



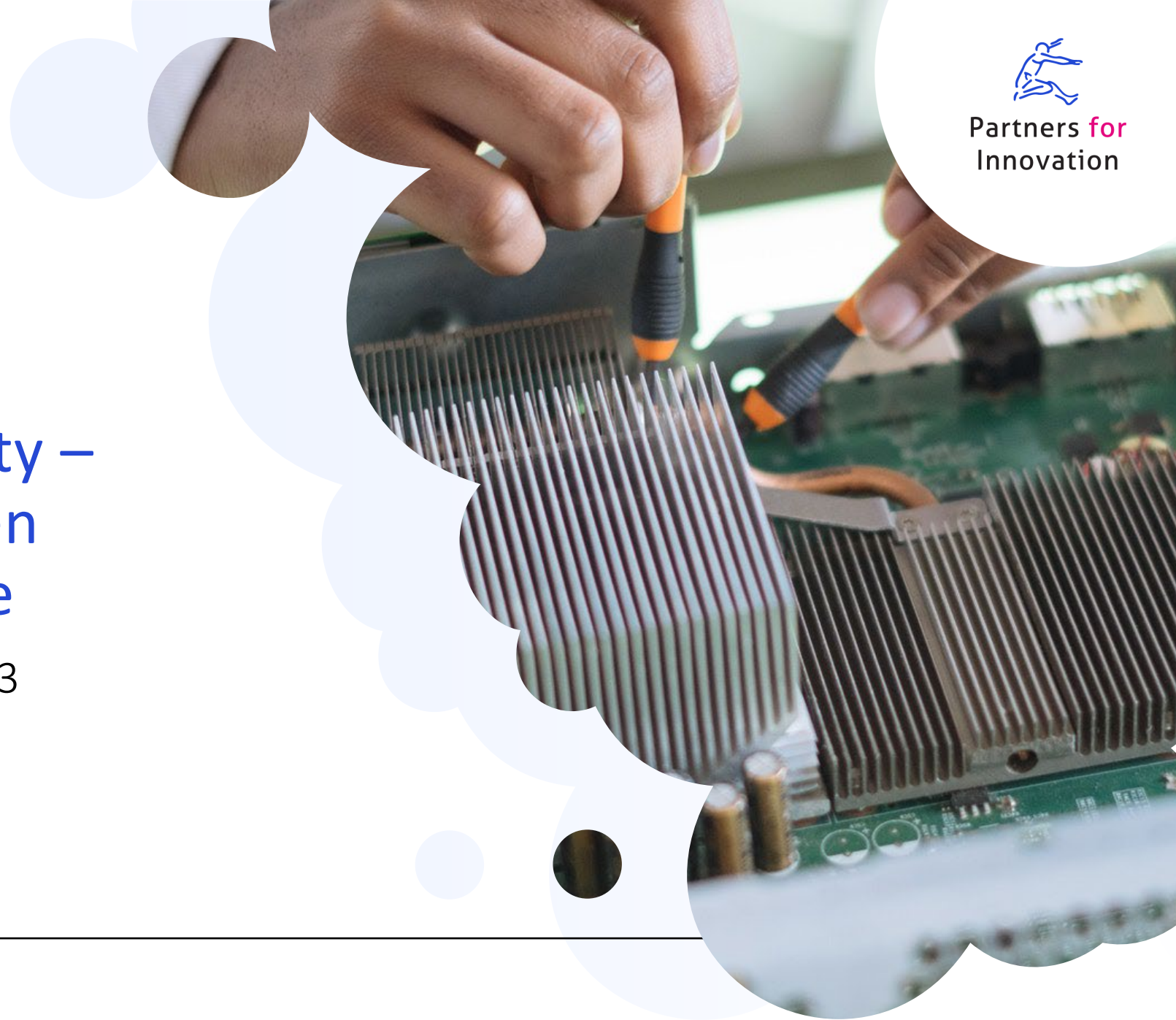
Partners for  
Innovation

# Design for Circularity – Ontwerpen voor een Circulaire Economie

Electronics & Applications '23

*28-09-2023 | Flora Poppelaars*

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# In a linear economy, we

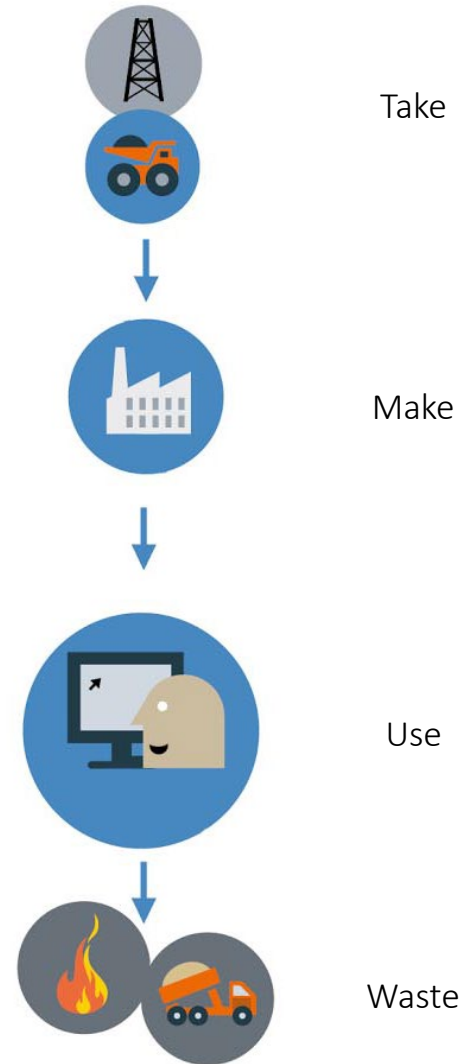
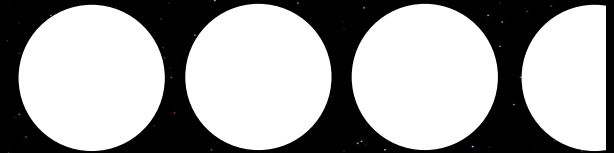
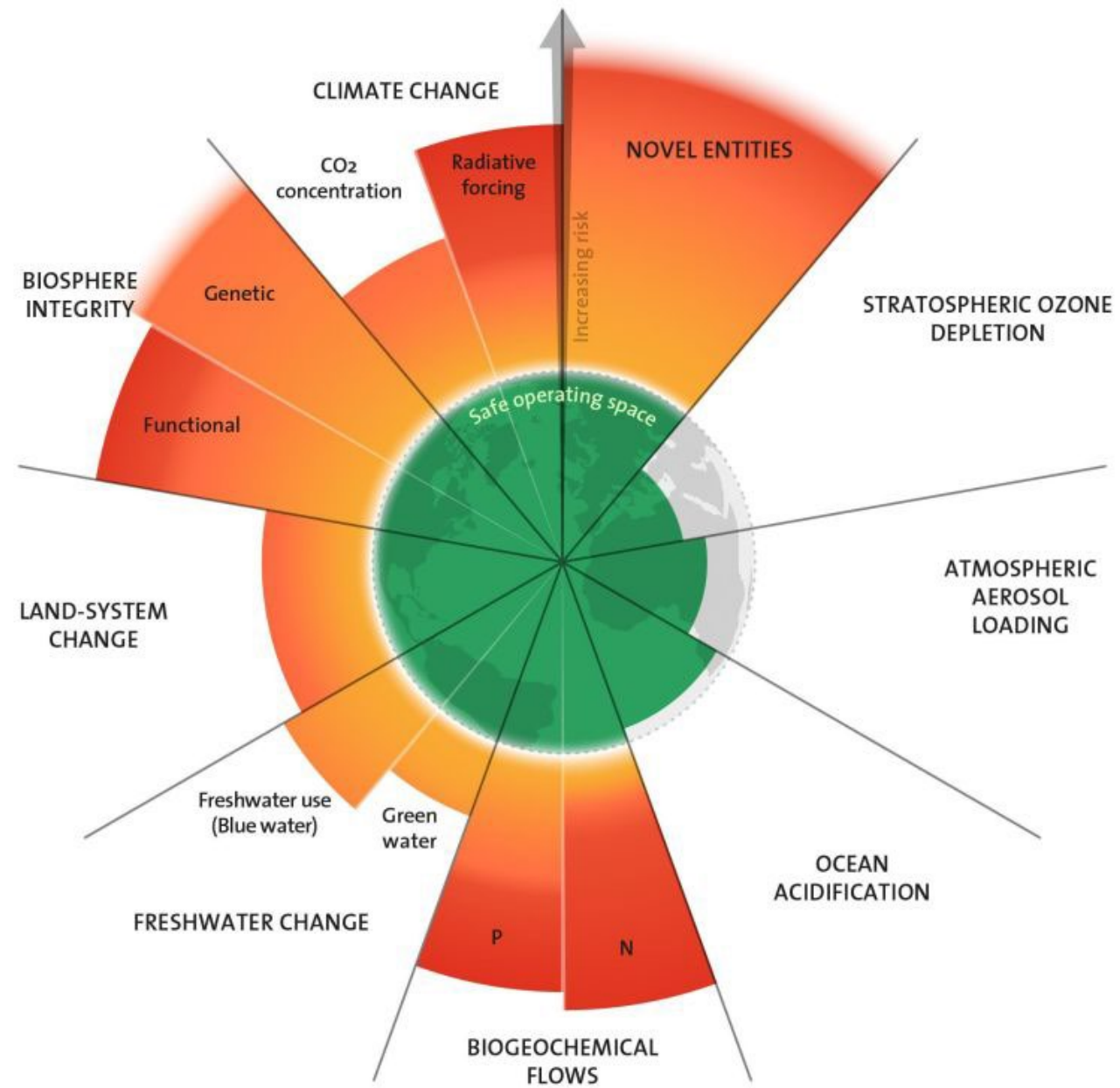


