What about data demand? Bringing the issue of Internet growth to the mobile, wearable and ubiquitous systems community.

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Data demand i.e. the *"demand for network connectivity and online services"* [Lord et al. 2015] is integrated into the many mobile, wearable and ubiquitous systems we develop and rely upon in everyday life. In fact, these devices would arguably be useless, or certainly less 'smart', if they weren't Internet-connected.

Yet this data demand has ramifications for the energy consumption of the associated Internet infrastructure (i.e. communication networks, data centres etc.). Global electricity demand for ICT is growing twice as fast as the demand overall [Van Heddeghem, 2014], and is expected to take a 21% share of the overall electricity demand by 2030 [Andrae and Edler, 2015]. In fact, it's been estimated that in 2040, ICT could exceed 14% of global greenhouse gas emissions; this is half of the carbon footprint of the transportation sector today [Belkhir and Elmeligi, 2018]. Despite energy efficiencies in the infrastructure, these are outgrown by demand [Preist et al. 2016].

At Lancaster University, our Socio-Digital Sustainability team (http://www.lancaster.ac.uk/scc-sds/) have been researching this demand for data to discover how it is integrated into everyday life—uncovering and evaluating what practices and devices are dominating Internet use. Using mixed-methods studies comprising of quantitative log data and semi-structured interviews with participants, we have investigated a variety of mobile and home-networked devices to discover what HCI (human-computer interaction) designers and society can do to transition our Internet futures in more sustainable directions.

At Ubicomp, the closest research in this field has involved investigating Internet-connected devices and activities in the home [Kawsar and Brush, 2013]. However, the associated data demand and energy consumption was not discussed. The lack of data demand research in this area is concerning considering mobile, wearable and ubiquitous devices are a large facilitator of the problem.

However, through this presentation, we aim to bring the issue of data demand to the mobile, wearable and ubiquitous systems community. We will primarily discuss our analysis of 398 Android devices (smartphones and tablets) from the Device Analyzer dataset [Widdicks et al. 2017]. Alongside this, we will reveal findings (due to be submitted to CHI'19) from our latest research involving router analysis; here we installed OpenWrt routers into participating households for one month to capture NetFlow and DNS data from the users' devices. In total, 66 devices (including smartphones, tablets, smart TVs, TV dongles, an Amazon Echo etc.) were logged from 20 participants across nine households.

So what can the ubiquitous systems community do to stem the extreme Internet demand in our society? What impact will our future designs have, how can we measure this, and what processes can we use to ensure sustainable device or application use? How can we design the Internet of Things or the smart home for example, to be data conscious? And how do concerns of data demand relate to device users' privacy and wellbeing? These are the types of questions we intend to discuss with the community in order to collaboratively tackle the growing issue of data demand and its rising energy consumption.

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