

Extending the lifetime of mobile devices to reduce their environmental impact: a glimpse on the project LIFESAVING

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Mobile Internet-enabled devices (MIEDs) such as smartphones, laptops, and tablets have become a crucial part of our lives. However, the environmental impact of MIEDs is significant and expected to increase markedly in the years to come due to the growing number of devices sold every year¹. Their main impacts, be it on climate change or material resource use, arise during the production phase. Using MIEDs longer can, consequently, curb demand for new devices and hence contribute to a significant reduction of the ecological footprint of our digitalised society. Considering that many devices that are replaced are still functional, extending the lifetime of devices seems to be expedient.

But how can such a lifetime extension be achieved in a way that is environmentally sound and considers the perspectives and rationales of consumers and commercial actors? This question stands at the core of the ongoing research project LIFESAVING, which is part of the National

Research Programme "Sustainable Economy" (NRP 73). In the following, we present some highlights of our ongoing research.

Measures to extend service lifetime

There exist a multitude of measures that contribute to extending the useful service lifetime of MIEDS. These can be taken by a wide range of actors, including, e.g., producers, retailers, consumers, or legislators. In a systematic literature review over ninety different such measures were identified². A subsequent characterization according to their specific targets yielded three broad categories of measures.

- The first is **improved product design**. By aiming to increase the longevity of the soft- and hardware of MIEDs, a device stays functional for a longer time. Consequently, the replacement rate can be reduced.
- The second is This category includes measures that aim at delaying the replacement of a device. Some of these can be implemented by consumers themselves (e.g. bumper case, repair when broken), some by others such as commercial actors (e.g. warranty, attractive repair services, etc.).
- The third is **recirculation**. This category includes measures that contribute to a second life for devices that are no longer used, such as selling it, handing it down to family and friends, or buying a second-hand device.

While improved product design certainly has a great potential for service lifetime extension, it is also hardest to change by Swiss actors (consumers, retailers, legislators, etc.) alone. In contrast, both retention and recirculation not only require a thorough understanding of how consumers make decisions but also of the operational principles of commercial actors (i.e. retailers, repair shops, marketplaces for used devices, etc.). These insights may in turn stimulate the creation of new business models that are attractive to both consumers and commercial actors.

Improving the data sources and approaches to measure the ecological impact

But are lifetime extending measures worthwhile from an environmental perspective? Looking at the case of repair, preliminary analyses suggest that it generally does: It performs considerably better from an environmental perspective compared to the acquisition of a new device, even though it requires the production and transportation of spare parts (e.g. a broken screen or battery). However, only few life cycle inventory (LCI) models exist at the moment for MIED specific components. Due to this lack of specific data, input data from one type of device (e.g. laptops) has previously been used to model others (e.g. smartphones)³. This can result in different life cycle assessments studies (see Fig. 1) finding different ecological footprints, e.g. for smartphone devices. This shows that LCI data from laptops cannot readily be used to model a smartphone. Thus, the project works on improving the data sources and approaches to assess the ecological footprint of different electronic devices.

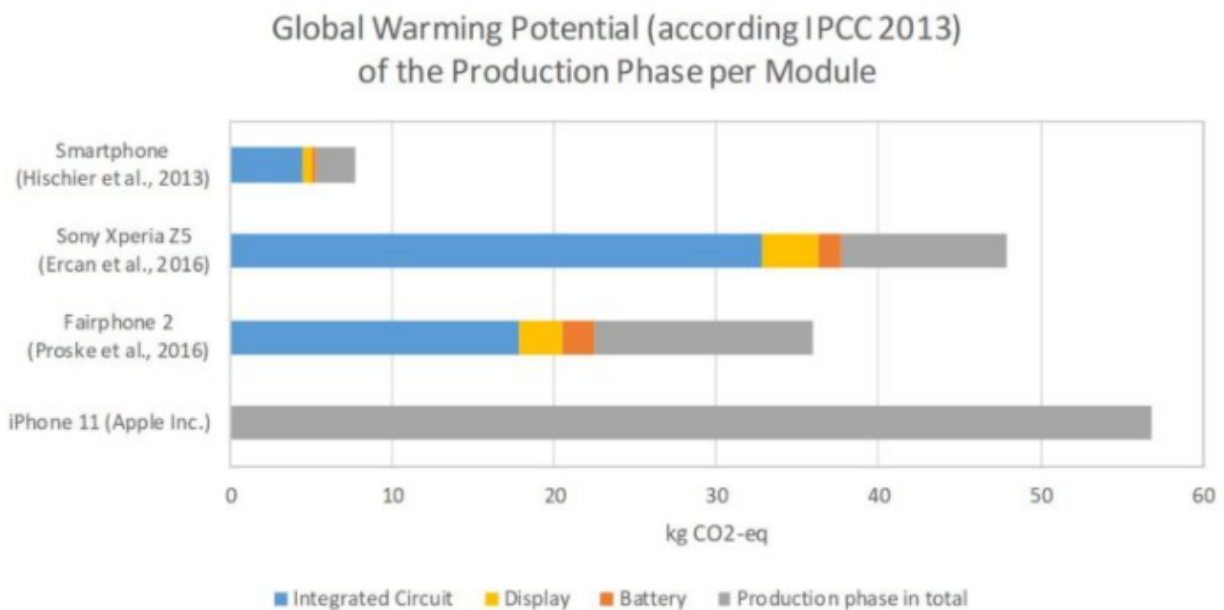


Fig. 1. Different estimates of the global warming potential of the production phase per module of different smartphones

Identifying barriers and drivers experienced by consumers to extend useful service lifetime

How attractive are different measures aiming to increase the lifetime of MIEDs from the perspective of consumers? A series of 29 interviews with consumers revealed several relevant barriers to using a device longer, repairing it, or buying a used one. These include cost considerations (simply buying a new phone is often preferred to a costly repair) but also the higher emotional satisfaction of buying a new compared to a second-hand device. The interviews furthermore showed that it is not primarily consumers' lack of knowledge concerning the environmental impact of these devices. Rather, interviewees voiced their concerns and thought alternative behaviours would be relevant and beneficial. However, several interviewees did not see it as their individual responsibility to maximize the lifetime of their MIED, blaming producers for planned obsolescence that avoids that a device can't be used for longer than a few years. To get a reliable representation of the prevalence of useful service lifetime behaviours as well as barriers and drivers experienced by Swiss consumers, a nation-wide survey will be realised.

Getting a comprehensive picture by combining different perspectives

Only the combination of these different perspectives allows for a comprehensive picture of how best to extend service lifetime and, therefore, how to reduce the environmental impact that arises from an increasingly digitalised world. Until Summer 2022, the research project Lifesaving will focus on how to overcome barriers perceived by consumers and how well lifetime extending measures perform in real-world settings. To that end, starting this Fall, we will be setting up field experiments in close collaboration with a number of practice partners, including retailers, manufacturers and NGOs.

Project information

An interdisciplinary team from the ZHAW and University of Zurich is working on the research project "Extending the lifespan of mobile devices". This research project is part of the National Research Programme "Sustainable Economy: resource-friendly, future-oriented, innovative" (NRP 73) of the Swiss National Science Foundation (SNSF). NRP 73 aims to generate scientific knowledge about a sustainable economy that uses natural resources sparingly, creates welfare and increases the competitiveness of the Swiss economy. NRP 73 takes account of the environment, the economy and society as well as all natural resources and stages of the value chain.

Further information on the National Research Programme can be found at www.nfp73.ch.

References

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