image adapted from Ellen MacArthur Foundation



12th of April 2023  
OVERSHOOT DAY

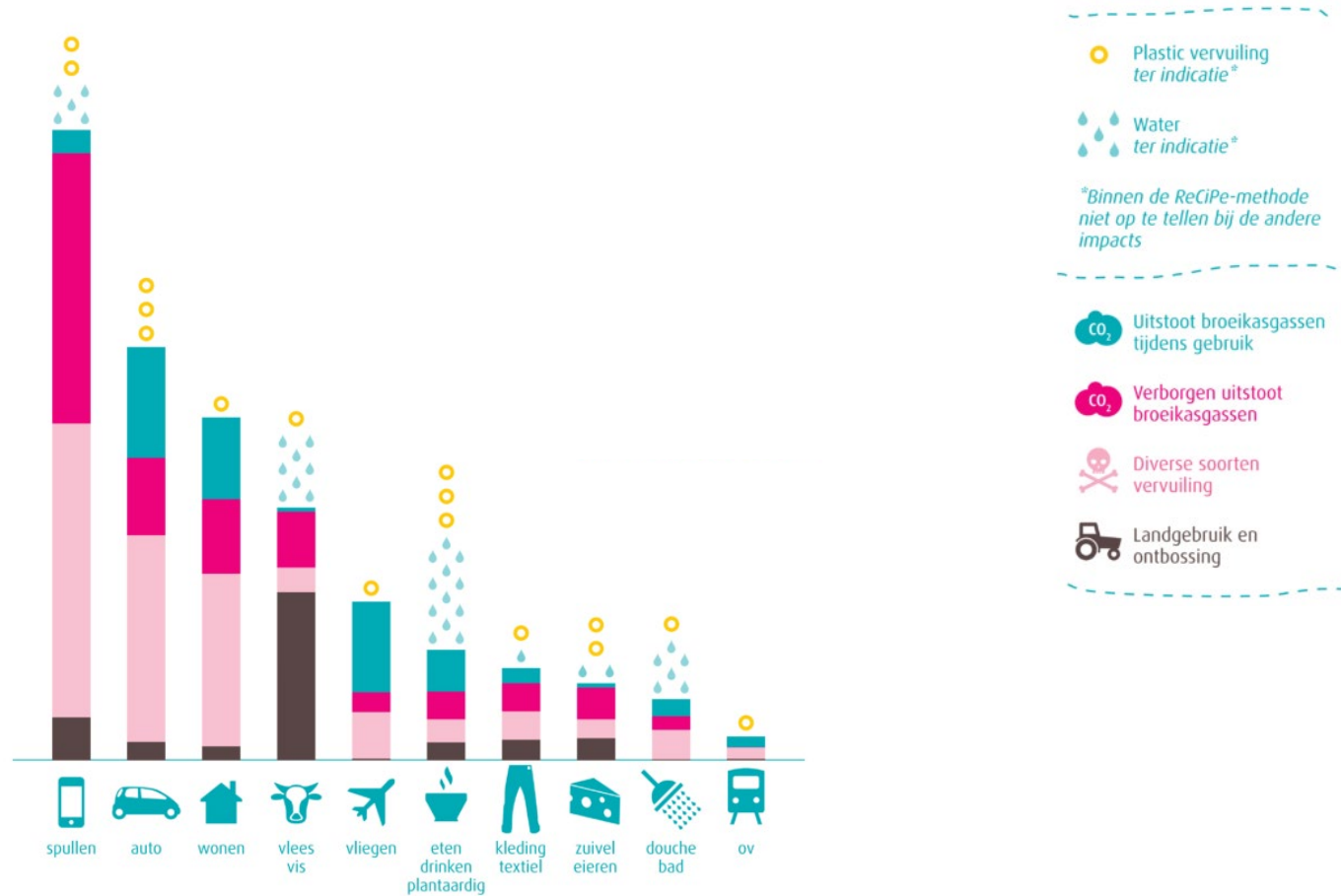




The 2023 update to the Planetary boundaries. Licensed under CC BY-ND 3.0. Credit: "Azote for Stockholm Resilience Centre, based on analysis Richardson et al 2023".

