*
		Creating mental rules	*I will only access Facebook at home or on the go, but not in the office*
SOCIAL MICROBOUNDARIES		Setting expectations	*Setting up email signature with checking habits*
		Managing availability	*Turning awareness cues off*

Our work has also uncovered a number of attributes according to which microboundary can be implemented. In Chapter 6 we discussed four of these attributes: **opportunistic or preparatory strategies**, depending whether they are used as and when needed, or they are set in advance as a preventative measure, and **implicit or explicit strategies**, which relate only to social microboundaries and how they are communicated to others. In Chapter 7 we identified additional

four attributes: **friction-*full* or friction-*less* strategies**, depending whether they introduced a positive friction to prevent certain behaviours or did not to encourage other behaviours, and **automatic or manual strategies**, which define how the strategy is initiated at time of use.

Aside from the implicit and explicit strategies which only relate to social microboundaries, all other attributes apply to any type of microboundary and are not mutually exclusive between each other. For example, deciding to access work emails on a browser by having to enter email address and password every time is an example of a manual, friction-*full* and preparatory strategy that belongs to the category of digital places. Similarly, turning awareness cues off is an example of a social microboundary that is automatic, implicit, friction-*less* and preparatory.

It is important to stress, however, that microboundaries are also not mutually exclusive and depending on users' needs and preferences, can be combined in infinite ways. This emphasises the dynamic nature of boundary management and how strategies often complement each other as part of a multipronged approach. As such, we can *say microboundaries are not mutually exclusive* and *they are dynamic in nature*. For this reason, the taxonomy we constructed should not be interpreted as absolute (i.e. it is not the only way strategies can be classified) or final (i.e. it is not necessarily complete) of all possible microboundaries strategies. While we have done our best to classify the strategies we have identified throughout the course of the studies presented in this thesis, future technological advances may challenge our current classification, depending on what features and settings are introduced.

8.3 Contribution to practice

Our second contribution is a resource of boundary management strategies that form *actionable knowledge* (Cummins and Jones, 2003 in (Kreiner et al., 2009)). In this section, we will first discuss how our findings contribute to individual boundary management practices and present how the work in this thesis has already started to create impact in this direction. Then, we will discuss how our findings contribute to organisational practices around work-home boundaries policies and guidelines, and in particular what are the implications for policy makers.

8.3.1 Impact for individual practices

In this thesis, we have demonstrated how the microboundaries strategies we identified in Chapters 4, 5, 6 and evaluated in Chapter 7 form a resource for individuals who struggle feeling in control of their boundary management. We have provided evidence of how microboundaries strategies can help increase boundary control and reduce perceived stress. We have also stressed the importance of users choosing a strategy that works for them based on their particular context. Thus, in order to contribute to individual practices, it was important for us to produce something that could help users reflect on their own practices and guide them in choosing a strategy.

We therefore created a diary study template and a booklet of microboundary strategies. In Chapter 6, we developed a diary template to collect participants' behaviour around boundary crossings caused by communication technologies. Based on the feedback we received and how the process of recording their behaviour in a diary helped them reflect on their daily practices, we refined the diary template as an Excel spreadsheet. We simplified the fields that users had to fill out compared to the diary study template and provided instructions on how to use it. A copy of this diary can be downloaded here: http://goo.gl/cmf9qf. In Chapter 7, we presented these strategies to participants in a booklet. Based on our findings, we later refined the booklet to include a brief introduction, some background information, and more importantly, a guideline of how to use the booklet. A copy of this booklet can be downloaded here: http://goo.gl/OJRw6W.

In January 2017, we then uploaded both these resources to our research website, www.digitalboundariesresearch.wordpress.com (created to recruit participants and disseminate research findings) and periodically shared it via social media. We used a shortened link for both the diary and the booklet to track the number of clicks on each file. However, depending on how the files were being shared, the shortened link was not always used, so not all clicks have been recorded.

To the best of our knowledge, no prior work has produced accessible resources that users can easily pick up and use to manage their boundaries. Over the past year (January 2017-January 2018), these resources have been disseminated across a number of venues all over the world, both in digital and printed format: the diary template was downloaded more than 60 times, whilst the booklet was downloaded almost 500 times. These resources were also explicitly mentioned or shared on various media outlets, including the New Scientist, the Changing Academic Life podcast, the Digital Mindfulness podcast, the UCL Student Support and Wellbeing blog, and the Women in Academia Support Network Facebook group, as well as being periodically shared on Twitter.

8.3.2 Impact for organisational practice

Throughout this thesis, we have demonstrated how, when it comes to boundary management, one-size does not fit all. We have emphasised how personal preferences and professional differences are not taken into account when company policies are introduced, showing their limitations to effectiveness. While we do not discount the importance of having organisational policies, based on the findings presented in this thesis we argue that these should be formulated as guidelines that help promote a working culture open to dialogue around boundary management, as opposed to constricting rules. To this end, we have proposed that a policy should instead require ad-hoc training for employers around how to increase boundary control, modelling our workshops presented in Chapter 7.

Whilst we have not produced a freely available resource to deliver these training workshops as we did for the diary and the booklet, our workshop model is currently being used as part of a different project and adapted to a different user group. This project (https://iwards.wordpress.com/), funded

by UCL Grand Challenges, focuses on increasing resilience strategies in junior doctors qualified as medical practitioners who are both working and completing postgraduate training. Ultimately this new project will provide insight on whether microboundaries are helpful also to other professions such as health care providers, who still have a lot of work flexibility, but less control over their working hours and place.

8.4 Contribution to design

Our third contribution concerns more specifically HCI research and how interactions with technology could be designed. Whilst we have made, where relevant, specific design recommendations as a result of findings from our studies, our work also allows us to make broader considerations for design. Here we discuss how, having created a better understanding of how device- and app ecologies are used to manage boundaries, our findings have implications for the design of interactions in general, and, more specifically, for cross-device interactions.

HCI and Interaction Design have always aimed at improving users' interactions and experiences with technology. As such, practitioners and researchers have strived to create seamless, friction-*less* interactions, that have the smallest possible number of steps to complete a task, following simple usability principles (Nielsen, 2000) . However, as technology becomes more prevalent in our lives, the frequency and way we interact with it has changed. We discuss two of the consequences, by underlining two principles that can guide the development of technological solutions to better support boundary management: (i) designing friction in the interaction can help align users' behaviours with their values and beliefs, and (ii) interactions across devices should be designed to be activity-centric (not device-centric) to take into account digital spaces and places.

8.4.1 Designing friction in the interaction can help align users' behaviours with their values and beliefs

One of the consequences of this change, is what popular media has referred to as 'attention economy' (McDonald, 2016), whereby users' attention is treated as a commodity that software companies leverage on to make sure users remain engaged with their content. An example of this exploitation can be a video on the Facebook newsfeed that automatically starts playing after the user has paused on it for long enough. This and many other techniques are designed into our interactions with the intention of keeping the user interested in the app. However, some argue that the downside of this is that users may no longer behave in accordance to their values and beliefs and terms such as 'Internet addiction' are used when making these arguments (Manjoo, 2018). Although Internet addiction is not a recognised pathology, market figures (Statista, 2017) show how we spend a growing proportion of our day on our devices and research has shown how quick we are to react to alerts (e.g. (Pielot et al., 2014)) for fear of missing out on information (Pielot & Rello, 2017).

We have demonstrated how microboundaries can be used to introduce a positive friction when interacting with technology, including them as a way to counteract the use of these attention economy techniques and thus discourage certain behaviours, which may have become habitual. However, our evidence also shows that these positive frictions are always introduced by the users themselves, yet the workarounds that participants created to introduce this friction could easily be designed into the technology by interaction designers. For example, when setting up a new smartphone, a user could be prompted with a series of questions that make him/her stop and reflect about what apps to install or what settings to select, providing some explanation as to why they might want to have separate work and personal email applications. This would ultimately help interactions be more in line with users' values and could apply not only to boundary management, but any other behaviour that might challenge values and beliefs.

Some researchers are already advocating for a similar approach, whereby users' values should be put at the centre of any interaction design (e.g. (Friedman, 1996, 1997) and the design of mobile user experience should take into account all aspects of users' lives, to make interactions more mindful (Robinson, Marsden, & Jones, 2014). Other examples of positive frictions being included into interactions to make sure behaviours align with values exist in the commercial world. For example, the fintech company Squirrel helps users avoid overspending by withholding money before it reaches the bank account so that pre-budgeted money does not get spent unwisely (Reynolds, 2017; Squirrel.me). Their app requires users to pre-allocate amounts of money as 'savings', 'bills', or 'spending money', Squirrel then acts as a second bank account which stores the money until it is needed, at which point it is released into the user's bank account. In case the user wants to override the system, money can be accessed but they still need to wait for a day to get it. By making expenditure outside the pre-allocated budgets more difficult, users have to think twice about whether they really want to follow through on their purchase. Although there are some clear financial gains for software companies in keeping users engaged with their apps at all times, we argue that there is scope to further explore the use of positive frictions for interactions to create more meaningful interactions that still prevent technology from being abandoned, especially if its use if voluntary. This is especially important when they relate to work-home boundaries and expectation management. Thus, what we contribute to this line of work is a contextualisation of how positive interactional frictions can be introduced to help boundary management.

8.4.2 Interactions across devices should be designed to be activity-centric, not device-centric, to take into account digital spaces and places

Another consequence of technology becoming more prevalent and changing the way we interact with it is directly linked to the number of devices we have at our disposal. One of the motivations for this thesis' approach was the lack of understanding of cross-device user experience, especially in relation to work-home boundaries.

In this thesis, we have shown how using multiple devices to complete a task can affect performance, as well as challenge boundary management. For example, in Chapter 4 we provided evidence of participants struggling to keep on top of their inbox because of not remembering what actions they completed on their phone vs. their laptop and thus suggested labelling actions based on devices they were completed on. In Chapter 5 one of our design recommendations was around de-centralising notification settings, in order to better support boundary management based on people, not applications. Extending the work of Nouwens et al. (Nouwens et al., 2017), findings from Chapter 6 echoed the need for creating specific places within different digital spaces to support the various rules and behaviours that participants put in place across apps and devices. What all these recommendations have in common is the need to design settings and features that are de-centralised from specific applications or devices (digital spaces), in order for them to support individual preferences and rules around people, topics, and life domains (digital places).

Although current work around cross-device interaction has focused primarily on producing new systems, interaction techniques, and tracking infrastructures (e.g. (X. Chen & Grossman, 2014; Plank et al., 2017; Rädle, Jetter, Marquardt, Reiterer, & Rogers, 2014)), most of these have not yet been incorporated into commercial technology, nor do they consistently take into account the inherent messiness of when people 'do the ubicomp' (Weiser, 1991) in realistic environments. Devices and their containing applications are still designed as 'isolated islands' of computing and information. As a result, when people use multiple devices in various combinations and configurations depending on the activity at hand, they resort, when possible, to elaborate workarounds to make technology work for their needs (Cecchinato et al., 2016), as we have shown in this thesis. Therefore, we argue that research and commercial efforts should better support dynamic device ecologies that are activity-centric, by designing for users' work around devices (digital spaces) and activities (digital places).

