MODULARITY

as One Principle in Sustainable Technology Design -
A Design Case Study on ICT

Ines Junge, PhD candidate, Dep. of Informatics, University of Oslo

OUTLINE

Responsibility for the futures that design materializes

A design case study on (modular) ICT

Nowadays insufficiencies and desirable, meaningful futures

Vision: Sustainable Technology and Interaction Design (STaID), Critical Design Practice

POLITICS BY OTHER MEANS

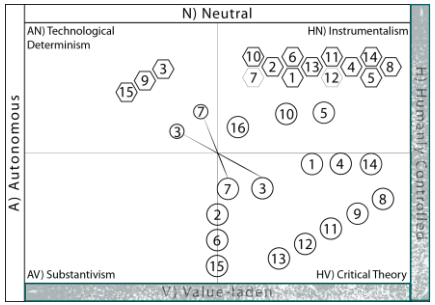
- Have to engage more with the politics of technology

"Design is
politics by other means"
Randi Markussen, 1996

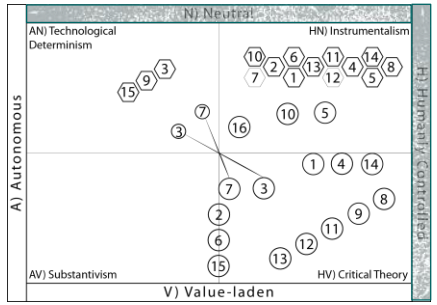
- As long as understanding of "technology as neutral" …

- values invisible! -

- critical stances in the Norwegian media: continuation of the liberal idea of control over technology for more acceptable ends



lack of deeper engagement



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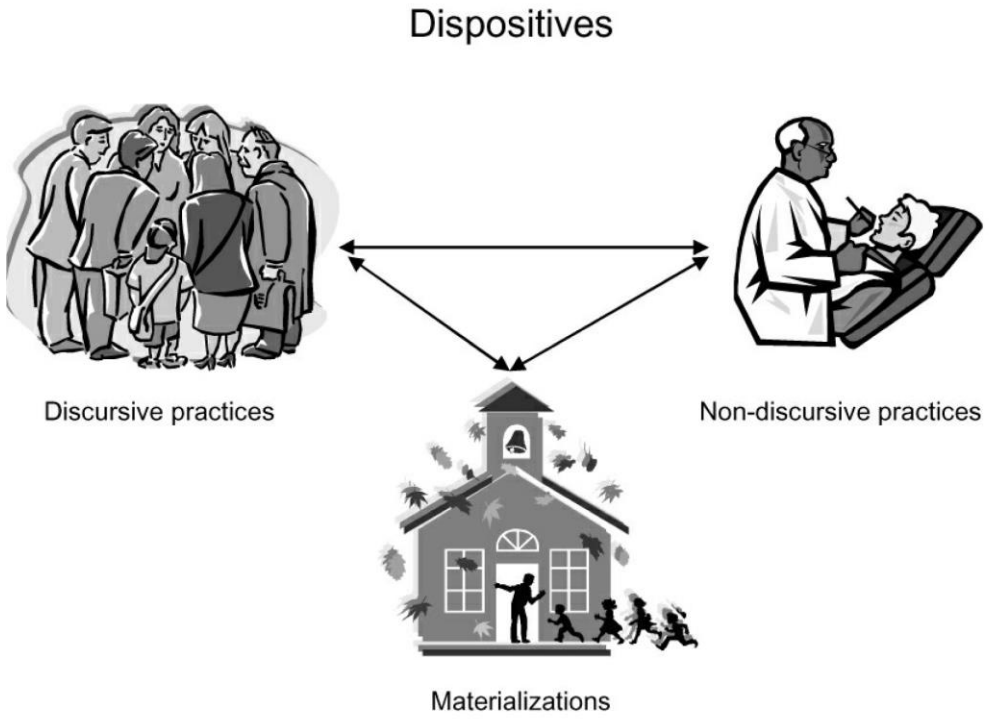
DISPOSITIVES (JÄGER)

- Research into the **non-discursive practices** and underlying **established or emerging manifestations** = designed technology and its lifecycle
  - Forthcoming publication(s) on modularity as a particular and 5 other sustainable design principles identified through a comprehensive design case review



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Vision: Sustainable Technology and Interaction Design (STaID), Critical Design Practice

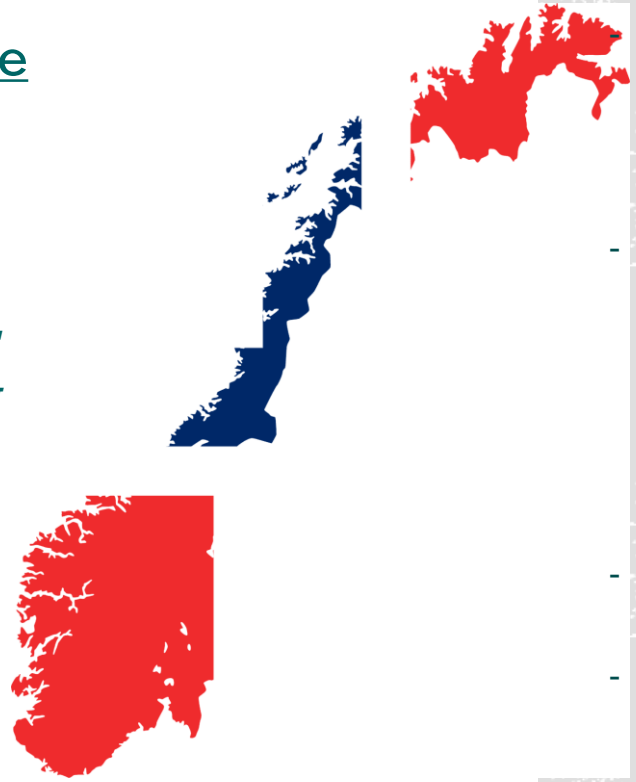
- Vision: STaID

Sustainable **T**echnology **a**nd **I**nteraction **D**esign

Challenges to Increased Design for X (like Remanufacture, Recycling):