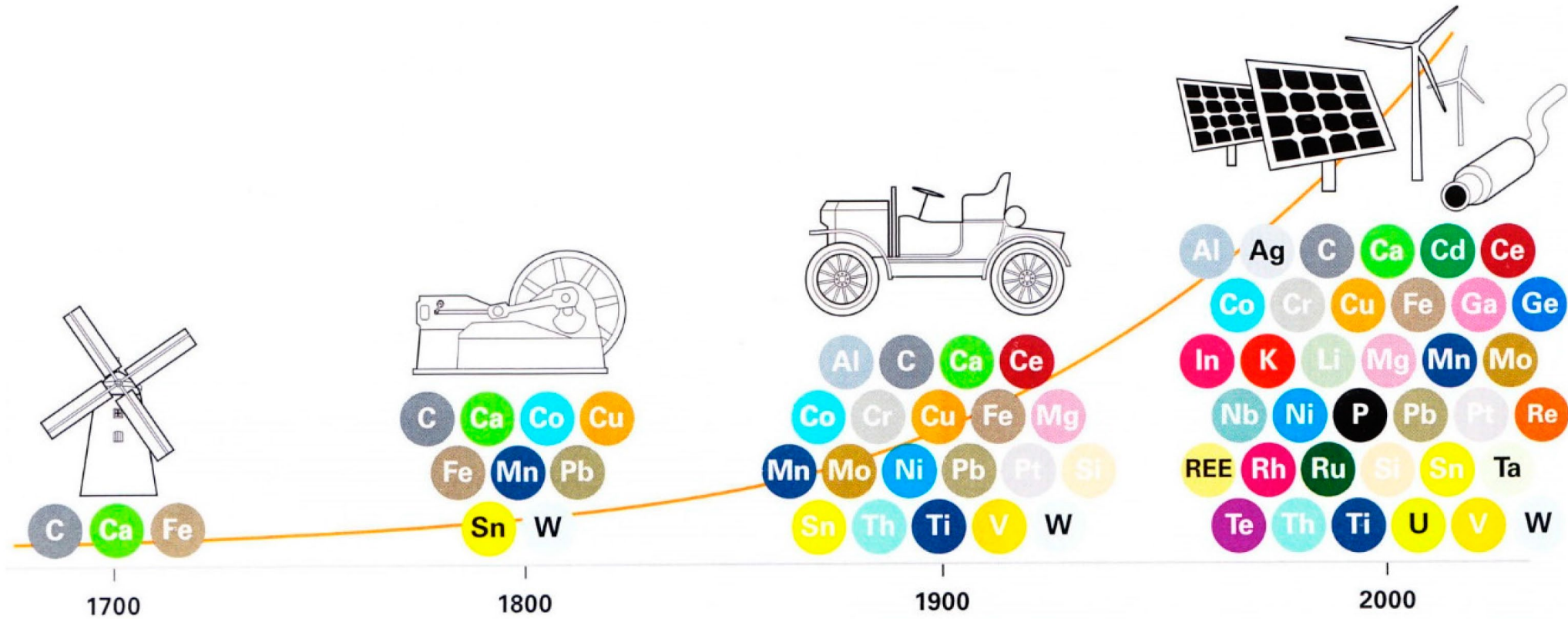
# Environmental impact

De impact top 10 van de gemiddelde Nederlander



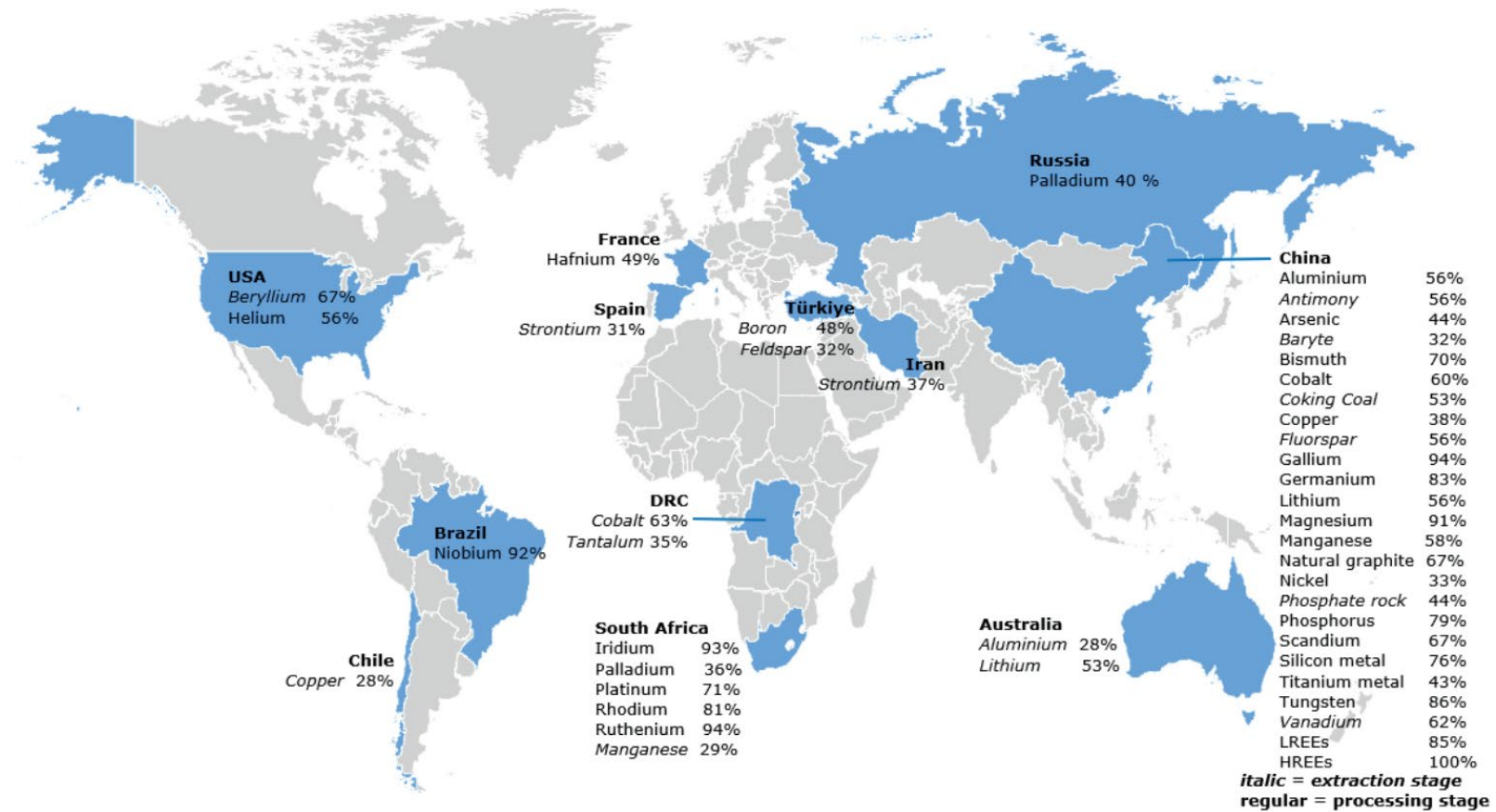
Bron: Babette Porcelijn, Think Big Act Now

# Increased complexity and resource intensity



Source: Achzet et al. (2009)

# Issues with scarcity, price volatility and sovereignty



# Financial losses

QUANTIFY financial loss



