Ecodesign requirements for software: another possible horizontal approach?

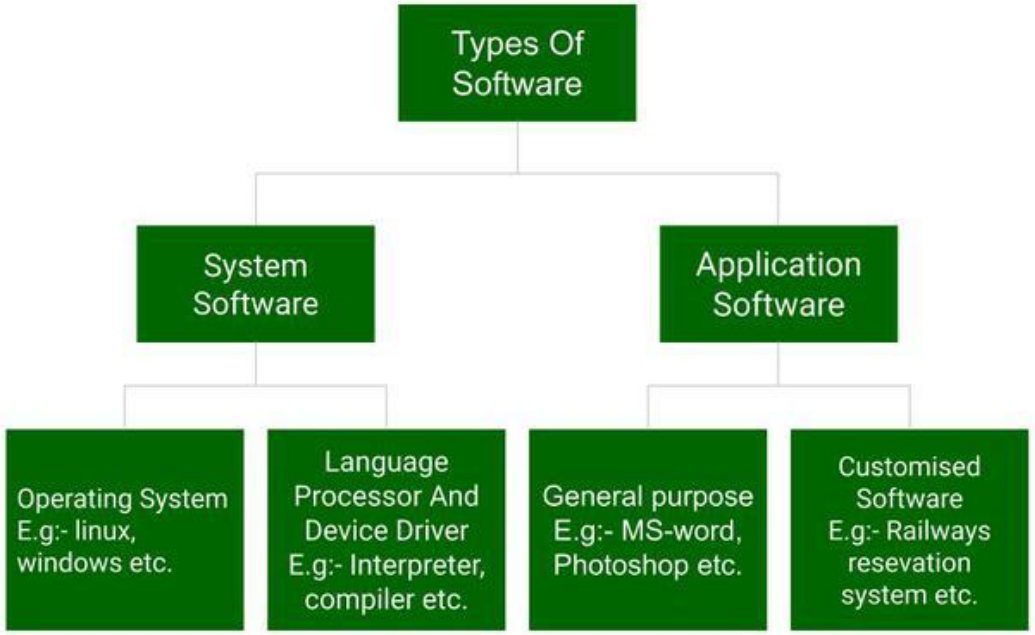
ECEEE Summer Study – 10-15 June 2024 - Mathieu Rama, Environnemental Coalition on Standards (ECOS)

With contributions from Sergio Fernandes (Intely) and Luka De Bruyckere (ECOS)

Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.

What is a software?

- ‘Software’ as opposed to ‘hardware’, (the physical parts of an electronic product). Though also to be addressed as a tangible product.
- Software consists of instructions, programs, and data that drive computers and execute tasks.
- It comes in two main types: System software (e.g., operating systems, firmware, device drivers) and Application software (e.g., word processors, spreadsheets, Enterprise Resource Planning).



The Scope of software?

- Software has a strong impact on the hardware, influencing everything from the design, functionality and lifespan of the devices.
- It defines and enhances the capabilities of hardware. Firmware and drivers control and optimise the use of hardware components.
- A critical role in energy management and security.
- Software updates can extend the functionality and lifespan of hardware; though often it is the opposite happening.
- Effects dripping down the chain: Vendor – Public-/Private Sector - to Consumers
- Increased costs for software means increased costs for hardware and services.
- Professional software impacts need to be in scope;
  - Vendor life cycle now 5-7 years (from 10 years few years ago)
  - End-users' product lifecycle is 8-10 years