Market Demand
Legislation
Design Skills and Education
Business
Knowledge

REG
EDU
BIZ



RESEARCH CONTEXT

- Research cluster *Digital Sustainability* at Department of Informatics, UiO, Digitalization & Entrepreneurship section https://digent.blog/
- *SMART* (Sustainable Market Actors for Responsible Trade) project led by Faculty of Law at UiO,: Dep. of Informatics with Ass. Prof. Maja van der Velden contributing with the case of the Life Cycle of the Mobile Phone; https://www.smart.uio.no/project
- *Futuring Sustainable Nordic Business Models*
- PhD project "From Designed Obsolescence to Sustainable Technology Design"

RESPONSIBILITY FOR FUTURES THAT DESIGN MATERIALIZES

- Transitional state
- Find new ways of designing, take responsibility

TRANSITION DESIGN FRAMEWORK

Four mutually reinforcing and co-evolving areas of knowledge, action and self-reflection

Visions for tran
needed, based u
life-styles that a
globally connect
information and
upon communit
to the ecosyster

New ways of designing will help realize the vision but will also change/evolve it. As the vision evolves, new ways of designing will continue to be developed.

The transition to a sustainable society will require **new ways of designing** that are characterized by:

• Design for 'initial conditions', • Placed-based, context-based design, • Design for next level up or down in the system, • Network & alliance building • Transdisciplinary and co-design processes, • Design that amplifies grassroots efforts, • Beta, error-friendly approach to

New Ways of Designing

Design for Transitions - from and to what?

Cameron Tonkinwise
School of Design, CMU

As part of its attempt to resituate the practice of designing within a commitment to facilitating social change toward more sustainable futures, the School of Design at Carnegie Mellon University has started talking about 'Transition Design.' It is risky to invent yet another term which too easily looks like an appropriative branding exercise. But

4) Sustainable Design was too Problem-Solving

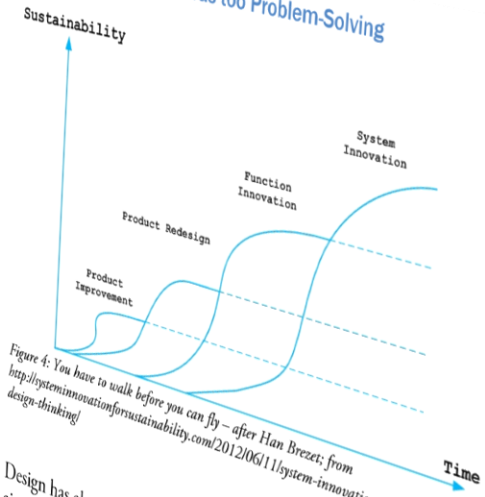
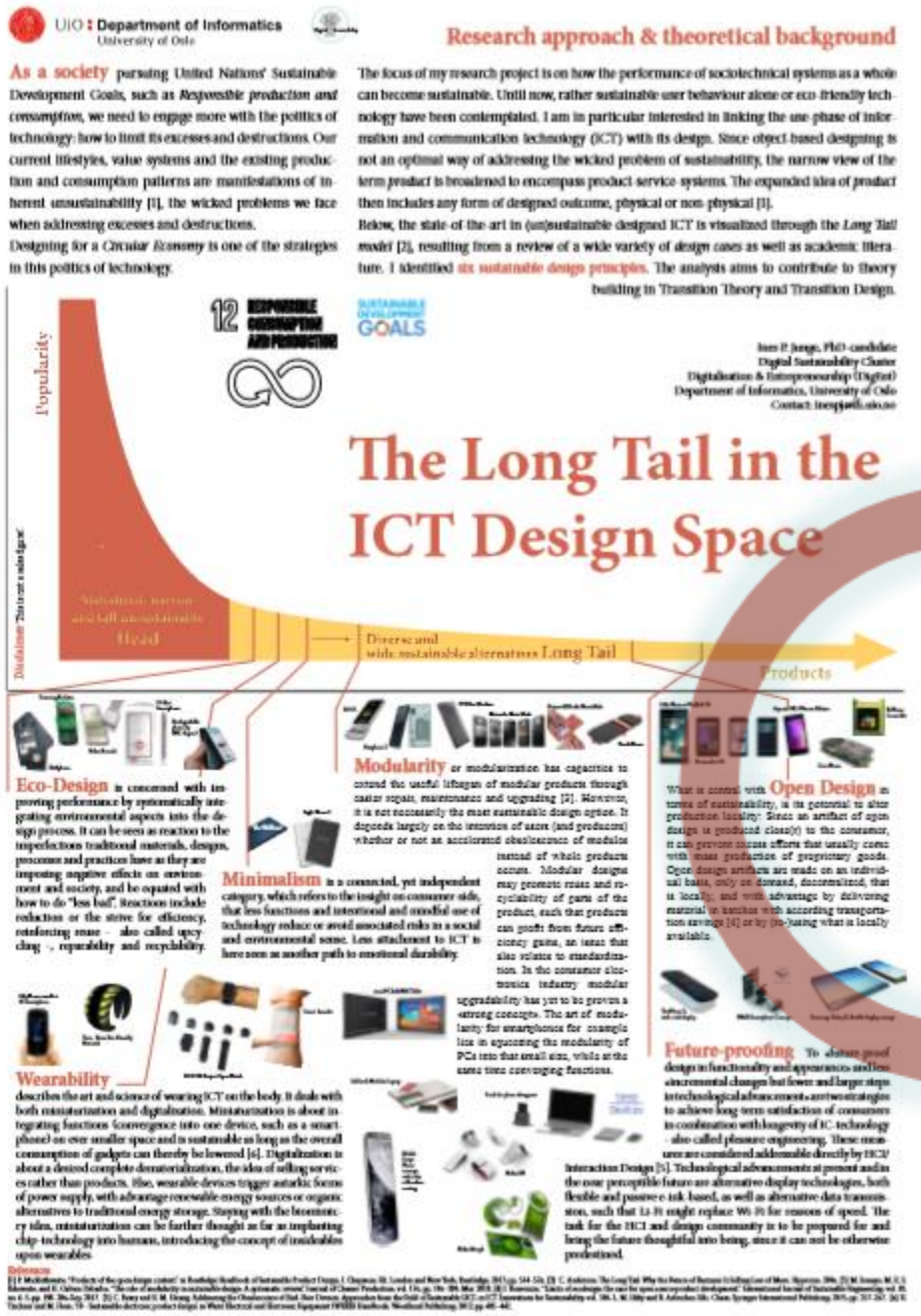