Bron: Sustainable Finance Lab, Circle Economy, Nuovalente, TU Delft, & het Groene Brein



# EU & NL wet- & regelgeving

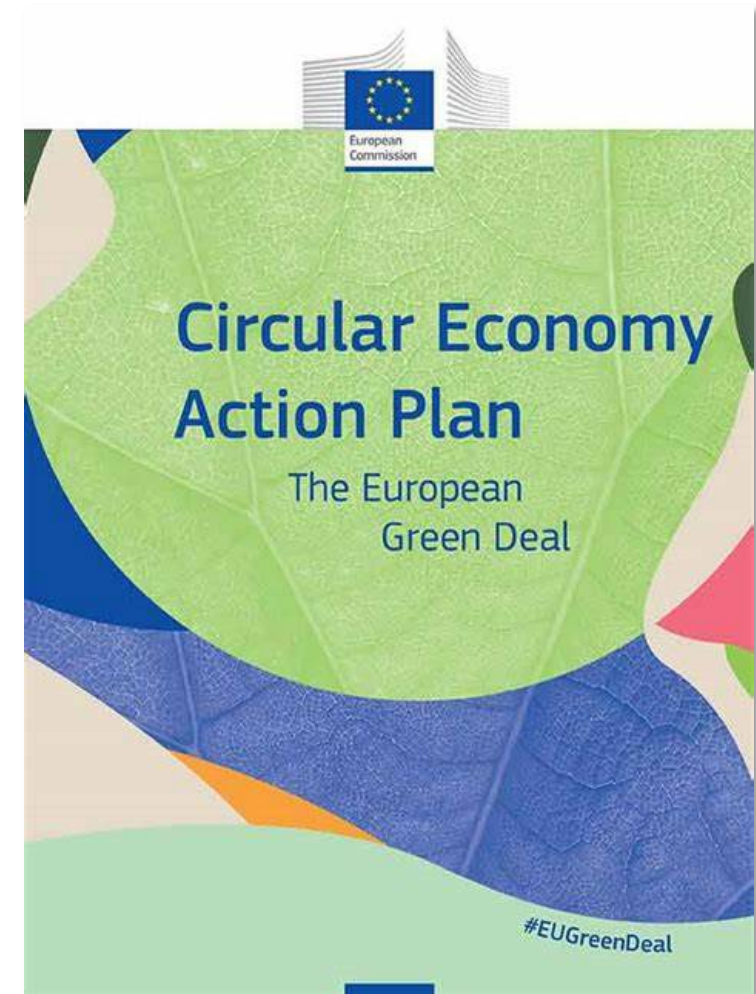
## Europese doelen

Met de European Green Deal en het Circular Economy Action Plan streeft de EU ernaar om in 2050 klimaatneutraal en circulair te zijn.

