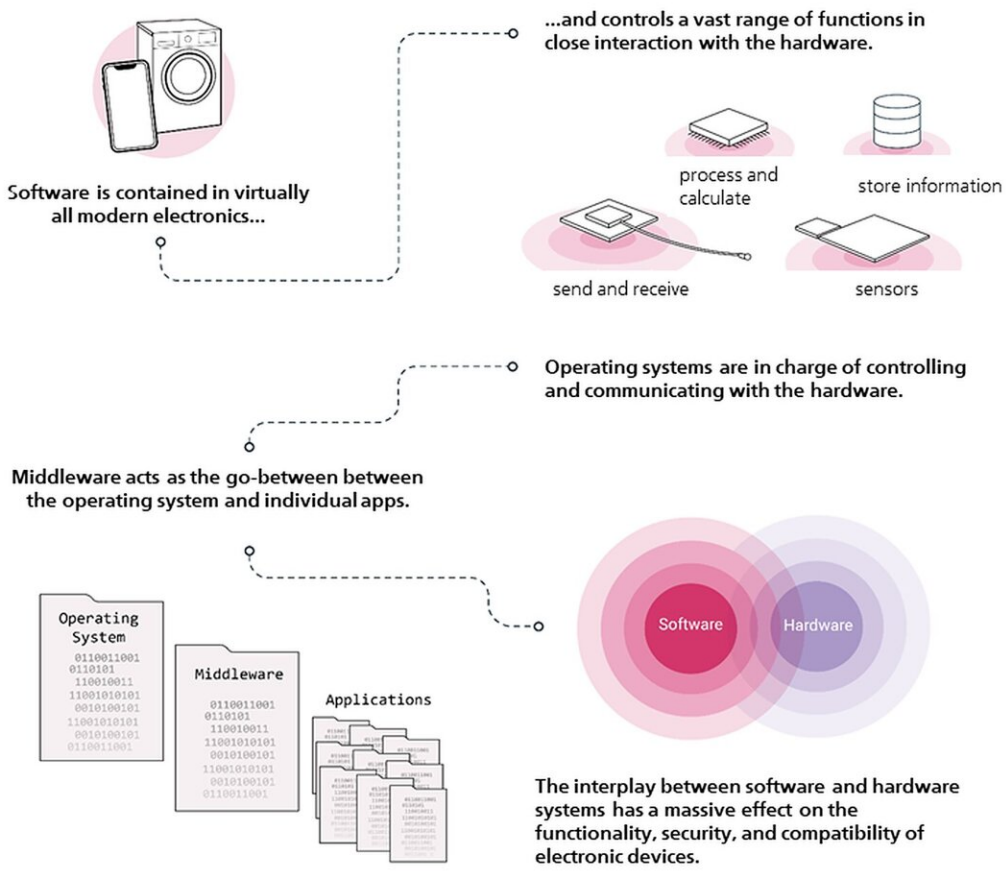
Blame the software: Study reveals new risks to the longevity of electronic devices

April 4 2023, by Susann Thoma



Increasing digitalization is reinforcing the risk of software obsolescence. Credit: Technical University of Berlin

Open your garage door by smartphone and control your home's heating on your way back from the office: More and more aspects of our lives are governed by smart, connected electronic devices. Many functions can be controlled and information shared only if the hardware works seamlessly with the operating systems under the hood.

When a product is purchased, the buyer typically expects it to work for as long as possible. But what if it stops working even if the hardware is still fine? In a study commissioned by the German Environment Agency, Fraunhofer IZM and its partners explored the mechanisms behind software obsolescence to come up with practical recommendations for political decision makers.

The scientific community exploring the live expectancy of electronics have long focused on how electronic components age and wear out. Software was not on their radar, but software can be a key factor for reducing the lifespan of electronic devices and adding to the ever-growing mountain of electronic waste.

To understand and define the fraught term of software obsolescence, researchers at the Technical University of Berlin, the Oeko-Institut, and the Fraunhofer Institute for Reliability and Microintegration IZM were tasked by the German Environmental Agency with a special study. Their mission: To record the status quo, research different product groups, conduct consumer surveys, and come up with practical recommendations for users and, above all, for tackling the root causes of the issue.

