Future challenges in design for multitasking at work

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ABSTRACT

It is increasingly important for the CHI community to investigate the future of work. Technology allows simultaneous engagement in work and personal tasks on a multitude of digital devices. As a result, modern workers experience high fragmentation of their working days which can be stressful and impact work-life balance. Future challenges include design of smart tools to manage frequent task switching and interruptions. This position paper discusses how capturing patterns in workload and productivity levels, as well as in email behaviours will be a prominent future research direction.

CCS CONCEPTS

- Human-centered computing → Interactive systems and tools; Human computer interaction (HCI); Interaction devices; Ubiquitous and mobile computing.
KEYWORDS
multitasking, productivity, email, flexible working, work-life balance

MOTIVATION
New technologies increasingly shape the way people plan and execute tasks. For instance, advances in Information and Communication technologies enable individuals to engage in work from anywhere and at any time through their always-on devices. Such new opportunities are exciting as they bring the promise of more control and flexibility over how work is done. Indeed, evidence suggests that workers put high value on having a choice over their job arrangements. People report feeling happier and more motivated to work when they are able to choose how to fit work tasks around their schedules [2]. More generally, technology enables open access to employment and contributes to increased fairness in job opportunities.

Although innovations are often viewed as beneficial, it is important for the CHI community to investigate the various challenges that are likely to accompany future work environments. One responsibility of the CHI community is finding ways to cope with the demands of poorly defined digital activities.

MULTITASKING AT WORK
Execution of job responsibilities increasingly requires digital multitasking, the work on multiple tasks using digital media [8]. Many workers need to switch back and forth between applications (e.g., emails, browsers, documents) and devices (e.g., laptops, phones, tablets). Keeping focused attention will be an important challenge as those frequent switches put high cognitive demands and increase the chance for irrelevant interruptions.

The fragmentation of work has been studied by observations of real-world workplace behaviour. On a very low level of granularity, multitasking is studied by the average amount of window switching while working on single devices [7]. Information workers, for instance, switched screen windows 37.1 times per hour [6]. Increased number of window switching is linked to perception of higher workload and more stress [8]. On a broader level, work fragmentation can be studied by looking at the switching between higher-level tasks, such as writing an article or having a meeting. Studies report that people switch their central working sphere on average every 12 minutes [6]. This fragmentation may constrain ability to plan ahead, given that it has been reported that 41% of the time people do not continue their original task after being interrupted [8].

The increased access to work and expectations of extensive availability impact work-life balance. Work can be accessed from multiple devices and from multiple locations. As a result, work is often performed during non-work hours and from non-traditional locations, such as home and cafes.
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Research has already gathered evidence that these poorly defined temporal and spatial boundaries of work cause stress and lead to burnout [5]. Hence, keeping healthy boundaries between work and personal life is a growing challenge to solve.

The above findings illustrate how multitasking on devices allows people to easily cross the boundaries of unrelated tasks and contexts. The CHI community has addressed these issues and has started to accumulate a body of literature to suggest strategies and designs which facilitate work-related multitasking and improve work-life balance.

DESIGN OPPORTUNITIES

Understanding Workload. Understanding moments of high and low workload will be a fruitful research avenue. Research has shown that interruptions during moments of high workload are the most detrimental. A software detecting workload intensity can aid the reduction of disruptive interruptions, for instance by indicating whether the worker can be interrupted to coworkers. Recent efforts have showed that we can predict workload intensity and direct external interruptions to moments of low workload. Such systems can be based on monitored computer activity, such as frequency of keyboard and mouse presses and application type. A field study confirmed that this method can reduce social distraction by 46 per cent [9].

More research is needed for further refinements in these systems such as inferring periods of active thinking when workload is high but computer activity is low. Further, this research is still to be extended into the virtual work environment where messages are being delivered regardless of the current workload status.

Understanding Productivity. The future of work will depend on how productive people are. There is a gap of research on suggesting the best way to utilize the rich information offered by current productivity tools.

Most of the current research in this area has used activity loggers. There are various commercial tools aimed at increasing productivity by showing time spent in different applications. Users can set targets on how long to work on projects and which distracting websites to block. Currently existing tools however are heavily criticized for their lack of flexibility and very low engagement rates [4]. Researchers need to find how to utilize these data beyond purely raising awareness about the proportion of time spent in different applications. For instance, designers need to offer actionable insights. To do so, an important future question is identifying distracting applications for different contexts. That is, the same application can be both beneficial and distracting for different tasks and there are no appropriate tools to show what is best to do across different situations.

Future research can explore moving beyond activity trackers on computers to exploring the rich sensor data collected from mobile phones and smart watches. The already built-in sensors have proven
very useful in recognizing emotions, such as stress and boredom [1]. Detecting patterns in behaviours and associated emotions can lead to context-informed recommendations. For instance, suggestions can be fed back when engagement levels drop and the user feels unproductive e.g. How about taking a five-minute walk?

Understanding Email. Supporting email interactions is a major future challenge. Some studies show that people habitually check their email on average 70 times per day and they respond immediately to 70 per cent of the email notifications they receive [8]. This pattern does not seem to have a positive impact on people. Modern workers often feel lost and overwhelmed in their email box [3], as well as get distracted with irrelevant emails, a condition coined as email overload. Emails are also disruptive to work-life balance as they can pop-up at inappropriate times and lead to inability to switch-off from work. Ways forward include design of smart notification systems based on location data, improving automatic replies, using alternative communication channels for team conversations and building healthier email habits, such as email batching.

Investigating how we can meet design needs posed by the future work environment is a focus of our research. By attending this workshop, we hope to widen the scope of our knowledge about the challenges in the future work community.

ABOUT THE AUTHORS

Yoana Petrova is a PhD student at the UCL Human-Computer Interaction Centre at the early stages of investigating the relationship between digital multitasking at the workplace, productivity and work-life balance. Her supervisors are Dr. Duncan Brumby and Prof. Anna Cox.

Duncan Brumby is a Reader in Human-Computer Interaction at UCL. His research is concerned with understanding how people manage digital distractions.

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