## Nationale doelen

Nederland wil in 2050 klimaatneutraal en circulair zijn. Het tussendoel is om in 2030 ongeveer halverwege te zijn:

50% van het gebruik van grondstoffen is dan circulair  
minstens 55% vermindering van CO<sub>2</sub>-uitstoot t.o.v. 1990 (Kabinet-Rutte IV)



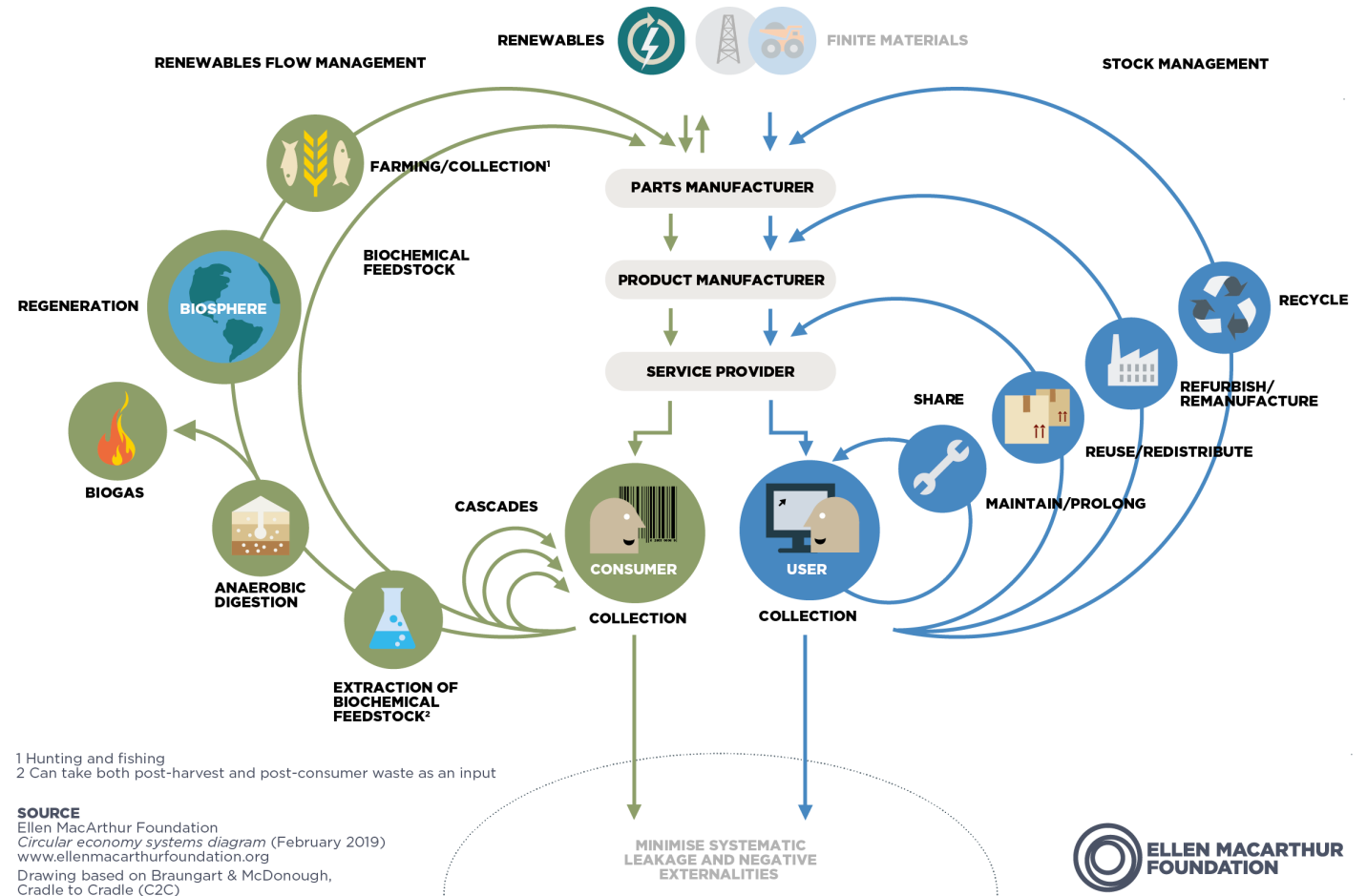
# CIRCULAR ECONOMY

## What is a Circular Economy?



# A circular economy

is **regenerative** by design,  
 aims to keep products,  
 components and materials at  
 their **highest utility and value**  
 at all times,  
 distinguishes between  
 technical and biological  
 cycles



# Circulaire economie



Bron: Sustainable Finance Lab, Circle Economy, Nuovalente, TU Delft, & het Groene Brein