Their pioneering work on software-caused obsolescence is helping fill the gap in our knowledge about how software, product design, and a product's environmental footprint affect each other.

The basic thinking is: Software has a certain quality and a certain set of functions it is supposed to fulfill. If the requirements change, e.g. when

devices change or new safety standards come in, this can affect quality or functionality—in many cases, negatively.

The team took on individual instances of software obsolescence from a range of product categories, ranging from the incompatible software narrowly developed for one specific smart thermostat to smartphone software updates that allegedly helped protect the health of the batteries in older smartphones. As the scandal soon called Battery Gate revealed, the updates often caused the performance of the devices to suffer as a whole.

Three key aspects were defined by the researchers: the security, functionality, and compatibility of the systems in question. Software obsolescence is what happens if one of these aspects is affected negatively. The case studies they surveyed revealed to the researchers that there is a conflict of interest at work: Requirements and expectations of what devices can do are constantly evolving, leading to the software and the entire systems being in a constant state of flux. And it is that flux that often lets invisible flaws creep in.

At the start of their research, the team surveyed actual consumers and found out that no less than 60% of the respondents would like to know more about the concrete obsolescence risks of software. Why software as a catalyst for obsolescence has long been such a blind spot seems due to a simple explanation: Up until recently, most electronic devices were not as extremely software-dependent as they are now.

And trends indicate that the situation is changing and will continue to change rapidly: The fast-growing market for home automation or the introduction of driverless cars will lead to even more devices offering additional functionality that is heavily dependent on software. The public space, too, will become more and more interconnected, e.g. with digitally controlled lights or smart traffic controls.

One thing is certain: Updates that one can usually assume to improve the user experience of a device can potentially lead to a loss of performance or even removal of individual features in the long run.

"People tend to think that software cannot become obsolete. It won't get rusty. But if a smartphone's software is not supported anymore after only two years of use, that is a genuine disaster from an engineering standpoint. We need to apply the principles of eco-design to software as well to slow down the pace of waste and make our devices work for longer," Erik Poppe, project manager at the TU Berlin, explains.

Marina Köhn, scientific assistant at the German Environment Agency with responsibility for green IT, would put it in even starker terms: "The study by Fraunhofer IZM, the TU Berlin, and the Oeko-Institut is a clear sign of the problems we can expect to come with the connected products of tomorrow."

"Software must not be allowed to contribute to our products becoming unusable and ending up as waste. We should get manufacturers to design their products in such a way that they can be used for a meaningfully long time. Any business models that rely on the opposite should be illegal. Consumers should also be informed, before they buy a product, how that product depends on other devices or services, and manufacturers should be forced to get their customers' consent when they want to change anything about that."

The researchers also came up with pragmatic proposals for official regulations that can help extend the lifespan of products by way of their software, instead of artificially reducing it. Three aspects stand out from the many ideas: There should be minimum standards before allowing products in the market, including a minimum term of use.

Devices should be able to work without depending on anything external.

Security-relevant updates should be offered for at least ten years. And interfaces should be avail-able to improve the compatibility and interoperability between systems.

The second aspect concerns transparency: Manufacturers should be made to disclose any dependencies affecting their software-driven products as well as the guaranteed support period. Finally, there should be support for green innovations like more sustainable software development.

"On top of the recommendations for the Federal Environment Agency, our ambition for the project was to spark a debate in the community. Software obsolescence should be understood as a problem for sustainable electronics. And this is not limited to the professional community: Actual users need to be more aware of the issue and be able to know before they buy anything what will happen after their purchase," Jan Druschke, sustainability expert at Fraunhofer IZM, states.

The scientific findings of the study will now feed into the political debate to come up with practical recommendations and create new common ground between electronics manufacturers, consumers, and experts.

Provided by Fraunhofer IZM

Citation: Blame the software: Study reveals new risks to the longevity of electronic devices (2023, April 4) retrieved 9 April 2024 from https://techxplore.com/news/2023-04-blame-software-reveals-longevity-electronic.html