8.5 Limitations and future work

In addition to the limitations of the individual studies presented in this thesis, which have been discussed in their corresponding chapters, there is an additional point that applies to the thesis as a whole. Due to the nature of our research question, most of our evidence is based on self-reported data, which can be criticised for potentially lacking accuracy due to mis-remembered experiences (Silverman, 2013). However, because we were more interested in understanding people's everyday experiences, a situated approach was preferred to an experimental one, consistent with other boundary management work (e.g. (Cousins & Robey, 2015; Jahn et al., 2016; Kreiner et al., 2009)). In addition, whilst data logs could have provided more accurate accounts of users' activities, overcoming participants misremembering, they also introduce issues around trust and privacy (Cecchinato et al., 2016), and research has shown how collecting logged data of cross-device experiences is still not possible (Dong, Churchill, & Nichols, 2016). As a result, in each of our studies we have taken a mixed method approach in order to triangulate findings. In Chapter 4, we subsidised interview data with a standardised survey to compare professional differences for email

management; in Chapter 5 the author of this thesis carried out an autoethnography to ensure a deeper understanding of the experiences reported in the interviews with early adopters of smartwatches; in Chapter 6 we deepened our understanding of availability and awareness management from interviews and a focus group by using daily diary entries that could reduce participants' burden of having to remember interactions and experiences; finally, in Chapter 7 we combined observations during the creative workshops, with interviews and standardised survey at multiple points in time to uncover how microboundaries are put in practice. In addition, to increase credibility, we have included where appropriate simple counts of phenomena in each chapter and have pointed out consistencies between participants across studies over what they considered challenging in boundary management and communication technologies, and what strategies they found useful.

Because of the nature of our mainly qualitative mixed method approach, we need to be careful about generalising beyond our sample. However, we argue that this does not limit the usefulness of our findings, and instead opens the door to opportunities for future work. Researchers have already started to build on some of the published work presented in this thesis. For example, we have already pointed out how Jahn et al. (Jokela et al., 2015) build on our concept of microboundaries. In another example, Zhao et al. extend findings from Chapter 4 to show how they apply also to the use of social media platforms, where users "*consciously calibrate platform boundaries*" (Zhao et al., 2016, p. 97).

We call for more work to further deepen our understanding of microboundary strategies, for example, by taking a longitudinal approach. Long-term studies are not common in HCI, where most work focuses on understanding current use, design, and experiences of technology and interactions. We have attempted to overcome this by extending our evaluation over two months (see Chapter 7). Longer-term evaluations that take into account particular contextual changes can provide further insights into the kind of barriers users might face over time when adopting microboundaries.

In addition to deepening the concept, future work should also broaden our current understanding of microboundary strategies to go beyond their use in knowledge workers and for communication technologies. For example, what other professional groups could benefit from using microboundaries? If microboundaries do not help improve boundary control for a particular professional group, what would help? Some work in this area is already being carried out in a project the author of this thesis is collaborating on and that we mentioned earlier, (see section 8.3.2) which is looking at how to increase resilience and wellbeing in junior doctors but it is also looking to evaluate their use of microboundary strategies. Moreover, in this thesis we have focused primarily on the impact of communication technologies defined as channels and devices on boundary management. However, there are other domains where boundary strategies might be used and be indeed useful, such as in security or in personal information management (PIM). PIM has received a large amount of attention in HCI (e.g. (Bergman, Boardman, Gwizdka, & Jones, 2004; Boardman & Sasse, 2004;

Haraty, McGrenere, & Tang, 2016; Jones et al., 2015), but very little work has addressed differences between how work and personal information is managed and retrieved. Some initial work has looked at how retrieval strategies differ between work and personal emails across devices (Cecchinato et al., 2016), but more work is necessary to extend this to other forms of personal information, as part of a broader call to make HCI more scalable across contexts (Brown, Bødker, & Höök, 2017).

Chapter 9

Conclusions

Today's pervasiveness of communication technologies has had profound impacts on spatial-temporal interactions in both work and personal domains, creating a constantly connected society: connected through our multiple devices, connected on a multitude of communication accounts and channels, and connected with our many daily roles (that loosely fall in either work or personal life domains). While on one side, this has created positive work-home boundary interferences where users have more flexibility and control of their working hours and location based to their needs, on the other side these spill-overs between work and personal domains have been linked with stress and the compelling feeling of having to be constantly available, regardless of time or space. Initial evidence has shown how these two consequences have changed the way we work, extending the usual 9-to-5 working hours to potentially spread throughout the whole day. This in turn introduces the new challenge of negotiating availability and work-home boundaries throughout the day, exacerbated by mobile and wearable technologies that can act as notification devices strapped to our body. On one hand, boundary theory from organisational psychology has started to identify general trends and users' preferences regarding work-home boundary management strategies, but so far has lacked a deeper understanding of what strategies are used to manage boundaries, particularly when technology has increased the opportunity, frequency, and ease of cross-overs. On the other hand, HCI literature has failed to address the implications that technology pervasiveness has on users' way of managing work and personal domains.

This thesis has investigated how work-home boundaries and availability are managed in knowledge workers, via the use of modern CMC channels and multiple devices, with respect to those with

whom we interact. Our findings have shown how cross-overs, boundary interruptions, and expectations of availability can be mitigated by users by relying on microboundary strategies. Thinking back at our initial vignette, microboundary strategies could have helped Sophie and prevented her from an unwanted interruption from her supervisor. These strategies can help users take control over communication technology and become more mindful of their interactions. By feeling in control, users experience fewer unwanted boundary cross-overs and ultimately feel less stressed.

This work contributes to both organisational psychology and HCI literature. By demonstrating how communication technologies challenge boundary management, and how users create workarounds to ensure they can feel in control of any boundary cross-over, it highlights the need to design technologies that ensure users' behaviours align with their values and beliefs. Above all, this understanding can help us design interactions that make users more mindful, and that take into account users' complex ecologies of devices and channels as well as the associated behaviours. We have also emphasised the practical implications for individuals who want to increase their boundary control, as well as for organisations who care to provide tailored training that accounts for individual and professional differences and avoid a one-size-fits-all policy approach.

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Part IV

Appendices

Appendix A

Chapter 4 Study Material

A.1 Informed consent

A.2 Survey

A.3 Interview questions

A.1 Informed consent

Information Sheet for Interview Participants

Title of Project: **Qualitative evaluation of email experience across devices and work/life boundaries**

This study has been approved by the UCL Research Ethics Committee as Project ID Number: BSc/1213/002

Name, Address and Contact Details of Investigators:

Marta E. Cecchinato	Anna Cox	Jon Bird
UCL Interaction Centre	UCL Interaction Centre	City University London
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We would like to invite you to participate in this research project. Before you decide whether you want to take part voluntarily, please read the following information carefully. Ask us if there is anything that is not clear or you would like more information.

Details of the Study

The research aims to explore email habits in the context of work-life balance.

The main purpose of this research is to investigate how people interact with their email on different devices (e.g. computers, smartphones, tablets) and how this affects their work and personal life boundaries.

You will be asked to take part in an interview that will last about 30-40 minutes. Questions will include your email management strategies, devices used to access email and physical location in which email is accessed. Other topics covered are the concept of email overload and the role of email in work-life balance. Written notes will be taken and the interview will be audio recorded. Interviews will be anonymised and personal information will be kept confidential. You will be compensated with a £7 Amazon voucher for your participation.

It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and asked to sign a consent form. Even after agreeing to take part, you can still withdraw at any time and without giving a reason. A £7 Amazon voucher will be given to all participants who complete the interview.

All data will be collected and stored in accordance with the Data Protection Act 1998.

Informed Consent Form for Interview Participants

Title of Project: **Qualitative evaluation of email experience across devices and work/life boundaries.**

This study has been approved by the UCL Research Ethics Committee as Project ID Number: BSc/1213/002**.**

Participant's Statement

I …………………………………………...................................

- Confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily or have been advised of an individual to contact for answers to pertinent questions about the research.

- Understand that my participation is voluntary and that I can refuse to answer certain questions, or discuss certain topics or even withdraw at any time without giving any reason.

- Understand that during my participation interviews will be voice recorded and notes will be taken to support data analysis.

- Understand that I will receive a £7 Amazon voucher for my assistance in this research.

- Understand that the information I will provide (including any screenshots) may be presented in an academic publication and/or conferences, workshops and/or teaching material. Confidentiality and anonymity will be maintained, and it will not be possible to identify me from any publications.

- Consent to the processing of my personal information for the purposes of this study only and that it will not be used for any other purpose. I understand that interviews will be anonymised and personal information will be kept confidential and handled in accordance with the provisions of the Data Protection Act 1998.

☐ I have read and agree with all the above statements. (Please tick the box).

Signed: _____   Date:

A.2 Survey

Welcome to our Survey on Work Life Balance.

This survey is part of a study you have taken part in, which looks at people's email strategies across devices and the effects on work-life balance. This study has been approved by the UCL Research Ethics Committee as Project ID Number: BSc/1213/002.

Name, Address and Contact Details of Investigators:
NAME: Marta E. Cecchinato
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This study is confidential and you will only be asked your name to pair your answers with those of the interview and   previous survey. Participation is entirely voluntary. All data will be collected and stored in accordance with the Data Protection Act 1998.

  Please check the following statements:

        I have read and understood the above information.

        I have been advised of an individual to contact for answers about the study.

        I am aware that I am free to withdraw from the study.

        I consent to the process of my information for the purpose of academic research.

        I understand my information will not be used to any other purpose.

And tick the relevant box below.

     ❍   I agree with the above statements, and consent to taking part in the study   (1)

     ❍   I do not consent to taking part in the study   (2)

Skip To: End of Survey If   Welcome to our Survey on Work Life Balance. This survey is part of a study you have taken part... = I do not consent to taking part in the study

Please write your name in order to match your responses to the interview data.