## How can you design for a CE?

PRODUCT



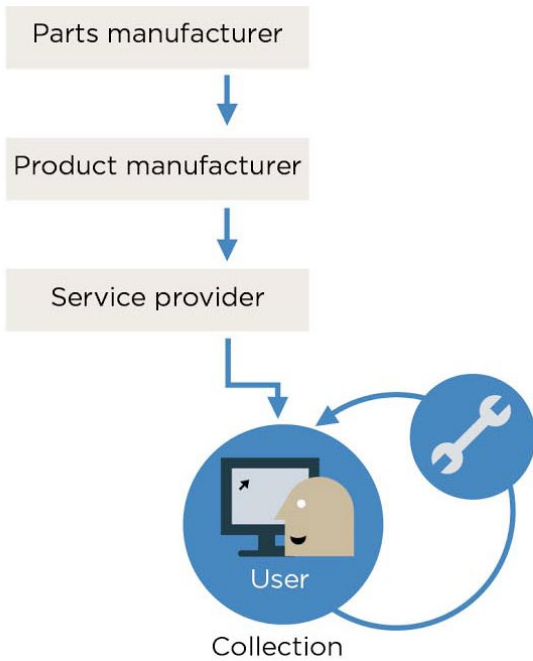
DIENST



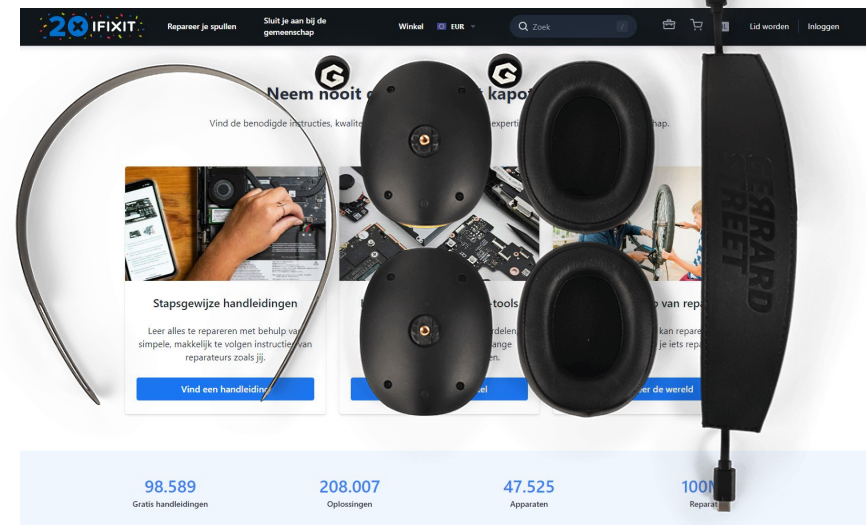
SYSTEEM



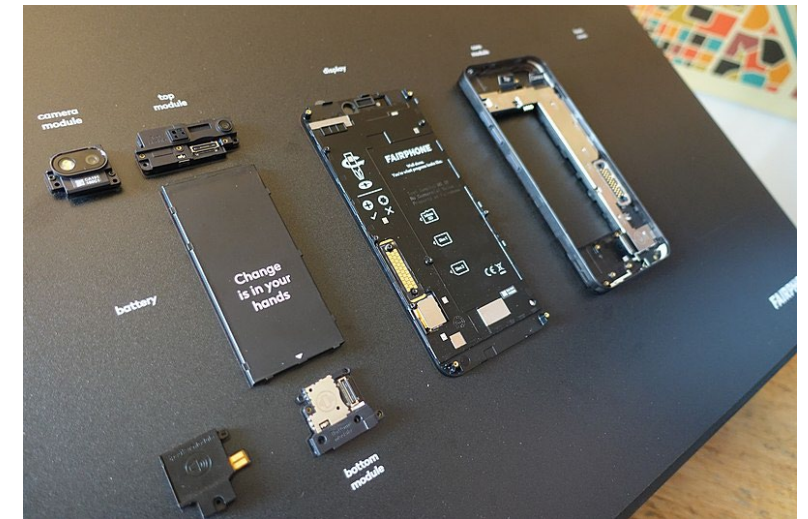
# Circular design strategies | Repair



1. Identify vital & vulnerable parts
2. Allow access to parts: accessibility & separability
3. Standard fasteners, not too many
4. Add clues for repair