Figure 4: You have to walk before you can fly – after Han Brezet; from http://systeminnovationforsustainability.com/2012/06/11/system-innovation-for-sustainability-using-systems-thinking-and-design-thinking/

Design has always sought resource efficiency: the minimalist functionalism of modernism aimed to do more with less. Designers have been explicitly concerned about the ecological

Is the potential design space of (modular) built ICT and design concepts well populated?

Paint a rich(!) picture



DESIGN CASE REVIEW

FINDING DESIGN CASES

What types of (modular) built ICT and design concepts exist?

ANALYSIS

- Snowball multimedia search
- Smartphone disassembly as course project work
- Literature review

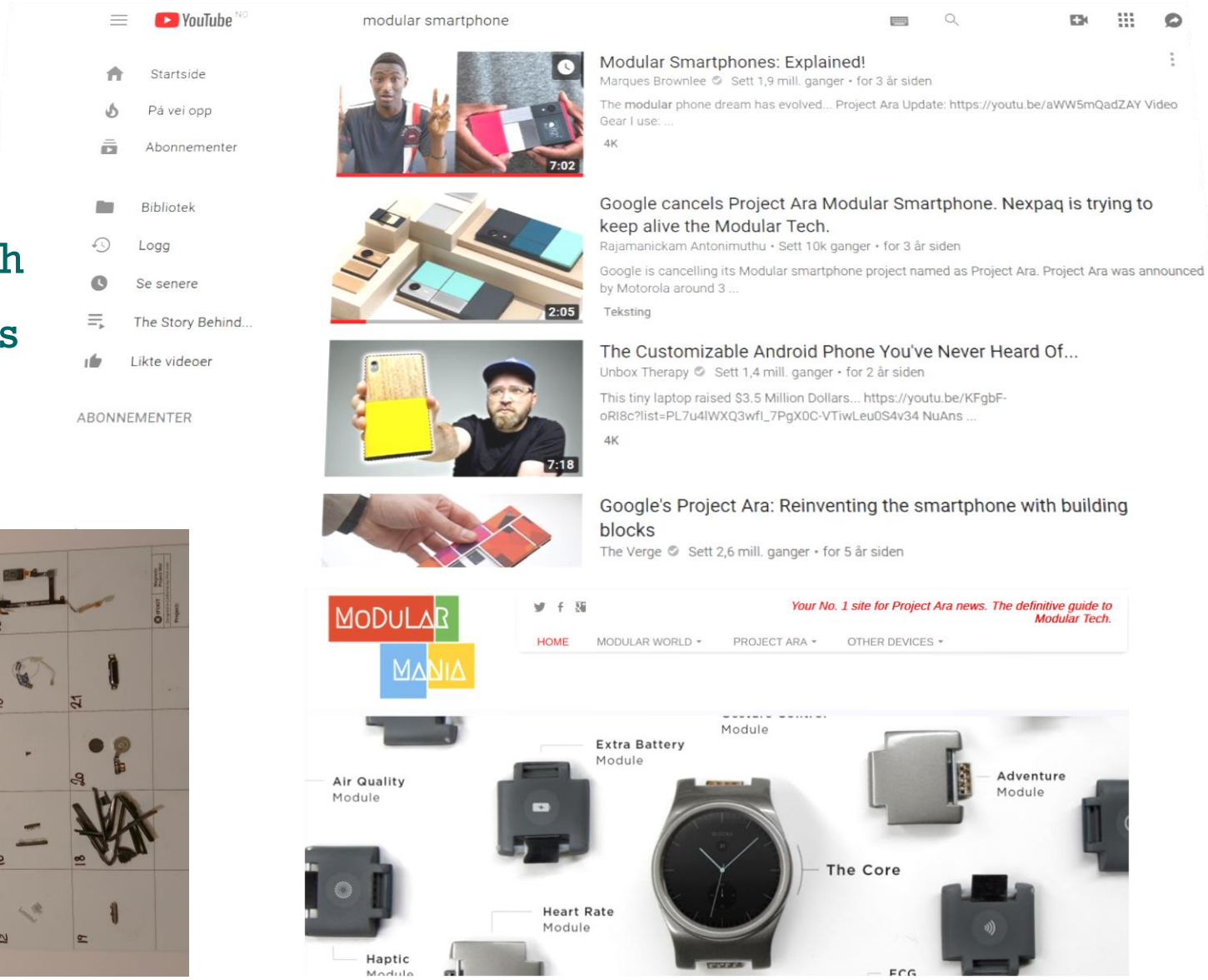


PLATE conference
Delft University of Technology
8-10 November 2017

PLATE
Product Lifetimes And The Environment

What's hot what's not: the social construction of product obsolescence and its relevance for strategies to increase functionality

Jaeger-Erben M.[a] and Proske M.[b]

a) Center for Technology and Society, TU Berlin, Germany
b) Environmental and Reliability Engineering, TU Berlin, Germany

Keywords
Obsolescence
Material culture
Public discourse
Design scenarios

Abstract

"Is it ethical to deny our products what we wish ourselves: A long live?" is one of the major questions the German documentary "Do mixers go to heaven?"[1] from 2016 asks. The star of this documentary is the RG28, a mixer once produced by a former GDR electronic factory, which became famous for its robustness and longevity. The factory didn't survive the Wende in 1989 but the mixers are still available on internet platforms and un junk-shops, some spare parts for the easy-to-repair mixer are still produced. Although it appears as a somewhat pathetic humanization of objects at a first glimpse, it makes an important point: Product lifetimes are more than a property of objects, a rationally calculated number that is inscribed in a product's design. The lifetimes of things made, used and disposed by humans can also be seen as an important characteristic of a given material culture and is rooted in current human-object relationships. This paper discusses both aspects – material culture and human-object relationship – with relation to the highly-contested term obsolescence[2]. Starting with the observation that obsolescence received most public attention in times of crisis, we report results of an analysis of current media discourses. Subsequently we present an alternative praxeological approach to obsolescence than the usual rational choice related explanations. The closing section discusses opportunities to increase a product's "affordance" to be kept alive longer.

Obsolescence as a contested issue

Latest since the term "throw-away society" has been taken up in the second half of the 20th century (Packard 1960) the question of how long consumer goods last and how much waste is produced has been the issue of much debate, particularly driven by an increasing number of consumption- and growth-criticists (O'Brien, Barnett 2013). According to Weber (2014) the public interest in longevity or short-lived products started even earlier and has risen in three waves since the industrial revolution, indicating critical turning points in the history of mass consumption society. First occurring in the interwar period in the USA, obsolescence became an issue again around the first environmental crisis in the 1970s and is coming up another time around 2000 when issues such as toxicity, resource scarcity and digitalisation gained more and more public interest. Particularly since 2011 obsolescence enjoys constant media attention, at least in Germany.

Results of a media analysis

Any sensible analysis of social phenomena particularly socially contested ones like obsolescence need to pay attention to how it is perceived as well as constructed in public discourses. As indicated above obsolescence is not a neutral description for a specific "natural" state of an object. It refers to a process where something is actively discarded, or seen as antiquated and outmoded. Even if an object like an electric device seems to be terminally broken it persists, and might still be useful, and be it only for art[3]. Hence, what is outmoded or not or worth being repaired, upcycled or re-used or not is socially negotiated. One approach to the communicative construction of obsolescence it to investigate media discourses.

A comprehensive search of online archives of German national and regional newspapers revealed over 200 newspaper and online articles that included the terms "obsolescence" or "product lifetimes" f… years. The analysis was guided b…

[1] German: "Kommen Rührgeräte in den Himmel"; see also www.rg28.de
[2] The paper presents some initial results and concepts of a 5-year transdisciplinary … sustainable consumption. It is financed by the German Ministry for Education and …
[3] See also Baudrillard's notion of the aesthetic transfiguration of mo… aura" (Baudrillard, Turner 2007)

RELATED RESEARCH

- Social construction of product obsolescence study from PLATE2017, Young researcher group "Obsolescence as a challenge for sustainability"