_____

Please indicate how much you agree or disagree with the following statements:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I take care of personal or family needs during work. (1)	❍	❍	❍	❍	❍
I invest a large part of myself in my family life. (2)	❍	❍	❍	❍	❍
When I work from home, I handle personal or family responsibilities during work. (3)	❍	❍	❍	❍	❍
I respond to work-related communications (e.g. emails, texts, and phone calls) during my personal time away from work. (4)	❍	❍	❍	❍	❍
I control whether I am able to keep my work and personal life separate. (5)	❍	❍	❍	❍	❍
I work during my vacations. (6)	❍	❍	❍	❍	❍
I respond to personal communication (e.g. emails, texts, and phone calls) during work. (7)	❍	❍	❍	❍	❍
I control whether I combine my work and personal life activities throughout the day. (8)	❍	❍	❍	❍	❍

I control whether I have clear boundaries between my work and personal life. (9)	○	○	○	○	○
I allow work to interrupt me when I spend time with my family or friends. (10)	○	○	○	○	○
People see me as highly focused on my family. (11)	○	○	○	○	○
People see me as highly focused on my work. (12)	○	○	○	○	○
I do not think about my family, friends, or personal interests while working so I can focus. (13)	○	○	○	○	○
I regularly bring work home. (14)	○	○	○	○	○
I usually bring work materials with me when I attend personal or family activities. (15)	○	○	○	○	○
I monitor personal-related communications (e.g. emails, texts, and phone calls) when I am working. (16)	○	○	○	○	○
I invest a large part of myself in my work. (17)	○	○	○	○	○

Please now think of all the digital technology devices you use on a regular basis, such as mobile phones and computers, including those located at your workplace and indicate

1. who paid for them

2. whether you use them for work, non-work or a mixture

3. where you use them

	Who paid for this device			What you use this device for					Where you use this device (select all which apply)			
	You (1)	Your work (2)	Other (3)	Entirely for work (1)	Mainly for work (2)	Partly work, partly non-work (3)	Mainly for non-work (4)	Entirely for non-work (5)	At work (1)	At home (2)	On the move (3)	Type of device (1)
Device 1 (1)	○	○	○	○	○	○	○	○	☐	☐	☐	
Device 2 (2)	○	○	○	○	○	○	○	○	☐	☐	☐	

What is the salary grade for you current job at UCL?

If you are not sure, you can check here: http://www.ucl.ac.uk/hr/salary_scales/final_grades.php

▼ Grade 1 (1) ... Prefer not to say (11)

What is the highest level of education you have completed?

❍ None   (1)

❍ GCSEs/O-Levels or equivalent   (2)

❍ A/AS Levels or equivalent   (3)

❍ Undergraduate Degree (e.g. BSc/BA)   (4)

❍ Postgraduate Degree (e.g. MSc/MA/PhD/PG Cert)   (5)

❍ Prefer not to say   (6)

End of Block: Default Question Block

Interview questions

ACCOUNTS
- How many email accounts do you have access to?
  - Would you be willing to send a screenshot of your various inboxes?
  - We can have a look now if you are not sure....
  - Do you have access to any other account that does not fall into work or personal?
  - Do you have a personal/work account?
  - Do you have any shared email accounts?
  - How do you use them?
  - Why (not) do you have different accounts?

INBOX
- How do you manage your inbox?
  - 1. TRIAGE 2. SCANNING 3. ARCHIVING 4. DEALING 5. SEARCHING
  - 1. FLOW 2. TRIAGE 3. TASK MANAGEMENT 4. ARCHIVE 5. RETRIVE
  - 1. GLANCE 2. SCAN 3. DEFER
- **STRATEGIES**
  - What about the other accounts?
  - How often do you access your email accounts?
  - How many emails do you normally receive each day for each email account?
- **DEFAULT SETTINGS?**
  - Have you ever personalised or customised any features of our email?
    - For which accounts?
    - Why (not)?
    - For example some people might adapt their signature, or create rules for incoming messages...

DEFERRAL BEHAVIOUR
- When do you decide to act upon an email?
- Does the SENDER/DATE/CONTENT/FLAGGED/SUBJECT LINE influence your decision?
- What do you base your decision on when you decide to respond or not to an email?
  - Does this differ when you are looking at emails on a different device?
    - why (not)?

DEVICES
- On which devices do you usually access your email?
  - Do you own a SMARTPHONE/TABLET?
    - why (not)?
  - (Do you receive emails on other devices?)
  - What accounts do you have synchronised to which devices?
  - What about email notifications on devices?
    - why (not)?
  - What sort of actions do you do when accessing email on different devices?
  - Some people for example just read emails on their phone, but then reply on a computer

CONTEXT
- Where do you usually check your email? In which physical place?
  - Which device do you use to access email when working/not working?
  - Do you check it during weekend?
    - why (not)?
  - Which accounts are you referring to?
  - Do you ever check it whilst commuting?
  - Do you check your email whilst working / not working?
    - why (not)?

WORK-LIFE BOUNDARIES
- Is your personal email organised differently from your work email? and vice versa?
  - why (not)?
- Does your work email intrude on your non-working time? and vice-versa?
  - Why (not)?
  - How do you define your working time?
  - How do you define your non-working time?

EMAIL OVERLAOD
- How do you feel when you think about your email?
- What comes to your mind when you think of 'email overload'?
  - Do you think this applies to you?
    - Why (not)?

During this interview, did you realise anything about your email habits you were not aware of before?

Appendix B

Chapter 5 Study Material

B.1 Informed consent

B.2 Survey

B.3 Interview questions

B.1 Informed consent

Information Sheet for Interview Participants

After completing the recruitment survey and giving your consent to take part, we would like to invite you to participate in an interview study. Before you decide whether you want to take part voluntarily, please read the following information carefully. Ask us if there is anything that is not clear or if you would like more information.

Details of the Study

This research aims to explore your smartwatch use in the broad context of other devices and work-home boundaries. The interview will last up to an hour and will take place over Skype or in one of UCL offices. More specifically, the interview will focus on understanding your motivations behind buying and using a smartwatch and also how you use your smartwatch in combination with other mobile devices. We are also interested in understanding how the use of a smartwatch impacts boundaries between work and personal life.

- By taking part in this interview, you will be entered in a raffle where you could win one of three £25 Amazon vouchers.
- During the interview, written notes will be taken and the interview will be audio recorded for later transcription.
- Your details will NOT be used for any purposes other than this study and will be stored in accordance with the Data Protection Act 1998.
- Information gained in the interviews will be used for the purpose of academic research and may be presented in an academic publication and/or conferences, workshops and/or teaching material.
- Confidentiality and anonymity will be maintained and it will NOT be possible to identify you from any publication.

It is up to you to decide whether or not to take part. Even after agreeing to take part, you can still withdraw at any time and without giving a reason.

Name, Address and Contact Details of Investigators:

Marta E. Cecchinato	Anna L. Cox	Jon Bird
UCL Interaction Centre	**UCL Interaction Centre**	**City University London**
Room 2.06, 66-72 Gower Street, University College London Gower Street, London, WC1E 6BT, UK	Room 2.06, 66-72 Gower Street, University College London Gower Street, London, WC1E 6BT, UK	**EC1V 0HB**
m.cecchinato@cs.ucl.ac.uk	**anna.cox@ucl.ac.uk**	**jon.bird@city.ac.uk**

The study has been approved by the UCL Research Committee as Project ID Number:
UCLIC/1314/003/MSc Cox/epiphanies.

B.2 Survey

Welcome to our survey on smartwatch use

We ask you to complete this recruitment survey in order to potentially be interviewed on your use of smartwatches. It will only take **2-3 minutes to complete this survey**. By filling out this survey you are volunteering to take part in a **40 to 60-minute long interview over Skype**.

If you are selected for the interview, we will email to schedule the interview at a time of your and the researcher's convenience, taking time-zone into account. If preferable, interviews can also be arranged to take place in one of UCL's offices/labs in London, UK. You will also be entered in a raffle where you could win **one of three £25 Amazon vouchers**.

The interview will focus on understanding your motivations behind buying and using a smartwatch. Our interests also include understanding how you use personal and work communication systems, such as email, across your devices (e.g. laptop, tablet, smartphone, and smartwatch). In addition, we are also interested in how the use of a smartwatch impacts your boundaries between personal and work life. During the interview an audio recording will be made for later transcription. Confidentiality and anonymity will be maintained, and it will not be possible to identify you from any publications.

If you have any questions or encounter problems at any stage you may contact us at: **marta.cecchinato.13@ucl.ac.uk**.

This study has been approved by the UCL (University College London) Research Ethics Committee as Project ID Number: UCLIC/1314/003/MSc Cox/epiphanies.

Before you start the survey please read the following statements:

- I have read the information above.
- I had the opportunity to ask questions and discuss the study.
- I received satisfactory answers to all my questions or have been advised of an individual to contact for answers to pertinent questions about the research and my rights as a participant.
- I understood that the information I have submitted may be presented in an academic publication and/or conferences, workshops and/or teaching material. Confidentiality and anonymity will be maintained, and it will not be possible to identify me from any publications.
- I understand that I am free to withdraw from the study without penalty if I so wish.
- I understand that I consent to the processing of my personal information for the purposes of this study only.
- I understand that if I am selected, interviews will be audio-recorded and notes will be taken to support data analysis.
- I understand that any such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.

I agree with the above statements and consent to take part in this study.   (1)

I do not agree with the above. I understand this means that I will not be able to take part in the study.   (2)

Skip To: End of Survey If Welcome to our survey on   smartwatch use   We ask you to complete   this recruitment s... = I do not agree with the above. I understand this means that I will not be able to take part in the study.

*

Please enter your name and email address to start the survey.

Your name: _____

*

Your email (this address will be used to arrange the interview and send your Amazon voucher):
_____

Gender:

- o   Male   (1)

- o   Female   (2)

- o   Other/Prefer not to say   (3)

*

Age: _____

Occupation: _____

What is the highest level of education you have completed?

- o   None   (1)

- o   GCSEs/O-Levels or equivalent   (2)

- o   A/AS Levels or equivalent   (3)

- o   Undergraduate Degree (e.g. BSc/BA)   (4)

- o   Postgraduate Taught Degree (e.g. MSc/MA/PG Cert)   (5)

- o   Postgraduate Research Degree (e.g. MPhil/PhD)   (7)

- o   Prefer not to say   (6)

Where do you currently live? Please indicate both City and State (e.g. London, UK)

_____

Is English your first language (mothertongue)?

- o   Yes   (1)

     o   No   (2)

What is your first language (mothertongue)?

_____

What other languages are you very fluent in (e.g. are you bilingual)? List all that apply.

_____

Do you own a smartwatch?

    ❍   Yes   (1)

    ❍   No   (2)

Do you own a watch?

    ❍   Yes   (1)

    ❍   No   (2)

What brand is/are your watch(es)?

_____

How long have you owned your watch(es) for?

_____

How often do you wear your watch(es)?

◯ Never   (1)

◯ Rarely   (2)

◯ Sometimes   (3)

◯ Most of the time   (4)

◯ Always   (5)

Have you ever considered buying a smartwatch?

◯ Yes   (1)

◯ No   (2)

Please indicate the reasons why you would buy a smartwatch:

_____

_____

_____

_____

_____

Please indicate the reasons why you would <u>not</u> buy a smartwatch:

_____

_____

_____

_____

_____

Which of these smartwatches do you own?