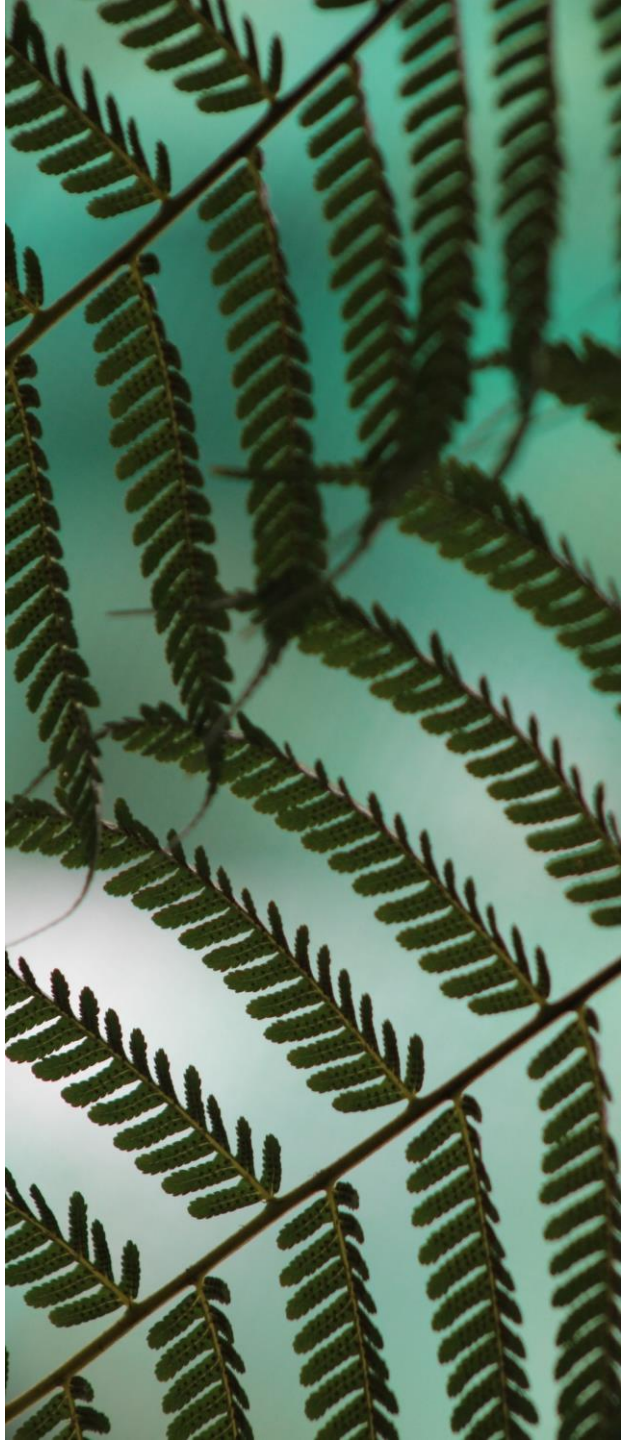
What impact on resource efficiency?

Impact on material efficiency:

- Hardware is highly dependent on Software
- Durability: Software updates can lead to the obsolescence of the hardware, as new requirements are set (too high)
- Repairability/Maintenance: Software practices limit self and third-party repair and maintenance
- Reusability: Lack of software function allowing safe data deletion can be a barrier to reuse

Impact on energy efficiency:

- The way software is coded determines energy efficiency
- Software updates can lead to increased energy consumption



Summary

I. Software practices impacting material efficiency
   1. Durability
      - Software issues related to durability
      - Software legislation related to durability
   2. Repairability
      - Software issues related to repairability
      - Software legislation related to repairability
   3. Reusability
      - Software issues related to reusability
      - Software legislation and standards related to reusability

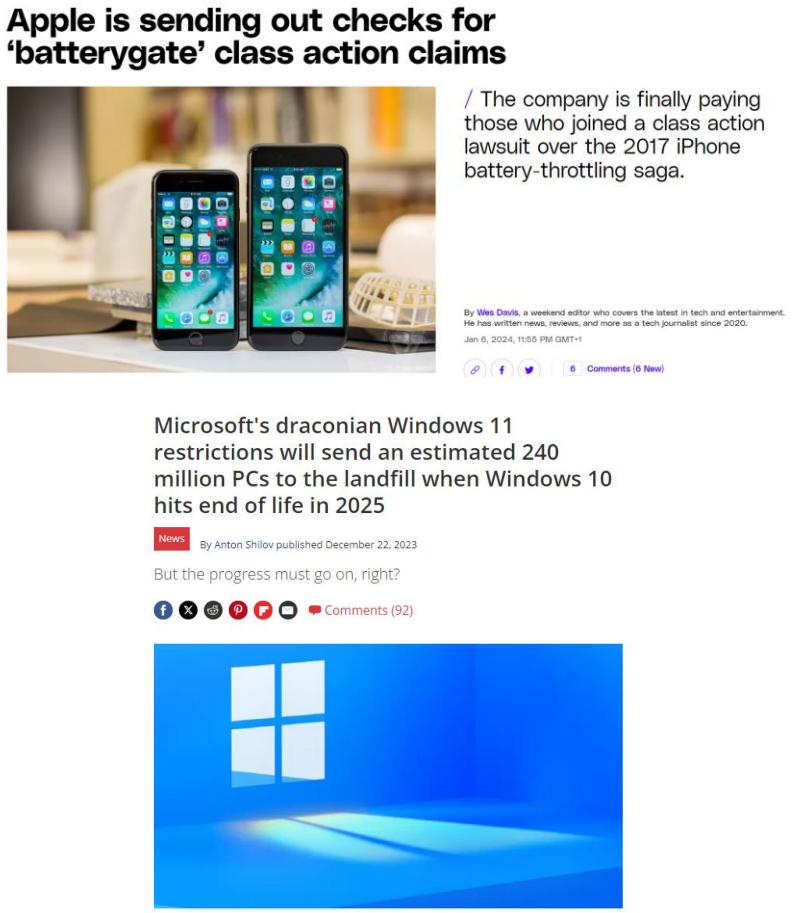
II. Software practices impacting energy efficiency
      - Software issues related to energy efficiency
      - Software legislation related to energy efficiency