A BIT OF THE BACKGROUND…

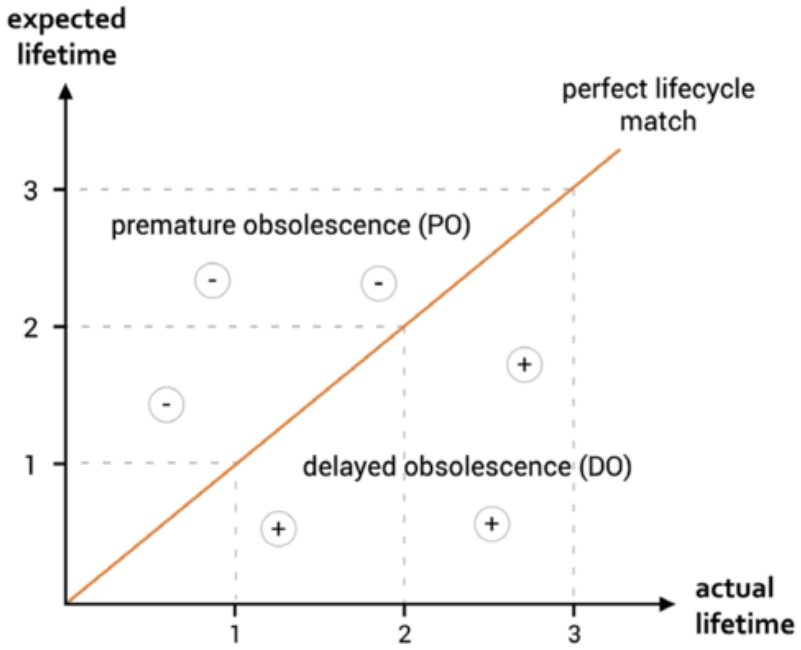
Questioning the pace of ICT consumption

FAST TECH <> SLOW TECH

- The smartphone – replaced on average every 18-24 months

https://en.wikipedia.org/wiki/IPhone_X

- Fast consumption
- Fast pace of technological development
- Premature obsolescence



[13] J. Longmuss and E. Poppe, 'Planned obsolescence: who are those planners?', in *Product Lifetimes And The Environment 2017 - Conference Proceedings*, Delft, 2017, pp. 217–221.

FINDINGS

Features of Modularity

15+ CONCEPTS IN RENDERINGS

FEATURES OF MODULARITY

- Define modular

Main units of ICT

A base unit

upgrade in terms of

a new screen,

CPU,

GPU,

camera,

battery and

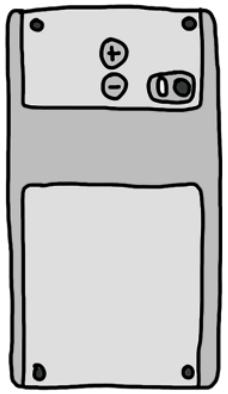
RAM

FEATURES OF MODULARITY MODULE

Sub assembly

Component

Part



(g) Puzzle Phone

(o) Fairphone 2

Spine (display, speakers, microphones)

Heart (battery) and

Brain (main electronics)