For each of the elements in the list you own, please indicate:

1) how long you've owned it for

2) who bought it

	How long have you owned it for?	Who bought this device?		
	(e.g. 2 months) (1)	Me (1)	My work (2)	Other (3)

Asus ZenWatch (1)		○	○	○
Cookoo (2)		○	○	○
LG G Watch (3)		○	○	○
LG G Watch R (4)		○	○	○
LG Lifeband Touch (5)		○	○	○
Martian G2G (6)		○	○	○
Martian Passport (7)		○	○	○
Martian Victory (8)		○	○	○
MetaWatch Frame (9)		○	○	○
MetaWatch Strata (10)		○	○	○

Motorola Moto360 (11)		○	○	○
Pebble (12)		○	○	○
Pebble Steel (13)		○	○	○
Samsung Galaxy Gear (14)		○	○	○
Samsung Gear Live (15)		○	○	○
Samsung Gear Fit (16)		○	○	○
Samsung Gear 2 (17)		○	○	○
Samsung Gear 2 Neo (18)		○	○	○
Samsung Gear S (19)		○	○	○
Sony Smartwatch (20)		○	○	○

Sony Smartwatch 2 (21)		○	○	○
Sony LiveView (22)		○	○	○
Qualcomm Toq (23)		○	○	○

If none of the above apply, please enter which smartwatch you own:

	Please specify brand and model:	How long have you owned it for?	Who bought this device?		
	(eg. BrandName, Model) (1)	(e.g. 2 months) (1)	You (1)	Your work (2)	Other (3)

Other 1 (1)			○	○	○
Other 2 (2)			○	○	○
Other 3 (3)			○	○	○

How often do you wear your smartwatch?

- ○ Never   (1)
- ○ Rarely   (2)
- ○ Sometimes   (3)
- ○ Most of the time   (4)
- ○ Always   (5)

Do you own any traditional watches?

❍ Yes (1)

❍ No (2)

What brand is/are your traditional watch(es)?

_____

How often do you wear your traditional watch(es)?

❍ Never (1)

❍ Rarely (2)

❍ Sometimes (3)

❍ Most of the time (4)

❍ Always (5)

Which of the following devices do you own?

		What is the model/version?	Who paid for it?		
	Do you own this device? (1)	(e.g. iPhone 6 plus, Samsung Galaxy Tab2014, MacBook Air, Fitbit flex, etc.) (1)	Me (1)	My work (2)	Other (3)

iPhone (1)	❏		○	○	○
iPad (2)	❏		○	○	○
Android smartphone (3)	❏		○	○	○
Android tablet (4)	❏		○	○	○
Laptop (5)	❏		○	○	○
Desktop computer (6)	❏		○	○	○
Activity Tracker (7)	❏		○	○	○
Other wearable device (8)	❏		○	○	○

Which of the following do you think represents you in general?

INNOVATOR

"I enjoy exploring new ideas and technologies. I am a gadget fetishist."

EARLY ADOPTER

"I like to have the latest products and services and be the first one in my group to have them."

EARLY MAJORITY

"I'm usually one of the first to try out and buy new products and services."

LATE MAJORITY

"I like to buy new products and services but I often wait for others to try them out first."

LATE ADOPTER

"I prefer more traditional communications and will adopt to new products when there are no alternatives or I usually wait until a majority of people have started using a product or service and can find out how good it is before."

- ○ Innovator   (1)
- ○ Early adopter   (2)
- ○ Early majority   (3)
- ○ Late majority   (4)
- ○ Late adopter   (5)

B.3 Interview questions

Smartwatch

MOTIVATION
- WHY did you buy this smartwatch?
- so what was the MOST IMPORTANT FEATURE / aspect for you when you bought your watch?

ARE YOU HAPPY WITH YOUR PURCHASE??

USE
- Can you explain to me how your watch works? What it does?
- So did you CHANGE SETTING since you've bought it?
- what is the feature you PREFER or USE THE MOST?
- Are there any FEATURES YOU WOULD LIKE it to have but doesn't have?

NOTIFICATION
- What NOTIFICATION do you have enabled?
  - WHY?
- can you REPLY to messages/emails from you phone? have you ever done it?
- how do you get notified? vibration/sound? only on watch\watch+phone?
- if you design your IDEAL NOTIFICATION for this watch, how would they work? (e.g. location based, set times)
  - WHY?
- What DON'T you get notified about?

EMAIL
- Do you have EMAIL NOTIFICATION enabled on watch? work/personal?
  - WHY?
- How often do you CHECK your emails?
- what do you usually do when you receive an email on your watch? where do you read it? where do you reply?
- do you think that having a smartwatch has changed your email checking habits?

SURVEY
- In the last question in the survey you said that you considered yourself a COULD YOU EXPLAIN TO ME WHY?
- Do you consider your smartwatch a PERSONAL, WORK OR BOTH DEVICE?
- WHEN DO YOU WEAR / NOT WEAR the smartwatch?
  - When do you wear your TRADITIONAL WATCH?

IDEAL USER
- WHO do you think WOULD BENEFIT most from having a smartwatch? To whom would you RECOMMEND buying one?

ADDED VALUE
- WHAT DO YOU THINK A What do you think that you smartwatch gives you that you wouldn't have without it?

WLB
- What, if anything has changed about your everyday life as a consequence of using this smartwatch?
- Do you think your work-home boundaries have changed since using the smartwatch?

SOCIAL ISSUES
- what have been people's reactions to your smartwatch?
- have you ever experienced PRIVACY ISSUES beacue the display is facing outwards?

OTHER DEVICES (email)
- how are notification settings different between watch and other devices?
- Do you have EMAIL notifications enabled on any of your OTHER DEVICES?
  - Do you have work/personal EMAIL synced to your PHONE? work/personal?
    - WHY?
    - where do you check them? same app or different apps?
    - do you get notified?
    - do you consider it a personal or work device?
  - where do you check work/personal EMAIL on your COMPUTER? (browser, desktop client,...)
    - where do you check them? browser/desktop?
    - Do you get notified?
    - do you consider it a personal or work device?
  - do you have work/personal EMAIL synced to your TABLET?
    - WHY?
    - where do you check them? same app or different app?
    - do you get notified?
    - do you consider it a personal or work device?

Appendix C

Chapter 6 Study Material

C.1 Informed consent

C.2 Survey

C.3 Interview questions

C.4 Diary template

C.1 Informed consent

Title of the Project: Managing and Inferring Availability

After completing the recruitment survey and being selected, we would like to invite you to participate in a diary study. Before you decide whether you want to take part voluntarily, please read the following information carefully. Ask us if there is anything that is not clear or if you would like more information.

Details of the Study

This research aims to explore your current communication practices across devices and how this impacts your sense of availability and work-home boundaries. To do so, we will ask you to take part in a diary study with pre- and post- interviews.

We are recruiting knowledge workers that have flexible working practices. Participants must fulfil the following requirements:

- Are 18 years or older
- Have a full or part time job and have flexible working practices
- Live and/or work in London or Cambridge

We are hoping to recruit at least some people that belong to the same organisation or work together (e.g. colleagues, line manager-employee) and therefore we will ask you to advertise this study to anyone who might be interested.

In detail, the study will consist of these three stages:

Initial interview. This interview is aimed at understanding your communication practices and how you manage your availability for work and non-work activities. You will be asked to bring along any device you use to communicate to prompt contextual explanations. This interview will last between 60-90 minutes and will take place in UCL or in your office at a time of your convenience.

Diary study. Starting the day after the initial interview, you will be asked to fill out a diary for two weeks reporting every time you find yourself "delaying a reply", "waiting for a reply", or "feeling compelled to replying". We are particularly interested in conflicting situations between work and non-work (e.g. delaying a work reply during non-work time). Diary entries will be collected using the OneNote app. Each entry shouldn't take more than 5 minutes to complete. You will receive reminders twice a day via SMS: a morning message reminding you to take notice of any relevant behaviour throughout the day, while the evening message to remind you to complete any missing details in the diary.

Follow-up interview. At the end of the diary study, participants will take part in a follow-up interview within a week from the end of the diary. The purpose of this interview is to walk the researcher through each diary entry, in order to provide more details and more contextual explanations, building on the in-depth data collection. The interview will last between 30-60 minutes and will take place in one of UCL offices, your office, or over Skype at a time of your convenience.

Please read the statements below before signing and agreeing to take part in this study:

- To take part in this study you must be 18 years old or over.

- If you complete the whole study (initial interview, 2-week diary, and follow-up interview), you will receive a £50 Amazon voucher.
- We will collect data from the recruitment survey, diary entries and interviews in the form of your answers, written notes, audio-recordings and pictures
- During the interview, written notes will be taken and the interview will be audio recorded for later transcription. We may ask you to share pictures or screenshots of things you mention and we consider relevant (e.g. work space, app features, etc.).
- Information gained during the study will be used for the purpose of academic research and may be presented in an academic publication and/or conferences, workshops and/or teaching material.
- Your details will not be used for any purposes other than this study and will be stored in accordance with the Data Protection Act 1998.
- Confidentiality and anonymity will be maintained and it will not be possible to identify you from any publication.

It is up to you to decide whether or not to take part. Even after agreeing to take part, you can still withdraw at any time and without giving a reason.

Participant's Statement

Name (please print): ………………………………………..……………………………..
Email address: …………………………………..………………………………….

Agreement to Terms:

By signing below, you confirm that you have read and agree with all the above statements, and are not subject to any restriction that would prevent you from participating in the study.

We thank you for your contribution and look forward to your research session.

Researcher:

Marta Cecchinato
m.cecchinato@cs.ucl.ac.uk

UCL Interaction Centre, 66-72 Gower St
University College London, WC1E 6BT

Participant:

_____
Sign

_____
Date

C.2 Survey

Thank you for your interest in our study!

This research aims to explore your current communication practices across devices and how these may impact your sense of availability and work-home boundaries. If you are interested in taking part, please fill out this short survey on your use of devices and communication technology. It will only take a few minutes. Because we are interested in recruiting people that know each other, please share this survey with your friends, family, and colleagues. If you are eligible, we will contact you to take part in our study. You can read about the details of the study here. By taking part in the whole study you will be eligible to receive a £50 Amazon voucher.

If you have any questions, please contact the researcher Marta Cecchinato by emailing m.cecchinato@cs.ucl.ac.uk.

By clicking on the arrow, you are agreeing that you are 18 years or older, and have read and understood the above statements.

Page Break

Some information about you

What is your name?

_____

✳

Email address

(this will only be used to contact you with information about the study)

_____

✳

What is your age (in years)?

_____

What is your gender?

❍ Male   (1)

❍ Female   (2)

❍ Other   (3)

❍ Prefer not to say   (4)

What is your nationality?

_____

Where do you currently live?

- ○ In London, England   (11)
- ○ Outside London, in England   (12)
- ○ Wales   (13)
- ○ Scotland   (14)
- ○ Northern Ireland   (15)
- ○ Outside UK   (16)
- ○ Prefer not to say   (17)
- ○ Other: (18) _____

What is your current occupation?

_____

What is the highest level of education you have completed?

