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The circular economy and rethinking sustainability

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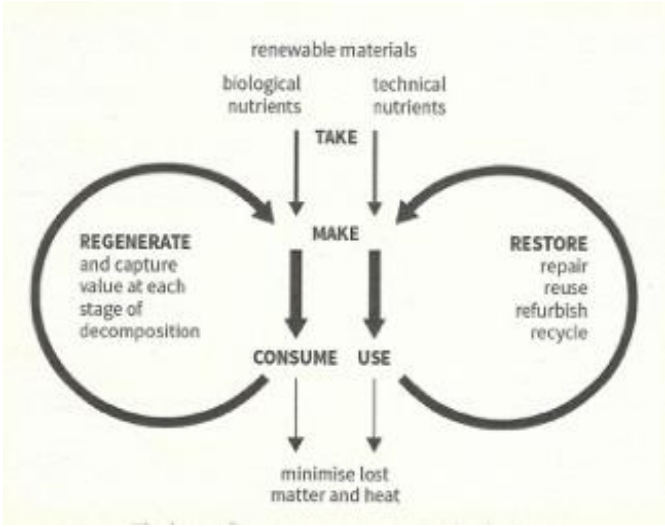
Circular economy strategies and business models

Circular economy principles
- Maximise and retain value of materials circulating in the economy
- Minimise waste: waste = loss of value

Two basic types of technology in CE
- Manufacture & process technologies
- Interconnectivity technologies: ICT, transport, distribution, logistics, etc.

Digital technologies in CE
- To retain value of a material need both end-to-end & life-cycle information
- Value = waste + data about the waste

Butterfly model



(Kate Raworth, Doughnut Economics, 2017)

MAXIMUM circularity = MAXIMUM value retention

REGENERATE
Restore natural or modified ecosystems

REDUCE
Increase efficiency of resource use

REUSE
Re-use products, through repair, maintenance, second-hand

RECYCLE
Re-process materials After initial use

RECOVER
Produce energy from residuals, e.g. burning waste

MINIMUM circularity = MINIMUM value retention

BUSINESS MODELS

Nature-based, bio- and eco-system services, urban farming, re-wilding

Eco-design, product-as-a-service, sharing & collaborative economy

Reverse logistics, modular manufacturing, re-manufacture

Industrial symbiosis, waste collection, sorting & recycling

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(Adapted from Bauwens et al, 2019)

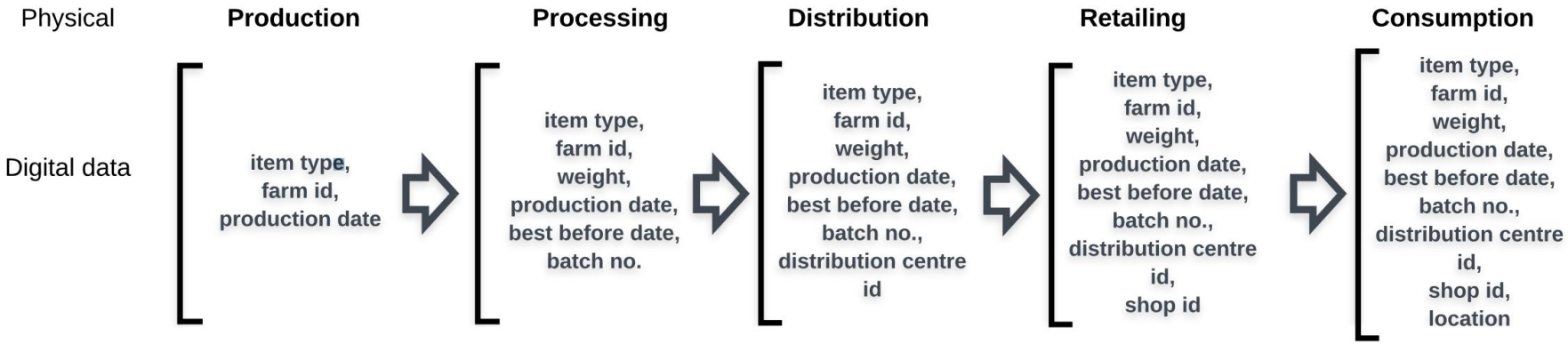
Examples: re-circulating biological and technical nutrients

Rethinking industries both from the bottom and from the top

- Digital technologies and interoperability enable information to travel with a product
- Real-time documentation, e.g. 'materials passport'
- More local & shorter value chains with local knowledge & proximity
- However, frontrunners are global multi-nationals

Regenerative CE: organic food waste, France

- *SmartNoshWaste*—a blockchain based multi-layered framework utilizing cloud computing, QR code, iterative learning



Restorative CE: construction, Zürich

- Baubüro: we "cut CO2 emissions by half, compared to the huge effort needed to shave a few percent off the carbon footprint of a standard construction project."