Transceiver (or core) unit

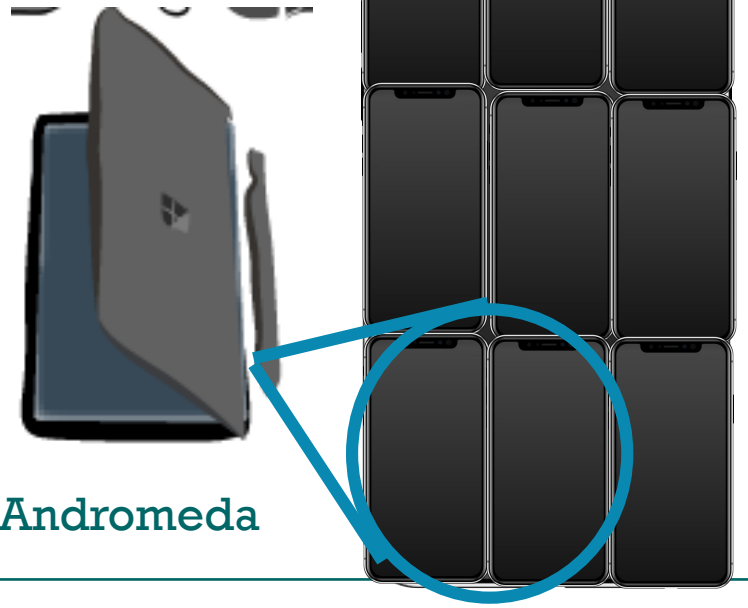
Display unit & the receiver module and

Rear camera module & speaker unit

FEATURES OF MODULARITY EXTEND LIFESPAN

- Easier repair, maintenance and upgrading

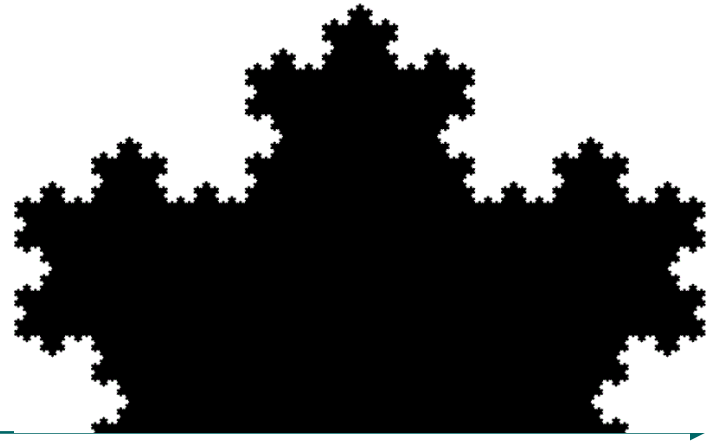
(o) Fairphone 2



(i) Microsoft Surface Phone Andromeda

Independence of components and/or their lifecycle processes

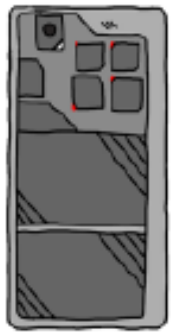
Self-similarity

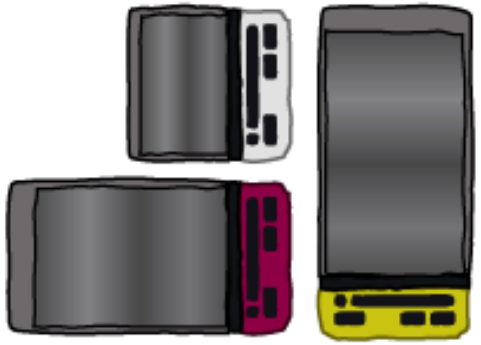


FEATURES OF MODULARITY MODULARLY UPGRADEABLE

- Easy(?) (hardware) upgrading

(h) ZTE Eco Moebius





(c) Facebook XBEAM

Independence of components and/or their lifecycle processes

Self-similarity

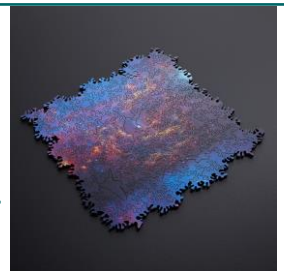
Display «growth»

CPU «growth»

Battery «growth»

https://twistedsifter.com/2018/11/infinity-earth-puzzle-by-nervous-system/

https://www.touchofmodern.com/sales/nervous-system-45a0b5e2-7f47-44dc-ad9b-424f27d55b01/infinite-galaxy-puzzle?share_invite_token=RY07OOEE&open=1



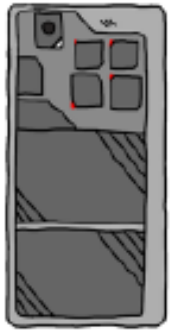
FEATURES OF MODULARITY MOUNTING

- Mounting mechanism

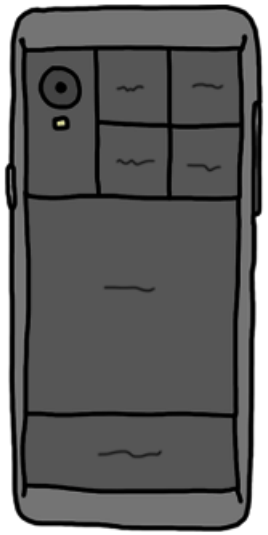
Special push button and hidden slider- mechanism

(k) LG G5

(h) ZTE Eco Moebius