- ○ None   (1)
- ○ GCSEs/O-Levels or equivalent   (2)
- ○ A/AS Levels or equivalent   (3)
- ○ Undergraduate degree (e.g. BSc/BA)   (4)
- ○ Postgraduate Taught Degree (e.g. MSc/MA/PG Cert)   (5)
- ○ Postgraduate Research Degree (e.g. MPhil/PhD)   (6)
- ○ Prefer not to say   (7)

Page Break

What are your usual working hours?

_____

_____

_____

_____

_____

How flexible are your hours? Are you in control of when you can work?

- ○ A great deal   (11)
- ○ A lot   (12)
- ○ A moderate amount   (13)
- ○ A little   (14)
- ○ None at all   (15)

How long have you worked under your current manager?

- ○ 1 month (or less)   (2)
- ○ Up to 6 months   (3)
- ○ Up to a year   (4)
- ○ Up to two years   (5)
- ○ Three years or more   (6)
- ○ other   (7) _____
- ○ I don't have a manager/line manager/supervisor/boss   (8)

Do you have any employees working for you? (i.e. are you a line manager/supervisor to someone?)

○ No   (1)
○ Yes, just one   (2)
○ Yes, a few (2-5 people)   (3)
○ Yes, several (more than 5)   (4)

Where do you usually work?

	Everyday (1)	Weekdays (2)	A few days a week (3)	Evenings (4)	Weekends (5)	A few times a month (6)	Occasionally (7)	Never (8)
Office (1)	❑	❑	❑	❑	❑	❑	❑	❑
Home (2)	❑	❑	❑	❑	❑	❑	❑	❑
Coffee shop (3)	❑	❑	❑	❑	❑	❑	❑	❑
Library (4)	❑	❑	❑	❑	❑	❑	❑	❑
Other (specify) (5)	❑	❑	❑	❑	❑	❑	❑	❑
Other (specify) (6)	❑	❑	❑	❑	❑	❑	❑	❑
Other (specify) (7)	❑	❑	❑	❑	❑	❑	❑	❑

What is your current household composition?

❑ I live on my own   (1)
❑ I live with one or more flatmates   (2)
❑ I live with my partner   (3)
❑ I live with family (parents, in-laws, children, partner, etc.)   (4)
❑ Other   (5) _____

If you wish to leave comments to any of your responses, please use the box below.

_____

_____

_____

_____

_____

Which of the following devices do you own or habitually have access to?

- ❑ Blackberry   (1)
- ❑ iPhone   (2)
- ❑ iPad   (3)
- ❑ Android smartphone   (4)
- ❑ Android tablet   (5)
- ❑ Windows Phone   (6)
- ❑ Windows tablet   (7)
- ❑ Laptop   (8)
- ❑ Desktop computer   (9)
- ❑ Smartwatch   (specify)   (10) _____
- ❑ Other (specify)   (12) _____
- ❑ Other (specify)   (13) _____
- ❑ Other (specify)   (14) _____
- ❑ Other (specify)   (15) _____

Carry Forward Selected Choices - Entered Text from "Which of the following devices do you own or habitually have access to?"

X→

Please answer below.

	What model/version is it?
	(e.g. iPhone 6 plus, Samsung Galaxy Tab2014, MacBook Air, etc.) (1)

Blackberry (x1)	
iPhone (x2)	
iPad (x3)	
Android smartphone (x4)	
Android tablet (x5)	
Windows Phone (x6)	
Windows tablet (x7)	
Laptop (x8)	
Desktop computer (x9)	
Smartwatch (specify) (x10)	
Other (specify) (x12)	

	Other (specify) (x13)	
Other (specify) (x14)	
Other (specify) (x15)	

- -

X→

Please answer the questions below.

	Who paid for it?			Where do you usually use this device?			
	me (1)	my work (2)	other (3)	home (1)	work (2)	on the go (3)	other (4)

Blackberry (x1)	❑	❑	❑	❑	❑	❑	❑
iPhone (x2)	❑	❑	❑	❑	❑	❑	❑
iPad (x3)	❑	❑	❑	❑	❑	❑	❑
Android smartphone (x4)	❑	❑	❑	❑	❑	❑	❑
Android tablet (x5)	❑	❑	❑	❑	❑	❑	❑
Windows Phone (x6)	❑	❑	❑	❑	❑	❑	❑
Windows tablet (x7)	❑	❑	❑	❑	❑	❑	❑
Laptop (x8)	❑	❑	❑	❑	❑	❑	❑
Desktop computer (x9)	❑	❑	❑	❑	❑	❑	❑
Smartwatch (specify) (x10)	❑	❑	❑	❑	❑	❑	❑
Other (specify) (x12)	❑	❑	❑	❑	❑	❑	❑
Other (specify) (x13)	❑	❑	❑	❑	❑	❑	❑
Other (specify) (x14)	❑	❑	❑	❑	❑	❑	❑
Other (specify) (x15)	❑	❑	❑	❑	❑	❑	❑

What are the notifications settings for your phone?

- ❑ It's always on mute   (1)
- ❑ It's always on vibrate   (2)
- ❑ It's always on sound   (3)
- ❑ I have priority notifications settings enabled (e.g. I get notified only from certain notifications) (4)
- ❑ I have night mode enabled (e.g. If notifications come in at night I don't get disturbed)   (5)
- ❑ Other (specify)   (6) _____

If you wish to leave comments to any of your responses, please use the box below.

_____

_____

_____

_____

_____

Which of the following communication apps do you **habitually use on any of your devices**? Select all that apply.

- ❑ Email   (4)
- ❑ traditional SMS   (11)
- ❑ Messages (iMessage)   (9)
- ❑ Phone call   (16)
- ❑ Facetime   (31)
- ❑ Skype   (3)
- ❑ Slack   (5)
- ❑ Facebook messenger   (7)
- ❑ Twitter Direct Messages   (28)
- ❑ Snapchat   (10)
- ❑ Telegram   (6)
- ❑ Viber   (8)
- ❑ weChat   (12)
- ❑ Whatsapp   (2)
- ❑ other (specify)   (13) _____
- ❑ other (specify)   (14) _____
- ❑ other (specify)   (15) _____

Carry Forward Selected Choices - Entered Text from "Which of the following communication apps do you habitually use on any of your devices? Select all that apply."

X→

Please answer below.

	For what type of communication do you use it?		
	Personal (1)	Work (2)	Both work/personal (3)

Email (x4)	❑	❑	❑
traditional SMS (x11)	❑	❑	❑
Messages (iMessage) (x9)	❑	❑	❑
Phone call (x16)	❑	❑	❑
Facetime (x31)	❑	❑	❑
Skype (x3)	❑	❑	❑
Slack (x5)	❑	❑	❑
Facebook messenger (x7)	❑	❑	❑
Twitter Direct Messages (x28)	❑	❑	❑
Snapchat (x10)	❑	❑	❑
Telegram (x6)	❑	❑	❑
Viber (x8)	❑	❑	❑
weChat (x12)	❑	❑	❑
Whatsapp (x2)	❑	❑	❑
other (specify) (x13)	❑	❑	❑
other (specify) (x14)	❑	❑	❑
other (specify) (x15)	❑	❑	❑

Carry Forward Selected Choices - Entered Text from "Which of the following communication apps do you habitually use on any of your devices? Select all that apply."

X→

Please answer below.

	For each channel, on what device do you receive notifications on? (select all that apply)					For each channel, what device do you use to send a reply? (select all that apply)			
	Laptop/ PC (1)	Tablet (2)	Smartphone (3)	Smartwatch (4)	I don't receive notifications (5)	Laptop/ PC (1)	Tablet (2)	Smartphone (3)	Smartwatch (4)

Email (x4)	❏	❏	❏	❏	❏	❏	❏	❏	❏
traditional SMS (x11)	❏	❏	❏	❏	❏	❏	❏	❏	❏
Messages (iMessage) (x9)	❏	❏	❏	❏	❏	❏	❏	❏	❏
Phone call (x16)	❏	❏	❏	❏	❏	❏	❏	❏	❏
Facetime (x31)	❏	❏	❏	❏	❏	❏	❏	❏	❏
Skype (x3)	❏	❏	❏	❏	❏	❏	❏	❏	❏
Slack (x5)	❏	❏	❏	❏	❏	❏	❏	❏	❏
Facebook messenger (x7)	❏	❏	❏	❏	❏	❏	❏	❏	❏
Twitter Direct Messages (x28)	❏	❏	❏	❏	❏	❏	❏	❏	❏
Snapchat (x10)	❏	❏	❏	❏	❏	❏	❏	❏	❏
Telegram (x6)	❏	❏	❏	❏	❏	❏	❏	❏	❏
Viber (x8)	❏	❏	❏	❏	❏	❏	❏	❏	❏
weChat (x12)	❏	❏	❏	❏	❏	❏	❏	❏	❏

Whatsapp (x2)	❑	❑	❑	❑	❑	❑	❑	❑	❑
other (specify) (x13)	❑	❑	❑	❑	❑	❑	❑	❑	❑
other (specify) (x14)	❑	❑	❑	❑	❑	❑	❑	❑	❑
other (specify) (x15)	❑	❑	❑	❑	❑	❑	❑	❑	❑

Please list all of your email accounts. Choose a name to describe each one.

	What email client is it?	How would you classify this account?			Select your main personal account and your main work account
		Personal (1)	Work (2)	Other (3)	(1)

Email account name	Account type				
Email account name (e.g. 'primary work', 'online dating account', etc.) (1)	▼ Gmail (1) ... other (6)	❑	❑	❑	❑
Email account name (2)	▼ Gmail (1) ... other (6)	❑	❑	❑	❑
Email account name (3)	▼ Gmail (1) ... other (6)	❑	❑	❑	❑
Email account name (4)	▼ Gmail (1) ... other (6)	❑	❑	❑	❑
Email account name (5)	▼ Gmail (1) ... other (6)	❑	❑	❑	❑
Email account name (6)	▼ Gmail (1) ... other (6)	❑	❑	❑	❑
Email account name (7)	▼ Gmail (1) ... other (6)	❑	❑	❑	❑
Email account name (8)	▼ Gmail (1) ... other (6)	❑	❑	❑	❑

Where do you check your main work and your main personal email accounts?

(e.g. I use separate applications on my phone; I only have personal email on phone, and check both work and personal on laptop in separate browser tabs, etc.)

_____

_____

_____

_____

_____

- -

For which of the following communication channels (EXCLUDING email) do you have **more than one account**? Please select all that apply.

- ❑ None   (33)
- ❑ Skype   (3)
- ❑ Slack   (5)
- ❑ Facebook   (7)
- ❑ Twitter   (28)
- ❑ Snapchat   (10)
- ❑ other (specify)   (13) _____
- ❑ other (specify)   (14) _____
- ❑ other (specify)   (15) _____

- -

Please answer below.

	How many accounts do you have?	How are the accounts different?

