Digital Integration in the 3\textsuperscript{rd} Wave of Mobile HCI: A Key Challenge for Overcoming the Inverted Digital Divide

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ABSTRACT

What does the 3\textsuperscript{rd} wave of mobile computing hold for us, and what are the challenges ahead as we now move from the 1\textsuperscript{st} and 2\textsuperscript{nd} wave to the 3\textsuperscript{rd} wave of mobile HCI? While the 1\textsuperscript{st} wave enabled mobile computing on a basic level – including basic connectivity and the development of mobile devices – and while the 2\textsuperscript{nd} wave was to a large extent about the development of mobile content (from digital services and apps, to services for storing our data in the cloud), the authors suggest that the 3\textsuperscript{rd} wave of mobile computing is less technology-driven, but rather about what mobile computing can enable, and how mobile computing is increasingly a gateway to society at large. In this article, the authors focus specifically on this 3\textsuperscript{rd} wave of mobile computing, and in particular on what they call an inverted digital divide – a state where the mobile technology is in place for its users, but where there is no access to the services in society that rely on mobile computing. In this article, the authors demonstrate this inverted digital divide through a number of examples where they show how this plays out for different groups of people where this is vital in a global world – e.g., tourists to a country such as tourists, immigrants and even people applying for asylum. The authors discuss what is needed in order to bridge this divide and they outline its implications for the further development of mobile services. In concluding this paper, the authors suggest that “digital integration” might serve as a key notion for resolving these issues as we now enter the 3\textsuperscript{rd} wave of mobile HCI.

KEYWORDS

3\textsuperscript{rd} Wave Mobile HCI, Digital Integration, Inverted Digital Divide, Mobile Computing

INTRODUCTION

Human-Computer Interaction (HCI) in general has been driven by an account for easy and universal access to information (see e.g., Shneiderman, 1987; Nielsen, 1993; Bergman et al., 1996; Benyon et al., 2010). Design guidelines have been developed for consistency in design, and one can argue that the whole sub area of usability studies in HCI is devoted to the task of making digital services, devices, and interactive systems more accessible and easy to use (Nielsen, 1993; Wiberg, 2003). This is true for HCI in general, and it also holds for lots of research and development efforts in the area of mobile HCI (see e.g., Shrestha, 2007). In short, easy access, as described above, has been considered a cornerstone for advancing the development of interactive systems, and this ranges from personal computing to the design and development of mobile devices, services and platforms.

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Along with this vision of easy access to digital services we can notice how this has, in particular, played out as a driving vision for mobile computing over the past two decades under the umbrella of mobile universal access to digital services for anyone, at anytime, and anywhere (Kleinrock, 1996; Wiberg & Ljungberg, 2000; Wiberg, 2001). In short, seamless integration has been the driving vision for moving forward – including how to easily access digital services from any location, switch between different devices, and securely access cloud services from a wide range of different mobile devices. Further on, lots of effort has been invested into research and development of mobile devices, and lots of development has been focused on, for example, better connectivity, faster and more dynamic mobile networks, and more stable cloud computing services, just to mention a few areas of developments for realizing this vision of mobile computing.

In this paper, we recapitalize the history of mobile computing through this lens of a 1st and 2nd wave of mobile HCI so as to shed light on where we are going next. Here we suggest that the 1st wave of mobile computing was a device-centered era where society started to move towards mobile computing and where connectivity was the focus for those who had access to early versions mobile technologies. In the 2nd wave, the focus shifted from connectivity to bandwidth and storage of data into the cloud. The use evolved into anytime, anywhere mobility, and we started to talk about ubiquitous computing – not in terms of a vision for the future of mobile computing according to Mark Weiser (1991), but as a description of how mobile computing was now literally in everybody’s hands, and with increased connectivity mobile computing could then, at least in theory, be done by anyone, and from anywhere.

The 1st and 2nd wave of mobile computing were indeed technology-driven accounts, and that was necessary for the development of useful mobile devices and services. But still, and as we are now moving towards the 3rd wave of mobile HCI, it is important to realize that mobile computing cannot be driven by a completely technology-oriented agenda: it is equally important to understand the interplay between technology development and how this technology actually enables full mobility for its users – something that we in this paper will refer to as 3rd wave mobile computing. In this 3rd wave, mobile computing is fully integrated in society and mobile services are spread to and used by everyone. The potential is huge when it comes to raise the levels of awareness for people anytime, anywhere when it comes to social and economical status. Wherever you are, payments can be made, e-mails can be sent, and work can be conducted. Communications with anyone, from anywhere, and access to all the services that society can offer is possible, at least in theory.

But with this co-dependency between mobile computing and society – what is at stake here? Everything seems fluid, and fluent, and in order, but what about interruptions and complications in this mobile technology-dependent society? Even earlier, research has warned about the emergence of a digital divide (Kling, 1996). How do we address that as we enter the 3rd wave of mobile computing? Will the divide disappear, get wider or change in any way? In this paper we argue for a growing problem with a phenomenon we call the inverted digital divide. Now it is not necessarily about having or not having digital technology (which was the initial definition of the digital divide). Today people do have access to mobile technology – and this seems to be the case all around the world (see e.g., Norris, 2001; Menzie and Fairlie, 2004; Martin 2011) – but providing a person with a smartphone does not necessarily grant access to society.

In order to further illustrate this problem with the emerging inverted digital divide as we now enter the 3rd wave of mobile computing we will, in this paper, present a set of examples of how persons that already have access to mobile computing resources still need to become “digitally integrated” – not in relation to mobile technologies, not in terms of closing the traditional digital divide (i.e., to put computing resources in the hands of people), but from the viewpoint of some of the use situations and societal services that nowadays demand mobile technologies. In short, we view digital integration as key for entering the 3rd wave of mobile computing and, from our perspective, this form of digital integration has to do with enabling access to societal services for those already equipped with mobile
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