(e) Fonkraft



Five-Year Phone (Designer James Barber), 2009/10

It uses just one screw to open the device for recycling…

FEATURES OF MODULARITY MODULARIZATION

- modularly upgradable architectures: from industrial markets to consumer electronics

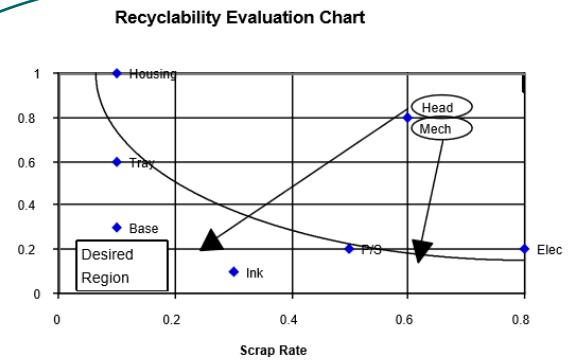
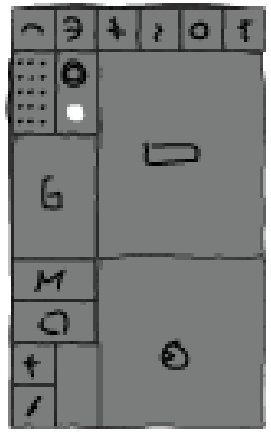


Figure 19. 6 Recyclability Evaluation Chart



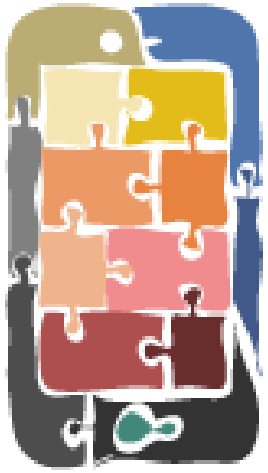
(a) Phonebloks

https://gadgetsextremes.wordpress.com/2012/09/20/future-technologyfuture-designindustrial-designgadgetsand-technology-news/

(Ishii, 1998)

FEATURES OF MODULARITY SOFT MATTER

- OS a module? Modular OS?



(f) VSenn

Swap OSs,
4 years waranty

BLOCKS Project OpenWatch

the idea of a modular Android-software open to system developers of wearables

AsteroidOS 1.0 released: Open source smartwatch operating system (for Wear OS devices)

05/16/2018 at 11:41 AM by Brad Linder Leave a Comment

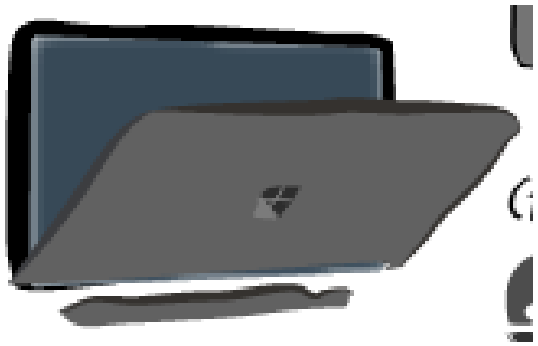
The smartwatch space has changed a lot in recent years. Pebble is dead. Fitbit makes smartwatches now (after acquiring Pebble's assets). Google's Android Wear is now called Wear OS since it supports iPhones as well as Android. And Apple and Samsung continue to dominate.