1 (1)	2 (2)	3 (3)	4 (or more) (4)	(1)

None (x33)	❏	❏	❏	❏	
Skype (x3)	❏	❏	❏	❏	
Slack (x5)	❏	❏	❏	❏	
Facebook (x7)	❏	❏	❏	❏	
Twitter (x28)	❏	❏	❏	❏	
Snapchat (x10)	❏	❏	❏	❏	
other (specify) (x13)	❏	❏	❏	❏	
other (specify) (x14)	❏	❏	❏	❏	
other (specify) (x15)	❏	❏	❏	❏	

How do you check your different accounts (EXCLUDING email)?

(e.g. I swap accounts within the same app; I use different browsers on my laptop; etc.)

_____

_____

_____

_____

_____

If you wish to leave comments to any of your responses, please use the box below.

_____

_____

_____

_____

_____

As we mentioned at the beginning of this survey, we are interested in recruiting people that know each other.

Please share up to 3 email address of friends, family, and colleagues who you think might be interested in taking part and getting a chance of receiving a £50 Amazon voucher.

The email addresses you provide will only be used to send a link to this survey and explain the study. Email addresses will not be shared with third parties and will not be stored beyond the purpose of this study.

_____

Did someone refer you to this survey?

- ❍ Yes   (1)
- ❍ No   (3)

Please provide the name of who referred you

_____

C.3 Interview questions

Availability / Awareness Interviews

COMMUNICATION TREE **

- Advantages?
- Disadvantages?
- Why these? (if different from frequent)
- You've circled more than one for the same person/group. How do you decide which one to pick? (time, day, location, person, device, etc.)
- Circled Preferred
- Why not so often?
- when are they used?
- disadvantages? or Differences?
- Not circled
- If someone contacts you through these channels how do you feel?
- Have you ever told the person you'd like to be contacted in other ways?
- EXCEPTIONS - Can you think of any exceptions to what you just said?

PROJECTIVE QUESTIONS**

- What do you think is the role of your smartwatch when it comes to your sense of availability?

AVAILABILITY - INTERRUPTABILITY / WLB

- How? When?
- Do you ever try to infer what someone is doing? (e.g. work / non-work) - 'hunt them down'?
- Why?
- Are there ever times when you feel under pressure to be available at times when you wouldn't want to be?
- Have you ever explicitly set an expectation of availability to someone else?
- Has someone set it for you?
- Overall, do you feel you are in control of when you are available?
- Why? what makes you feel (not) in control?
- Do you ever feel pressured to reply immediately?

RELATIONSHIP

WORK
- Is your manager someone you socialise with? To what extent do you socialise?
- If you socialise with people from work, do you use the same channels?
- Has things bee respected?
- How did that conversation happen
- Have you ever discussed with your line manager and/or colleagues when it's ok to be contacted?
- How quickly do you think your line manager expects are reply form you?
- Does this vary depending on the channel/time/day?

PERSONAL
- when and how do you use phone calls?
- How do you feel about personal communication when you are working?
- If you don't like it, have you told them?
- Does the frequency change when you are not working?
- How frequent does it happen? with whom? on what channels?
- what are company policies around it?

A-SYNCH CHANNELS
- Do you use social media for work? how?
- Do you make a distinction between synchronous and asynchronous? What is synch or asych for you?
- CHANNEL SWAP!!! When and why?
- What Does it depend on? the medium, the person, the context?
- Are there any channels that you see more intrusive than others?
- GO BACK TO TREE
- why and when?

AWARENESS (sender)
- Some people say there is a difference between LYING about your awareness and HIDING availability... what do you think about it?
- Do you ever look at people's statuses on communication channels? (e.g. last online, or blue ticks, or online on skype/slack)
- How do these awareness cues make you feel?
- do you ever check up on their calendar / social media to see if they are working/holiday/very busy?
- Is it enough for you to know that someone has seen/read your message? or do you exect a reply? what does it depend on?
- How do you feel when someone has seen your message but has not replied?
- In which situations? why?
- what do you think of read receipts?

DECEPTION (receiver)
- Have you ever hidden your availability? (e.g. gone offline) OR pretended you were not there?
- have you ever pretended not to read a message in time/delayed reading? Can you give me some examples?
- work / personal?
- why?
- Context?

PRIVACY
- Why not change?
- Could you think of a time when you were not happy? Maybe an episode even..
- Are you happy or satisfied with these settings?
- Why?
- When?
- Have you ever changed them?
- What are the privacy settings on your various channels?
- Do not disturb, invisible, last seen, read receipts, etc
- Slack, Skype, Whatsapp, etc....
- Can you give me a couple of examples of when this might have happened (work/personal), why...
- what notification settings do you have on devices?
- what notifications do you get on your watch?

- Do you ever use the calendar to hide your availbility? e.g. block out time with fake meetings?
- do you know if anyone checks it?
- who can see it?
- is your work / personal calendar shared?
- What about shared document folders (e.g. dropbox and google drive) - do you use them?
- do you take notice of who else is viewing/working the document?
- do you hide your presence there?

C.4 Diary template

Appendix D

Chapter 7 Study Material

D.1 Informed consent

D.2 Survey

D.1 Informed consent

Title of the Project: Taking Control for Work-Life Balance

Thank you for signing up to this study. Before you decide whether you want to take part voluntarily, please read the following information carefully. Ask us if there is anything that is not clear or if you would like more information.

Details of the Study

This study aims to explore any issues you might be experiencing around your use of communication technologies and work-life balance, and how research-informed strategies can help users feel more in control. In detail, the study consists of:

Workshop. In the first part, there will be an opportunity for you to reflect on your current practices and preferences, as well as sharing experiences with others. In the second part of the workshop, you will be presented with a series of possible strategies and asked to commit to at least one of them for 2 weeks.

Follow-up. Following the workshop, we will ask you to take part in a follow-up evaluation after 2 weeks. The aim of this evaluation is to understand how the intervention (i.e. the strategy you chose) worked, or didn't work, for you. The follow-up will consist of a brief chat on Skype (~20min) and a short questionnaire.

Recruitment

We are recruiting knowledge workers that have flexible working practices. Participants must fulfil the following requirements:

- Are 18 years or older
- Have a full or part time job and have flexible working practices
- Feel they lack control over work-life balance issues and being constantly connected through technology.

Please read the statements below before signing and agreeing to take part in this study.

I understand and agree with the following:

- To take part in this study you must be 18 years old or over.
- If you complete the whole study (take part in workshop and follow-up after 2 weeks), you will receive a £50 Amazon voucher.
- Workshops will be video and audio recorded, and pictures will be taken. This will be done for the purposes of later transcriptions. No pictures or videos will be used beyond the purpose of transcription, unless you give explicit consent (see back of page).

- During the follow-up evaluation, the interview will be audio recorded for later transcription. We may ask you to share pictures or screenshots of things you mention and we consider relevant (e.g. work space, app features, etc.).
- Information gained during the study will be used for the purpose of academic research and may be presented in an academic publication and/or conferences, workshops and/or teaching material. No pictures or videos will be used beyond the purpose of transcription, unless you give explicit consent (see below).
- Your details will not be used for any purposes other than this study and will be stored in accordance with the Data Protection Act 1998.
- You contact details will be retained for the purposes of future study recruitment.
- Confidentiality and anonymity will be maintained and it will not be possible to identify you from any publication.

It is up to you to decide whether or not to take part. Even after agreeing to take part, you can still withdraw at any time and without giving a reason.

Participant's Statement

Name (please print): ……………………………………………………………………..

Email address: ………………………………………………………………………..

Agreement to Terms:

By signing below, you confirm that you have read and agree with all the above statements, and are not subject to any restriction that would prevent you from participating in the study. Please also check the appropriate box below regarding the use of videos and pictures:

☐ I <u>consent</u> to have pictures or video extracts of me used for the purpose of academic research and may be presented in an academic publication and/or conferences, workshops and/or teaching material, and/or research websites.

☐ I <u>do not consent</u> to have pictures or video extracts of me used for the purpose of academic research and may be presented in an academic publication and/or conferences, workshops and/or teaching material, and/or research websites.

We thank you for your contribution and look forward to your research session.

Researcher:

Marta Cecchinato
m.cecchinato@cs.ucl.ac.uk

UCL Interaction Centre, 66-72 Gower St
University College London, WC1E 6BT

Participant:

_____
Sign

_____
Date

D.2 Survey

This study is confidential and you will only be asked your name to insure informed consent. Participation is entirely voluntary and you are free to withdraw at any time. All data will be collected and stored in accordance with the Data Protection Act 1998.

This study has been approved by the UCL Research Ethics Committee as Project ID Number: UCLIC/1314/003/MSc Cox/epiphanies.

If you have any questions, email the lead researcher:Marta Cecchinato m.cecchinato@cs.ucl.ac.uk

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Please write your name in order to match your responses to the workshop data.
Answers will later be fully anonymised.

_____

Page Break

The questions in this scale ask you about your feelings and thoughts during the last two weeks. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

In the last two weeks, how often have you been upset because of something that happened unexpectedly?

- ○ Never   (1)
- ○ Almost never   (2)
- ○ Sometimes   (3)
- ○ Fairly often   (4)
- ○ Very often   (5)

In the last two weeks, how often have you felt that you were unable to control the important things in your life?

- ○ Never   (1)
- ○ Almost never   (2)
- ○ Sometimes   (3)
- ○ Fairly often   (4)
- ○ Very often   (5)

In the last two weeks, how often have you felt nervous or stressed?

○ Never   (1)
○ Almost never   (2)
○ Sometimes   (3)
○ Fairly often   (4)
○ Very often   (5)

In the last two weeks, how often have you dealt successfully with irritating life hassles?

○ Never   (1)
○ Almost never   (2)
○ Sometimes   (3)
○ Fairly often   (4)
○ Very often   (5)

In the last two weeks, how often have you felt that you were effectively coping with important changes that were occurring in your life?

○ Never   (1)
○ Almost never   (2)
○ Sometimes   (3)
○ Fairly often   (4)
○ Very often   (5)

In the last two weeks, how often have you felt confident about your ability to handle your personal problems?

○ Never   (1)
○ Almost never   (2)
○ Sometimes   (3)
○ Fairly often   (4)
○ Very often   (5)

In the last two weeks, how often have you felt that things were going your way?

- ○ Never   (1)
- ○ Almost never   (2)
- ○ Sometimes   (3)
- ○ Fairly often   (4)
- ○ Very often   (5)

In the last two weeks, how often have you found that you could not cope with all the things that you had to do?

- ○ Never   (1)
- ○ Almost never   (2)
- ○ Sometimes   (3)
- ○ Fairly often   (4)
- ○ Very often   (5)

In the last two weeks, how often have you been able to control irritations in your life?

- ○ Never   (1)
- ○ Almost never   (2)
- ○ Sometimes   (3)
- ○ Fairly often   (4)
- ○ Very often   (5)

In the last two weeks, how often have you felt that you were on top of things?