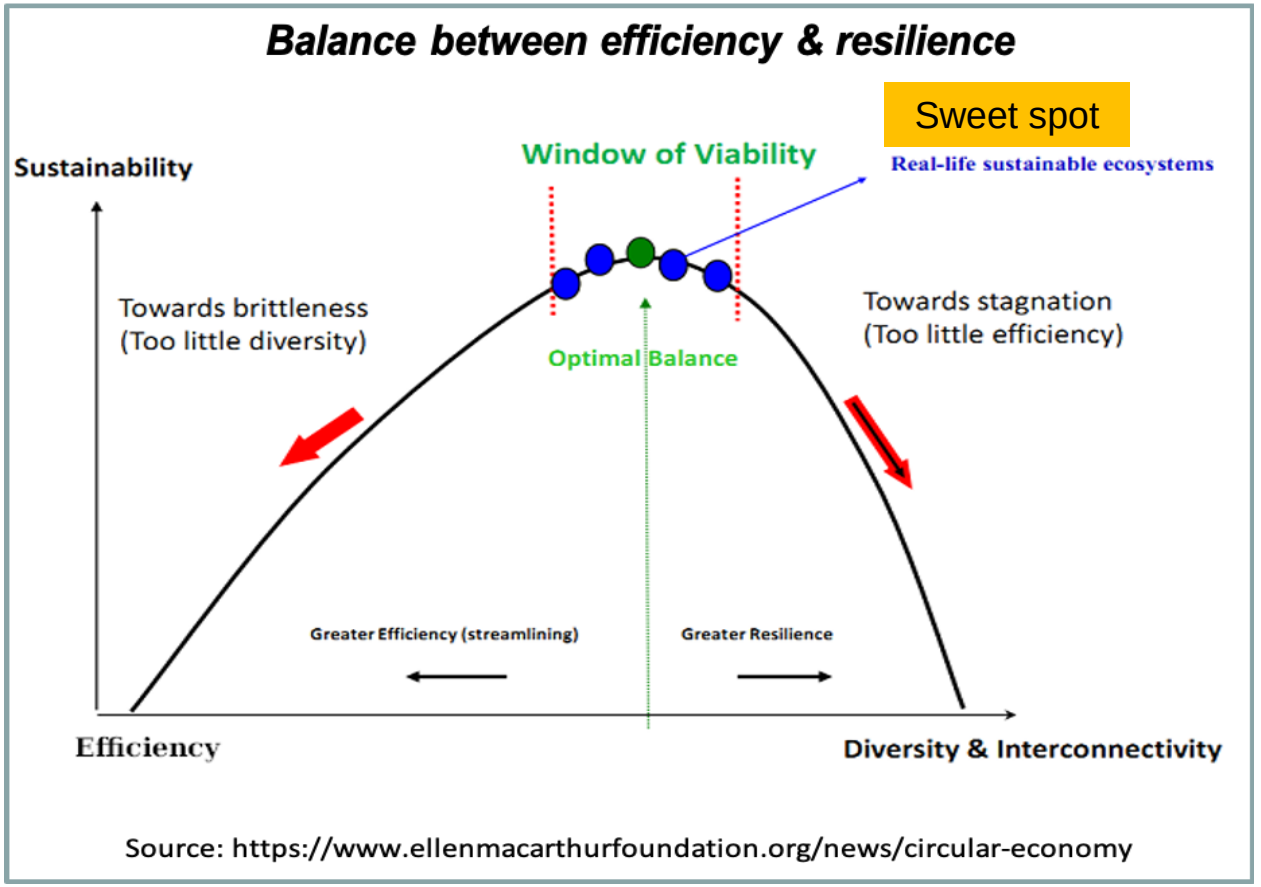
Circular economy and rethinking sustainability: balancing efficiency against resilience in new age of shocks and crises

A de-globalising world

- on-going climate catastrophe
- 2007-08 financial crash
- 2020 --> ? pandemic
- 2022 Ukraine

WEF: the 'great de-coupling'

- shorter value chains and on-shoring
- the 'new local'
- not independent isolation
- **'strategic autonomy'**
- Reconsider the mantra of 'leanness' as efficiency
- From 'just-in-time' to 'just-in-case'



Circular economy: meets requirement of maximising sustainability by balancing:

- efficiency to reduce waste
- resilience through diversity and interconnectivity (both proximity & digital)