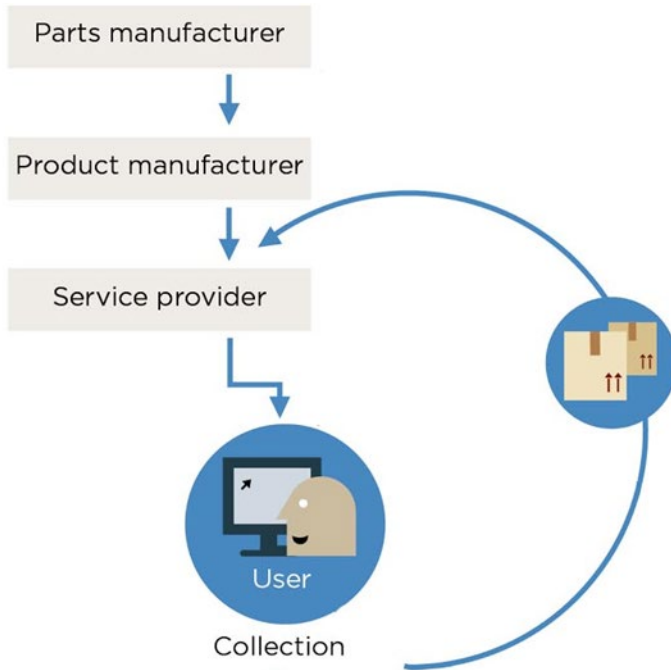
iFixit



Repeat

Fairphone

# Circular design strategies | Reuse



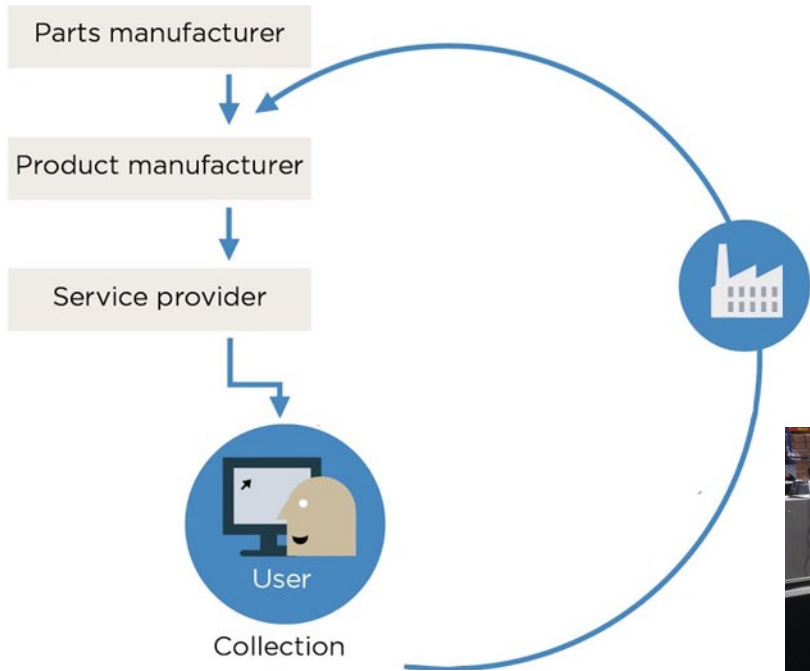
1. Product-as-a-service, build to last
2. Engineer! Make well-constructed products
3. Make a trade-off between repair & longevity
4. Don't go for cheap options
5. Make it adaptable: fit multiple users



Cooling as a service



# Circular design strategies | Refurbishment



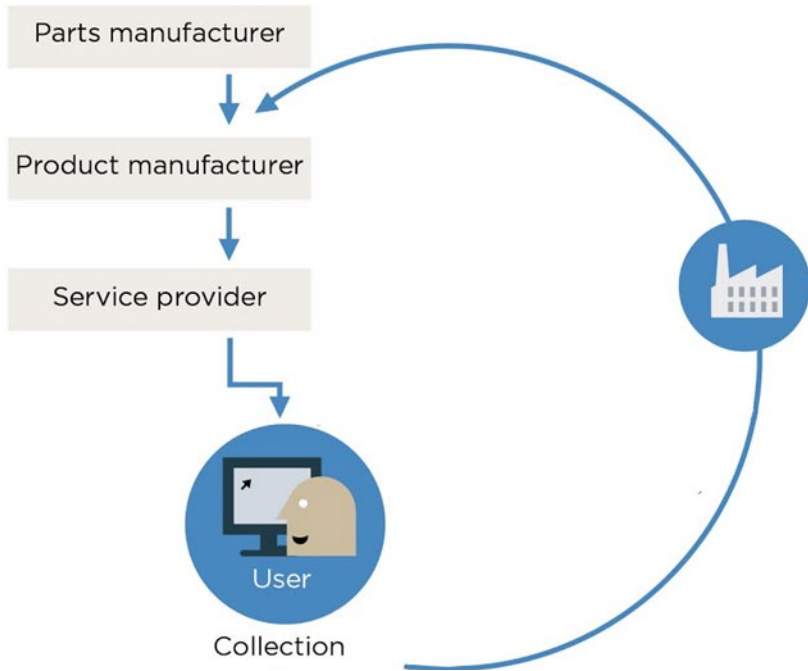
1. Be able to clean interior: accessibility
2. Make a good division between single use and multiple use parts
3. Use few fasteners on reusable parts