- ○ Never   (1)
- ○ Almost never   (2)
- ○ Sometimes   (3)
- ○ Fairly often   (4)
- ○ Very often   (5)

In the last two weeks, how often have you been angered because of things that happened that were outside of your control?

- ○ Never   (1)
- ○ Almost never   (2)
- ○ Sometimes   (3)
- ○ Fairly often   (4)
- ○ Very often   (5)

In the last two weeks, how often have you found yourself thinking about things that you have to accomplish?

- ○ Never   (1)
- ○ Almost never   (2)
- ○ Sometimes   (3)
- ○ Fairly often   (4)
- ○ Very often   (5)

In the last two weeks, how often have you been able to control the way you spend your time?

- ○ Never   (1)
- ○ Almost never   (2)
- ○ Sometimes   (3)
- ○ Fairly often   (4)
- ○ Very often   (5)

In the last two weeks, how often have you felt difficulties were piling up so high that you could not overcome them?

- ○ Never   (1)
- ○ Almost never   (2)
- ○ Sometimes   (3)
- ○ Fairly often   (4)
- ○ Very often   (5)

The questions in this scale ask you about your general attitude towards work and family/personal life.

I take care of personal or family needs during work.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I invest a large part of myself in my family life.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

When I work from home, I handle personal or family responsibilities during work.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I respond to work-related communications (e.g. emails, texts, and phone calls) during my personal time away from work.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I control whether I am able to keep my work and personal life separate.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I work during my vacations.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I respond to personal communication (e.g. emails, texts, and phone calls) during work.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I control whether I combine my work and personal life activities throughout the day.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I control whether I have clear boundaries between my work and personal life.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I allow work to interrupt me when I spend time with my family or friends.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

People see me as highly focused on my family.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

People see me as highly focused on my work.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I do not think about my family, friends, or personal interests while working so I can focus.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I regularly bring work home.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I usually bring work materials with me when I attend personal or family activities.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I monitor personal-related communications (e.g. emails, texts, and phone calls) when I am working.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

I invest a large part of myself in my work.

- ○ Strongly disagree   (30)
- ○ Disagree   (31)
- ○ Neither agree nor disagree   (32)
- ○ Agree   (33)
- ○ Strongly agree   (34)

These questions ask you about your demographics, as well as your use of devices and communication channels.

*

What is your age (in years)?

_____

What is your gender?

- ⭕ Male   (1)
- ⭕ Female   (2)
- ⭕ Other   (3)
- ⭕ Prefer not to say   (4)

What is your nationality?

_____

What is the highest level of education you have completed?

- ⭕ None   (1)
- ⭕ GCSEs/O-Levels or equivalent   (2)
- ⭕ A/AS Levels or equivalent   (3)
- ⭕ Undergraduate degree (e.g. BSc/BA)   (4)
- ⭕ Postgraduate Taught Degree (e.g. MSc/MA/PG Cert)   (5)
- ⭕ Postgraduate Research Degree (e.g. MPhil/PhD)   (6)
- ⭕ Prefer not to say   (7)

What is your current household composition?

❑ I live on my own   (1)

❑ I live with one or more flatmates   (2)

❑ I live with my partner   (3)

❑ I live with family (parents, in-laws, children, partner, etc.)   (4)

❑ Other   (5) _____

What is your current occupation?

_____

What are your usual working hours?

_____

_____

_____

_____

_____

How flexible are your hours? Are you in control of when you can work?

○ A great deal   (11)

○ A lot   (12)

○ A moderate amount   (13)

○ A little   (14)

○ None at all   (15)

Where do you usually work? (e.g. home 2 days a week, office, occasionally coffee shop, library on a weekend, etc.)

_____

_____

_____

_____

_____

How long have you worked under your current manager?

- ○ 1 month (or less)   (2)
- ○ Up to 6 months   (3)
- ○ Up to a year   (4)
- ○ Up to two years   (5)
- ○ Three years or more   (6)
- ○ other   (7) _____
- ○ I don't have a manager/line manager/supervisor/boss   (8)

Do you have any employees working for you? (i.e. are you a line manager/supervisor to someone?)

- ○ No   (1)
- ○ Yes, just one   (2)
- ○ Yes, a few (2-5 people)   (3)
- ○ Yes, several (more than 5)   (4)

Please list all devices you regularly have access to (e.g. work PC, personal laptop, tablet, smartphone, smartwatch, etc.)

_____

_____

_____

_____

_____

What are the notifications settings for your phone?

- ❏ It's always on mute   (1)
- ❏ It's always on vibrate   (2)
- ❏ It's always on sound   (3)
- ❏ I have priority notifications settings enabled (e.g. I get notified only from certain notifications) (4)
- ❏ I have night mode enabled (e.g. If notifications come in at night I don't get disturbed)   (5)
- ❏ Other (specify)   (6) _____

How many email accounts do you have?

- ❏ Work accounts   (1) _____
- ❏ Personal accounts   (2) _____

Which of the following communication apps do you **habitually use on any of your devices**? Select all that apply.

- ❑ Email   (4)
- ❑ traditional SMS   (11)
- ❑ Messages (iMessage)   (9)
- ❑ Phone call   (16)
- ❑ Facetime   (31)
- ❑ Skype   (3)
- ❑ Slack   (5)
- ❑ Facebook messenger   (7)
- ❑ Twitter Direct Messages   (28)
- ❑ Snapchat   (10)
- ❑ Telegram   (6)
- ❑ Viber   (8)
- ❑ weChat   (12)
- ❑ Whatsapp   (2)
- ❑ other (specify)   (13) _____
- ❑ other (specify)   (14) _____
- ❑ other (specify)   (15) _____

For which of the following communication channels (EXCLUDING email) do you have **more than one account**? Please select all that apply.

- ❑ None   (33)
- ❑ Skype   (3)
- ❑ Slack   (5)
- ❑ Facebook   (7)
- ❑ Twitter   (28)
- ❑ Snapchat   (10)
- ❑ other (specify)   (13) _____
- ❑ other (specify)   (14) _____
- ❑ other (specify)   (15) _____

Appendix E

Microboundary Booklet

E.1 Workshop version

For the latest version, available for download can be found here: https://goo.gl/OJRw6W

E.1 Microboundary Booklet

Taking Control of Work-Life Balance

Research-Informed Strategies

December 2016

UCL

For more info:
Marta Cecchinato
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www.digitalboundariesresearch.wordpress.com

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Key

📱	Phone based strategy
🤖	Android only strategy
🍎	iOS only strategy
⊞	Windows only strategy
💻	Laptop/PC based strategy
IFTTT	"If This Then That" service (https://ifttt.com/)

Email Management

Actionable now

Email research has found that checking email less frequently reduces stress.

- **Turn off push notifications**. You are likely to be checking anyway, so there is no need to be alerted for every new email, especially in your personal account(s).

- **Change how often you get new emails.** If you still want push notifications, try changing how often your email client syncs your inbox. You could change it to as low as once or twice per day, or to every 25 minutes, to allow you to work uninterrupted following the "Pomodoro technique".

Mobile email addiction has been identified and compared to gambling behaviours, whereby the unexpected new email provides users with a thrill. Here are some strategies to avoid falling in the trap of feeling rewarded for finding a new email, but then immediately feeling compelled to act on it:

- **Check work and personal emails separately.** Download two separate apps for work and personal email on your phone/tablet. Use different email clients for your laptop (e.g. check personal email in a browser tab, and work email on the Outlook desktop client).

Keep in mind:

- You can use unroll.me to delete unwanted email subscriptions.
- Schedule your emails with ad-hoc tools (e.g. Boomerang for Gmail, Right in Inbox, MailButler, etc.).
- Learn more about your email behaviour (Immersion, Gmail Meter).
- Be concise (see Email Charter, sentence.es).
- Have clear subject lines (e.g. use them to ask questions),
- Do you need to cc everyone?
- Could you be using an instant messaging (IM) channel instead? Slack is a great tool where you can create private and public channels with your team, as well as send direct messages and share files. (https://slack.com/).

3

Instructions to disable push notifications for email:

- o **Mail app (on iOS)**
  Device Settings -> Mail, Contacts, Calendar -> Fetch new data -> turn off Push.

- o **Gmail app (on Android/iOS):**
  Settings -> select account -> uncheck "Sync Gmail".

- o **Gmail (on browser)**:
  Download http://www.inboxpause.com/ and then manually pause your inbox to work offline.

- o **Outlook (on Mac):**
  From the top menu: Outlook -> select "Work Offline".

- o **Mozilla Thunderbird**
  Top menu: Tools/Edit/Preferences -> Account settings -> select the account -> Server Settings -> disable "Check for new messages every __ minutes" -> disable "Allow immediate server notifications when new messages arrive"

Instructions to reduce synching frequency of email clients:

- o **Outlook (on Windows)**
  By default this is set to be every 30 min. To change, go to Send/Receive tab -> Define Send/Receive groups -> schedule an automatic send/receive every -> select your frequency.

- o **Outlook (on Mac)**
  From the top menu: Tools -> Run Schedule -> Edit schedule -> click "+" to select your schedule. You can have it manually, or repeated schedules at your preferred frequency. Make sure that the Action is what you want it to be (e.g. Receive Mail). Quit Outlook to allow the changes to start.

- o **Mail (on Mac)**
  From the top menu: Mail -> Preferences-> General -> Check for new messages -> select the frequency you want (every minute, 5min, 15min, 30min, every hour, manually).

- o **Email app (on Samsung)**
  Apps -> Email -> Menu -> Settings -> email account -> Synch schedule -> select the frequency you want.

- o **Mail (on Windows 10 and iOS)**
  From device Settings -> Mail, Contacts, Calendar -> Fetch new data -> from the Fetch menu, select your preferred option (15min, 30min, hourly, manually).

- o **Mozilla Thunderbird**
  From the top menu: Tools/Edit/Preferences -> Account settings -> select the account -> Server Settings -> Check for new messages every __ minutes -> select your frequency preference. It can go as high as 410065408, which is every 780 years!

4

Other Communication Channels Management

Actionable now

Each person covers several roles in their life, some work-related, some pertinent to personal life. In our research on work-home boundaries and technology we found that people create more complex interactions to discourage them from accessing work 'stuff' when not working. They basically create some friction in their interactions.

- **Create different user accounts on your devices**. This could apply to accounts on your laptop (e.g. one for work activities where you block social media, and one for personal where you don't have work emails synched), or even different users on your phone (**only works with Android Lollipop**).

- **Create different accounts for communication channels**. You could have a Skype account for work on your laptop, and a different personal Skype account on your phone. That way you don't have to worry about thinking where you are logged in.

- **Group work and non-work tools separately**. On your phone, you can use folders to organise (and hide away) work apps such as email, Slack, etc. Moving that folder away from the home screen is another way of creating some friction.

Research has shown that people make use of online statuses to infer someone's availability and determine how quickly they are going to reply. If you do not want people to assume that just because you are online you are available and can be interrupted, set yourself away or log out of channels outside of working hours.