III. Recommendations for more sustainable software

I. Software practices impacting material efficiency

Software issues related to durability:

- Software updates:
  - Security and corrective updates are too heavy and bundled with non-essential ‘comfort’ or ‘functionality’ updates
    - If already overloaded, security and corrective updates are impossible
    - The product might slow down to a point where the user considers replacement
- Impossible software update:
  - OS and application updates are not compatible anymore with hardware, leading to early obsolescence
- End of Support:
  - The end of support of hardware related software, can lead to early obsolescence. Especially when functionalities are removed.
- Unilateral vendor policy or license changes that impact usage rights, making software (and hardware) redundant.
- Cloud based solutions:
  - No control by the end-user, need to follow the requirements
- Limited interoperability can lead to premature obsolescence (e.g. for smart functionalities)



I. Software practices impacting material efficiency

Software legislation related to durability:

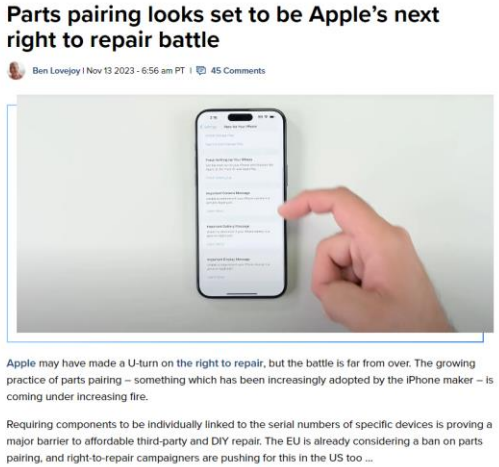
Legislative text	Provisions
Smartphones/tablets ED regulation	• Operating systems updates available for 5 years at no cost • The updates should not decrease the performance of the product
Smartphones/tablets EL regulation	The 'Software Updates (duration)' (SSU) score shall be calculated at product level as follows: • 7 years = 5 pt • 6 years = 3 pt • 5 years = 1 pt
Cyber Resilience Act	Products with digital elements must benefit from security updates for minimum 5 years, unless for products that last for a shorter period of time

A 2012 ECJ Ruling allowed the resale of Used Software licenses. This can prevent installing newer versions or forced transfer to cloud based usage

I. Software practices impacting material efficiency

Software issue related to repairability:

- Part-pairing:
  - Manufacturers lock out new spare parts with software.
  - Discourage, or even prevent, certain parts from being swapped, including with third-party spare parts, second-hand (cannibalised) spare parts or even manufacturer-original replacements



I. Software practices impacting material efficiency

Software issue related to repairability:

Article by:

Lauren Greenlee

@laureng

It's not just Apple

Lots of products limit repair through paired parts.

Chainsaws
Only dealers can update firmware on new parts for Husqvarna chainsaws and automowers.

TVs
On many TVs, mainboards, t-con modules and panels must be paired via a hidden routine.

Xbox One
The Xbox disc drive is paired to the motherboard, so replacing one means replacing both.

PS4/PS5
Sony took a cue from Microsoft and also paired the PlayStation disc drive with the motherboard.

Food Processors
When a Thermomix food processor throws an error, only official Vorwerk technicians can get the software to reset it.

Washing Machines
Many appliances require access to expensive manufacturer software to calibrate replacement parts.

Cars
Some parts are VIN locked, or paired to a car's serial number, requiring a dealer to program replacement parts.

Tractors
Replacing some parts on John Deere tractors requires dealers to input a code to get the tractor out of "limp mode."