I guess not everything has changed.

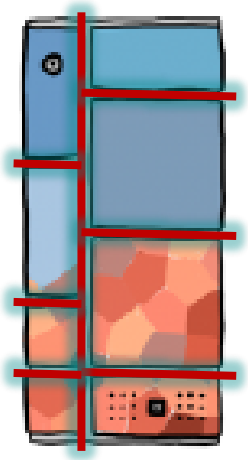
But through it all, a group of developers have been working on an open source alternative called AsteroidOS. Now the team has released the first stable version: meet **AsteroidOS 1.0**.

FEATURES OF MODULARITY DEMANDINGNESS

- more material in the first place (demandingness)

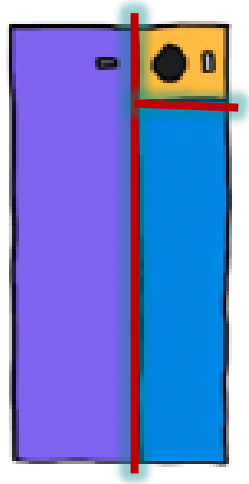


(i) Microsoft Surface Phone Andromeda



(b) Google project ARA

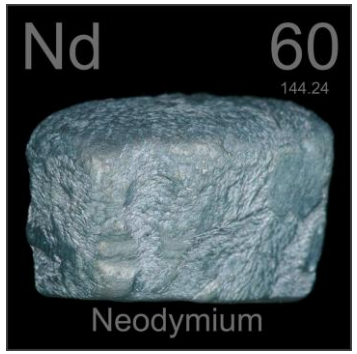
(d) Xiaomi Magic Cube

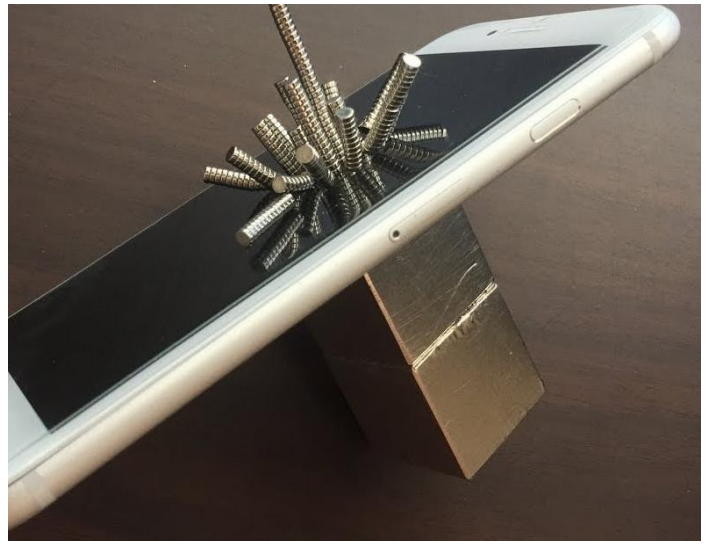


FEATURES OF MODULARITY REBOUND

- increased consumption of critical or scarce raw materials

Strong magnetic surfaces, much more neodymium necessary





FEATURES OF MODULARITY DISADVANTAGES

- Rebound – greatest environmental impact

Originally: easier repair, maintenance and upgrading ???

Disadvantages

- Rebound effects
- Redundant structures, overdesigned products with sacrificed performance
- Perceived less durable
- Difficult to use and onerous to maintain
- Less reliable and safe

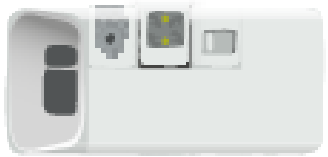
FEATURES OF MODULARITY EVERYTHING MODULAR

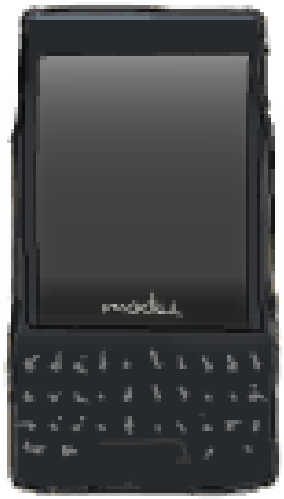
How I Made My Own iPhone - in China

https://www.youtube.com/watch?v=leFuF-zoVzA

FEATURES OF MODULARITY MODULARITY LEVELS

(l) Moto Z Moto-Mods





(m) Moduware modular smartphone cases

(j) Modu/Modu T

HISTORY

The Modu Mobile is the world's first modular phone ! It was created in 2009 by an Israeli company founded by Dov Moran.