- **Sign out of any instant messaging (IM) channel**. You can do this manually at the end of your working day, or you can automate it based on time/location (e.g. when you leave work, when you arrive home).

- **Sign out of any video-conference channel**. Any call on Skype, Google Hangout is likely going to be a schedule call anyway, so there is no need to be constantly logged in, especially on all your devices. You can do this manually or set automatic rules.

5

Create a new account on your laptop:

- **Mac**
  Apple menu -> System Preferences -> Users & Groups -> unlock and enter your password -> click "+" -> click New Account -> choose the type of user depending on how you want you use the other account (e.g. just for browsing the Internet a guest account may be enough) -> enter full name (you can't change this later!) -> enter a password for the new user -> click Create User.

- **Windows (8, 10)**
  Start -> Settings -> Accounts -> Your account -> Family & other users -> Add someone else to this PC -> here you will need to enter a Microsoft email account. If you don't have another one, choose "sign in without a Microsoft account" -> Local account -> choose their name and password -> Next -> Finish.

Create a new account on your phone:

- **Android Lollipop and above**
  Pull down the notification centre -> select the profile icon -> Add user -> follow the instructions to enter a new Google account. For this you will need to have create a new email address.

Create dedicated folder for apps:

- **iOS**
  Home screen -> hold down on an app for about two seconds -> all the apps start bouncing. From here, you can delete apps, move apps, and put apps in folders. To create a folder, just drag one app onto another.

- **Android**
  To create a folder, just drag one app onto another.

Keep in mind:

- Curate the content of your messages – if it's quick questions, etc. use IM channel. If you need to have a more permanent record, email it.
- Delete apps links from home screen or from the phone during holidays.

6

Time Management
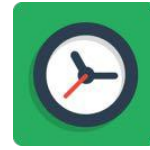
Actionable now

Boundary research has shown that work-life conflict occurs when the demands from one domain (e.g. attending art class) interfere with the demands of another domain (e.g. working long hours), leading then to burnout, absenteeism, and stress. To reduce work-life conflict, one of the suggested research solution is to create temporal boundaries to allow time to recover.

- **Build downtime in your schedule.** Block out time in advance in your calendar for your own activities, hobbies, etc. Regardless if you share your calendar or not, it will help you protect your time.

- **Build focused time in your schedule.** Block out time in advance every day or every week to schedule undisturbed time to work on a task/project. This could also mean blocking certain websites which can distract you from your task (e.g. social media). For example, you could set a calendar event called "No Meeting Wednesday".

In our research, we have found that sometimes people are not fully aware of how they are spending time (or how much time they are spending actually working). Self-tracking has been proven to encourage reflection, which increases self-awareness and thus promotes behaviour changes.
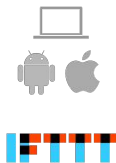
- **Self-track how you spend your time on devices.** There are several tools that allow you to track how you spend your time on your devices, while others allow you to track how much time you spend in different locations (see overleaf).

> **Keep in mind:**
>
> - You don't need to be connected to the Internet on your phone all the time. Turn on airplane mode, or simply turn off data (so you still get phone calls and SMS) when you don't want to be interrupted.

7

Web tools to block distracting websites or apps:

- **StayFocusd** http://www.stayfocusd.com/ (works on Chrome)

- **LeechBlock** http://www.proginosko.com/leechblock/ (works on Firefox)

- **WasteNoTime** http://www.bumblebeesystems.com/wastenotime/ (works on Safari)

- **Productivity Owl** http://www.productivityowl.com/ (works on Chrome) – this one is more for fun: an owl starts flying around the page when your dedicated time on the website it up and automatically closes the page!

Self-tracking tools:

- **RescueTime** https://www.rescuetime.com/ The free version of this tool can be installed on your Android device and any laptop/PC. It automatically classifies time spend on each device as productive (e.g. Word, email) or as procrastination (e.g. Facebook). You can change what it considers productive or not. You can try the Pro version for free for 2 weeks.

- **30/30 app**: http://3030.binaryhammer.com/ This iOS only app allows you set a list of tasks and a length of time for each one (from 1 minute to 1 hour). When you start the timer, it will tell you when it's time to move on to the next task.

- **Pomodoro timer**. If you search for "Pomodoro timer" you will find several online tools and apps to download. The aim is to break down each task into chunks of 25 minutes at a time, with a 5 minute break in between.

8

Notification Management

Actionable now

Research on multi-tasking and interruptions has shown that we generally react to a new message within 6 seconds. Resuming a task after an interruption takes between 64 seconds and 20 minutes. Constant activity switching can actually have more negative effects than actual interruptions.

Also, research on notification behaviour has shown that critical messages are only 12% of what we receive.

- **Turn off your notifications.** You might want to do this forever for certain apps, or based on certain times/locations, or even manually on a case-by-case basis.

We have also found that people who separate their devices (i.e. smartphone and tablet are only for personal stuff, laptop is only for work stuff) feel more in control of work-home boundary management.

- **Create device separation.** Dedicate each device to one life domain; this might mean deleting or removing any work/personal accounts/apps on it.

Keep in mind:

- You could simply put your phone with the screen facing down on the table to avoid catching glimpses of incoming notifications.
- You can customise sounds for important notifications.
- If you want to use a device for multiple life domains, think of how to structure them (e.g. different users, creating folders, separating desktops, etc.) – see strategies in other sections.

9

Turning off notifications oh phone:

- **Android**
  Settings -> Sounds and Notifications -> App notifications -> select the app you want to change settings for -> Notifications -> select between Block all, Treat as priority, or Allow peaking

- **iOS**
  Settings -> Notifications -> select the app you want to change settings for -> toggle notifications off. Consider also whether you want the notification to be displayed on the lock screen, or whether you want the 'Badge App icon" (the red circle with the number). Repeat for all other apps you want to change.

- **Windows phone**
  Settings -> Notifications & actions -> find the app you want to change -> select preferred notifications (Windows phone 8)

Customise "Do Not Disturb" settings:

- **Slack**
  From the top menu: Slack -> Preferences -> Do not disturb -> customise the time when you do not want to be disturbed

- **Laptop (Mac)**
  Apple menu -> System Preferences -> Notifications -> Do not disturb -> then select when to turn off notifications (e.g. specific times).

- **Laptop (Windows 10)**
  In the bottom right corner, right click or press and hold "Action Centre icon" -> select Turn on Quiet hours. Alternatively, open Settings -> System -> Notifications and actions -> select your preferred settings (e.g. showing notifications on the lock screen, turning off notifications, etc.).

See Email Management section to change settings for Email notifications

10

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See Email Management section to change settings for Email notifications

10

Expectation Management

Actionable now

Research has shown that response expectations are set after the first response, with an initial baseline of 24hours. This is valid for email, but will vary depending on the channel used.

- **Set email signatures**. Tell people when/how you check emails or what channels are best to be used for certain situations.

- **Set an out-of-office for the weekends**. You could say something like "*As an attempt to master more work-life balance, I don't check my email during the weekend. I will get back to you next week.*"

- **Turn off Awareness cues.** Awareness cues are all those cues that let you know whether a person is online, if a message has been read, or when they were last using the app. Knowing someone has read your message can be useful, knowing they've been online 4 times since is not so useful.

Keep in mind:

- People will message you on the channel they are most likely going to get your quickest response from. Create some 'perceived boundaries" – if you want to check your emails, go ahead, but it doesn't mean you need to reply straight away.
- Set expectations in advance.
- Sit in someone else's office when they are not in, or go to a coffee shop.
- Learn to say no and delegate:
    "I only say yes to something if I have something particular to offer"
    "I only say yes if I'm the best person to do this, because…"
    "I will do it because I will be able to get …… out of it"
    "If I want to say no, or delegate, I should ask 'Is there someone else who could do this equally well?'"

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Turn off Awareness Cues:

- **WhatsApp ("last seen at …")**
  Open WhatsApp -> Menu (three dots top right corner) -> Settings -> Account -> Privacy -> Who can see my Personal Info -> "Last Seen" -> choose between everyone, my contacts, and nobody.

- **WhatsApp (read receipts)**
  Open WhatsApp -> Menu (three dots top right corner) -> Settings -> Account -> Privacy -> uncheck "read receipts"

- **iMessage/Messages (read receipt)**. On iMessage (Messages) you can turn off read receipts for specific people. Open Messages -> tap on the conversation you are interested -> Info -> Send read receipts -> toggle it off (it needs to be white).

12

What is IFTTT?

It's a free service (web & app based) that allows you to create simple conditional rules, called "applets". IFTTT stands for "If This Then That" and it allows you to link different web services (e.g. Gmail) and specific settings (e.g. entering a specific location).

There are several already existing applets that you can choose from, or you can create your own based on your needs. All you need to do is create an account and download the app on your phone. You will need to authorise individual services, depending on the applet you choose.

https://ifttt.com/ and https://ifttt.com/products/do/button

Actionable now

You can use IFTTT to set rules ("applets") around when and where you want to receive notifications. You will need to create an account on the website and download the app on your phone. These are some of the existing rules and what apps they work with (just search for IFTTT and the name of the rule):

- **Let the team know you are signing off (Slack):**
https://ifttt.com/applets/45017934d-let-the-team-know-you-are-signing-off

- **Post on Slack when entering/exiting an area (Slack):**
https://ifttt.com/applets/45017672d-when-entering-or-exiting-an-area-post-to-a-slack-channel/

- **Let your team know you are away (Slack):**
https://ifttt.com/applets/192057p-let-your-team-know-you-re-away

- **Log how much time you spend at home, work, etc**. **(GPS)**:
https://ifttt.com/applets/133495p-log-how-much-time-you-spend-at-home-work-etc

- **Get a notification every time you come home (GPS)** (this can be used to set location-based alerts regardless of time, e.g. remember to log out of a channel. It uses the GPS on your phone). https://ifttt.com/applets/165413p-get-a-notification-every-time-you-come-home

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![IFTTT ifthisthenthat logo]

- **Send a notification if enter or exit an area (GPS)** (this can be used to alert others that you are no longer working for example). https://ifttt.com/applets/25874686d-if-you-enter-or-exit-an-area-then-send-a-notification/edit

- **Automatically unmute your android phone at a specific time on weekdays:** https://ifttt.com/applets/165394p-automatically-unmute-your-android-phone-at-a-specific-time-on-weekdays

- **If today's smartphone usage time exceeds your limit be polite and put your phone away:** https://ifttt.com/applets/257213p-if-today-s-smartphone-usage-time-exceeds-your-limit-be-polite-and-put-your-phone-away

- **Turn off mobile data when I get home**: https://ifttt.com/applets/185476p-turn-off-mobile-data-when-i-get-home

- **Mute phone when a focus time session is started (needs RescueTime):** https://ifttt.com/applets/315926p-mute-phone-when-a-focustime-session-is-started (Needs Rescuetime)

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