I. Software practices impacting material efficiency

Software legislation related to repairability:

Legislative text	Provisions
New battery regulation	Software shall not be used to impede the replacement of a portable battery or LMT battery, or of their key components, with another compatible battery or key components.
Right to repair directive	Manufacturers shall not use hardware or software techniques that impede the repair of goods covered by ecodesign provisions on repair, unless justified by legitimate and objective factors including the protection of intellectual property rights under Union and national legal acts.
Smartphones/tablets ED regulation	Provide non-discriminatory access for professional repairers and end-users (for parts they can access) to any software tools, firmware or similar auxiliary means needed to ensure the full functionality of replaced spare parts and of the device in which such spare parts are installed

I. Software practices impacting material efficiency

Software issue related to reusability :

Data deletion function:

- Lack of data deletion function means no way to reuse a product
- Lack of trust from users in collection systems
- If too complex, raises refurbishment/reuse costs

Password reset function:

- If lacking, no reuse possible

I. Software practices impacting material efficiency

Software legislation and standards related to reusability:

Legislative and standardisation	Provisions
New battery regulation	• Software reset function mandatory for batteries
Servers and data storage products ED regulation	• Secure data deletion shall be made available for the deletion of data contained in all data storage devices of the product (ETSI/EN 303 800-2 - Secure data deletion) • The latest firmware is available two years after being placed on the market and for a minimum period of eight years after the last product of a certain product model is placed on the market, free of charge or at a fair, transparent, and non-discriminatory cost (ETSI/EN 303 800-3 - firmware updates)
Smartphones/tablets ED regulation	• Mandatory software function, that resets the device to its factory settings and erases securely by default the encryption key and generates a new one • Access to software and firmware reset functions for professional repairer
EN 45554:2020 - repair, reuse and upgrade	Scoring approach for: • Data management (transfer and deletion) • Password and factory reset for reuse

II. Software practices impacting energy efficiency

Software issues related to energy efficiency:

- Coding:
  - The way software is coded brings about different levels of energy efficiency – UBA compared, among others, two text processing programmes: One consumed four times more than the other.
- Software updates:
  - Potentially increasing energy consumption of hardware through more demanding programmes (leading consequentially to less endurant batteries)
- Settings and information:
  - Software can be an ally to nudge consumers towards more energy-efficient behavior. Ex: Info on battery damage caused by fast charging, adaptative luminance, battery-saving mode, etc.

II. Software practices impacting energy efficiency

Software legislation related to energy efficiency:

Legislative and standardisation	Provisions
(Upcoming) Computer ED regulation	• The GTD methodology, developed to measure the active mode energy efficiency of computers, will determine Operating Systems are the most energy efficient.
Smartphones/tablets ED regulation	• End-users should be informed and given the opportunity to refuse functionality updates that impact the performance of their smartphones/tablets

III. Recommendations for more sustainable software

- Product-by-product approach not sufficient to cover all products concerned, especially considering the development of more and more IoT (Internet of Things) products
- Need for a harmonised horizontal approach, building on the existing legislation and going for more ambition
- Right to Repair directive only covers products that already have resource efficiency requirements under ecodesign, which is too narrow

III. Recommendations for more sustainable software

- Ecodesign requirements on software could include:
  - Banned part pairing (in the same way as for batteries)
  - Mandatory in-built data deletion and password reset function
  - Mandatory provision of corrective and security updates for longer periods
  - Unbundling necessary updates from dispensable ones
  - Mandatory ability to switch from one software to another (particularly operating systems)
  - Mandatory energy and resource efficiency information functions
- A standardisation request to develop standards that underpin the reliability of energy-related products, as well as their reusability and repairability (software and firmware updates
  - At the moment, the EN 4555X series does not contain adequate provisions regarding the resource efficiency requirements related to software and firmware updates or the replacement of serialised parts.
  - ETSI is currently drafting a standard on firmware updates for servers and data storage products (EN 303 800-3), which has a high horizontal replicability potential.
  - Clear licensing and contract terms - Standards to be set

Relevant links

- https://www.techtarget.com/searchapparchitecture/definition/software
- https://www.britannica.com/technology/software
- https://www.geeksforgeeks.org/software-and-its-types/
- https://hbr.org/2020/09/how-green-is-your-software
- https://www.umweltbundesamt.de/en/press/pressinformation/environmental-impact-of-software-is-now-measurable
- https://inria.hal.science/hal-04082263/document
- https://www.infoq.com/news/2022/03/environmental-impact-software/
- https://www.umweltbundesamt.de/en/publikationen/entwicklung-anwendung-von-bewertungsgrundlagen-fuer
- https://www.bbc.com/news/business-61823512
- https://www.tomshardware.com/software/windows/microsofts-draconian-windows-11-restrictions-will-send-an-estimated-240-million-pcs-to-the-landfill-when-windows-10-hits-end-of-life-in-2025
- https://repair.eu/resources/position-on-part-pairing/
- https://www.ifixit.com/News/69320/how-parts-pairing-kills-independent-repair