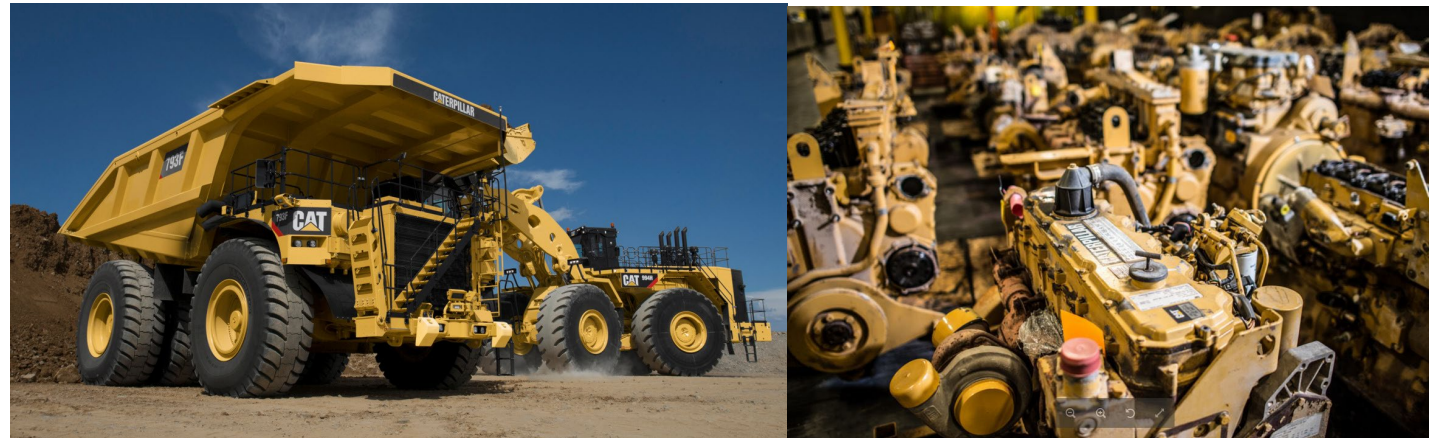
Infotheek

Active disassembly, self healing materials

# Circular design strategies | Remanufacture



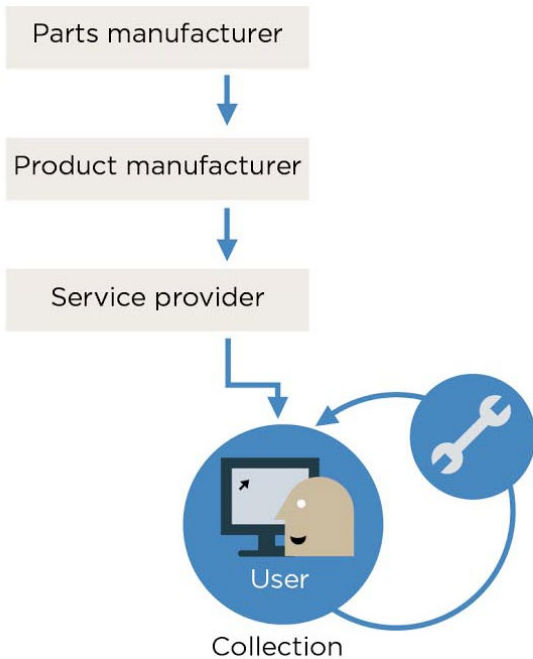
1. Again: be able to disassemble
2. Know the durability of your components
3. Build in modules
4. Stock spare parts



Caterpillar

# Circular design strategies | Recycling

ILLUSTRATE w/ <1% CRM is being recycled



HP printing as a service

1. Make hazardous & valuable materials removable
2. Make different materials releasable: no big bolts, few screws, no glue
3. Make material content information available
4. Use recycled materials



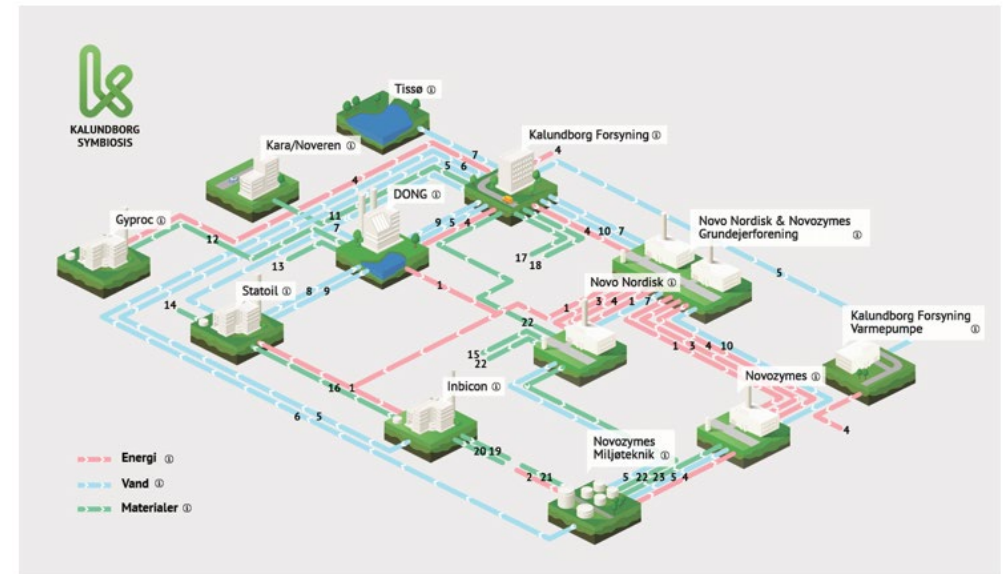
Bron: Apple

# Stelsel niveau

- Refuse
- Rethink
- Circular business models
- Waarde management
- Logistiek
- Inzameling



Bron: CHEP pooling system



Bron: Kalundborg Symbiosis



## Next steps



# Applying circular design

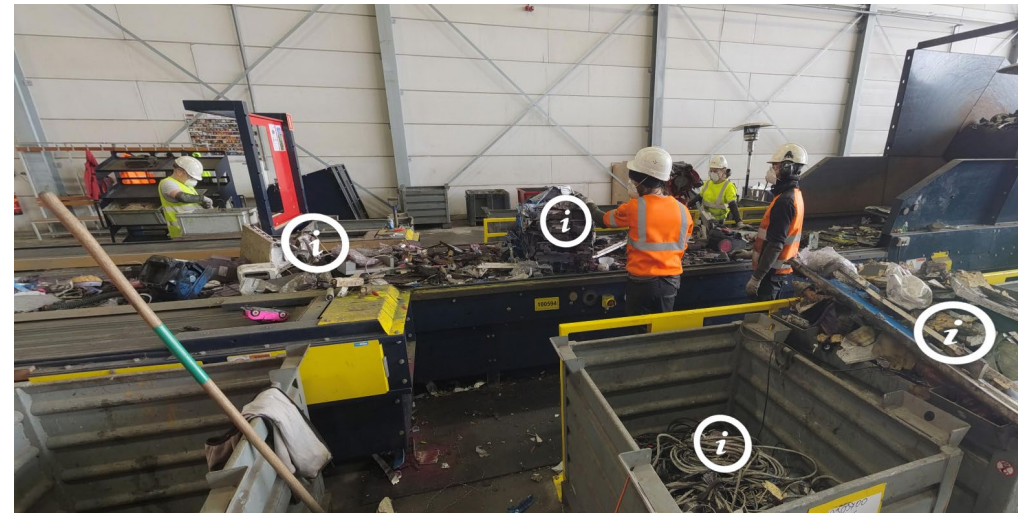
**Join CIRCO tracks:** Programme for entrepreneurs and creative professionals to (re)design products, services and business models in a circular manner

**Follow free online courses on edx.org**

Look for: Edx, TU Delft, Circular Economy, designing electronics

**Map out material flows, quantify your circular performance, identify hotspots and shape the circular transition**

Go on the CIRCONNECT platform, look into IDEO's and Ellen MacArthur Foundation's Circular Design Guide or contact me



# Thank you for your attention!



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