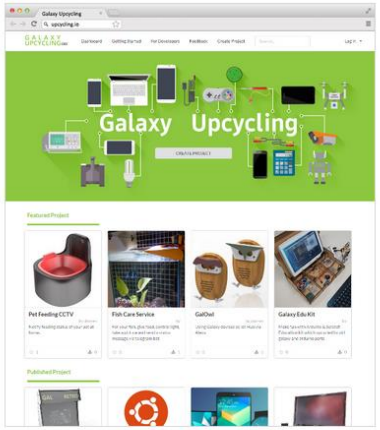
FEATURES OF MODULARITY PLATFORM MODULARITY

upcycling.io

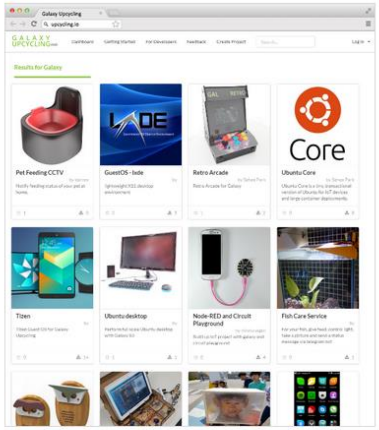
WEB community

where sharing and connecting with the creative reuse of Galaxy mobile devices.

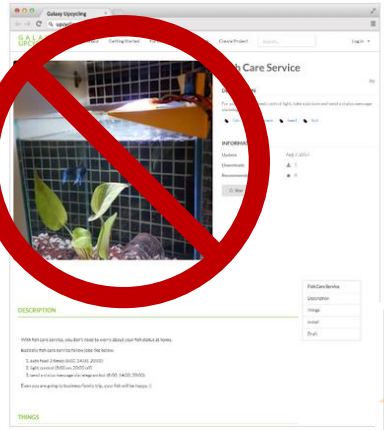
Browsing



Searching



Project View



Upcycling your Galaxy

Experience Galaxy Upcycling first at SDC 2017!

We will soon open beta service to users.

(z) [illegible]

(æ) MC

(ø) Blocks

(å) Samsung

(aa) B-Squares

(bb) cellBot.

Advanced Removable Modules technology

(re)configurability important for to build a "shared product platform"

not whole devices reused ("downcycled")

(t) XPX Life 7 tablet

(y) RePhone open source and modular phone kit,

FEATURES OF MODULARITY VALUE PRESERVATION

(n) Shiftphone

online shop
for new and
used modules,
third party
manufactured

(e) Fonkraft

CONCLUSION

Important principle – fight rebound – link reg-edu-biz ecologies - fundamental creativity-based research in academic context

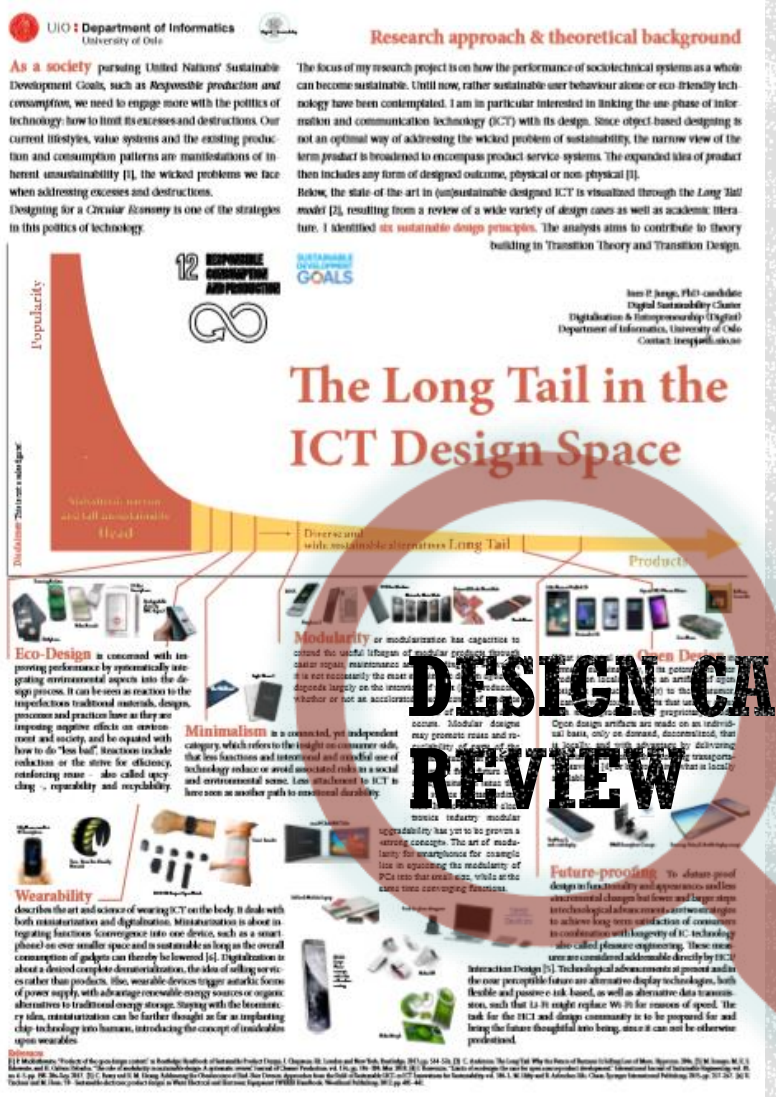
FUTURE RESEARCH

Critical (speculative) Design, RtD, Transition Design, Proto-practices, Slow Tech

CRITICAL (SPECULATIVE) DESIGN, RtD, TRANSITION DESIGN, PROTO-PRACTICES, SLOW TECH

Proposal of proto-practical, speculative design scenarios

- Forthcoming publication(s) on Speculative design scenario/proto-practice of "borrowed for use" mobile phone/ICT
- Journal/Special issue publication about the complete ICT design space study (wide, not in-depth as about modularity)
- Workshop on Futuring STaID



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