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Circular economy and the society

Managing Circular Economy 03.04.2023

Samuli Patala

Today’s session

- Circular economy and policy development
- Circularity transitions
- Critiques of circular economy

Circular economy and the policy environment

EU Circular Economy Action Plan

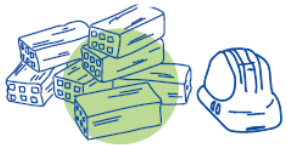
- **Broad policy programme aiming at accelerating circular economy development**
- **Part of the broader European Green Deal initiative, focused on various sustainability targets**
- **Covers the value chain broadly: incl. product design, production processes, consumption and recycling**

https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf

EU Circular Economy Action Plan

Key product value chains

Construction and buildings



Electronics and ICT

Plastics

Packaging

Food, water and nutrients

Batteries and vehicles

Textiles

EU Circular Economy Action Plan

Policy development examples:

- **Textile waste – separate collection mandatory by 2025**
- **Plastics – ban on single use plastics**
- **Ban on the destruction of unsold durable goods**

Finland – Strategic CE Programme

- **Broad, national CE programme started in 2021**
- **Aims at making circularity a cornerstone of the economy by 2035**

Circular economy Green Deal

- **Initiative for generating voluntary commitments to CE**
- **Developed in thematic groups related to different industries**
- **Commitments and goals are also input into a scenario model, to assess sustainability impacts of the actions**

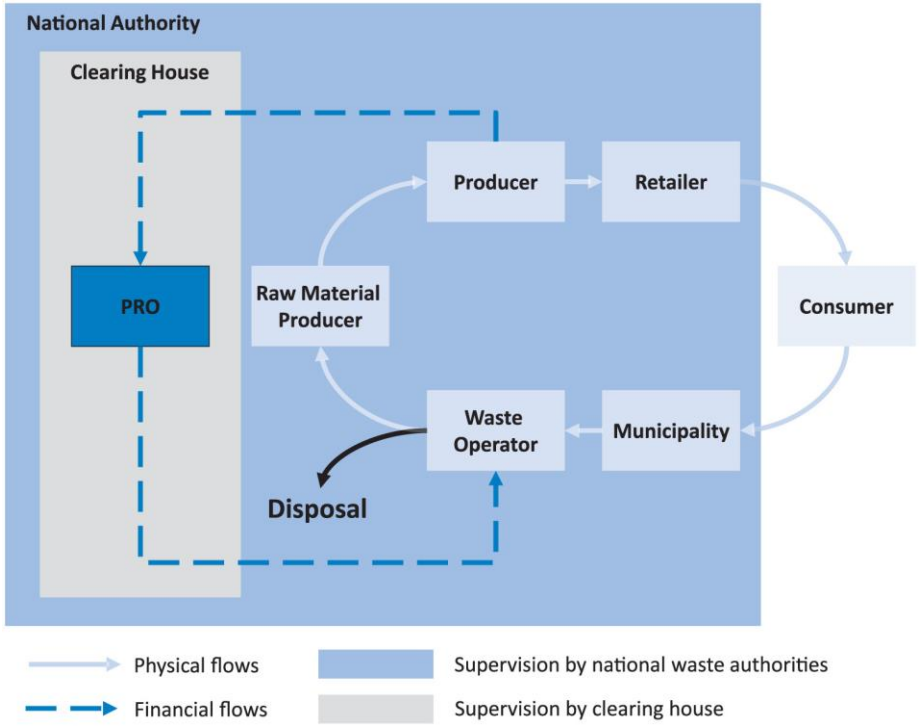
Circular economy Green Deal

Common vision and rules

Broad collection of goals and actions for firms,industries, regions and municipalities

Organizations commit to goals which relate to their activities

Extended Producer Responsibility (EPR)



Kunz et al. 2018

EPR systems in the EU

- **Mandatory throughout EU for electronic waste, batteries and end-of-life vehicles**
- **Obligatory or voluntary EPR schemes also exist for many other waste streams across different EU countries: packaging, paper, tyres, construction waste, plastic bags, etc.**
- **In Finland, EPRs exist for packaging, beverage containers, paper and tyres, in addition to the EU-mandated waste streams**
- **France has an EPR system for textiles**

Re_fashion

Sustainability transitions

Sustainability transitions as a research field

- **Originated in the late 1990s as an interdisciplinary social science research field, with an aim to tackle fundamental *environmental* sustainability challenges**

- **Tries to understand socio-technical system change through**
  - (a) creation and diffusion of innovations (niches, technological innovation systems)
  - (b) path dependencies, lock-ins and the processes of destabilising socio-technical regimes/systems
  - (c) influence of broader landscape changes

Key concept: a socio-technical system

- **E.g. energy supply, water supply, transportation, food supply**

- **“*consists of (networks of) actors (individuals, firms, and other organizations, collective actors) and institutions (societal and technical norms, regulations, standards of good practice), as well as material artefacts and knowledge”***

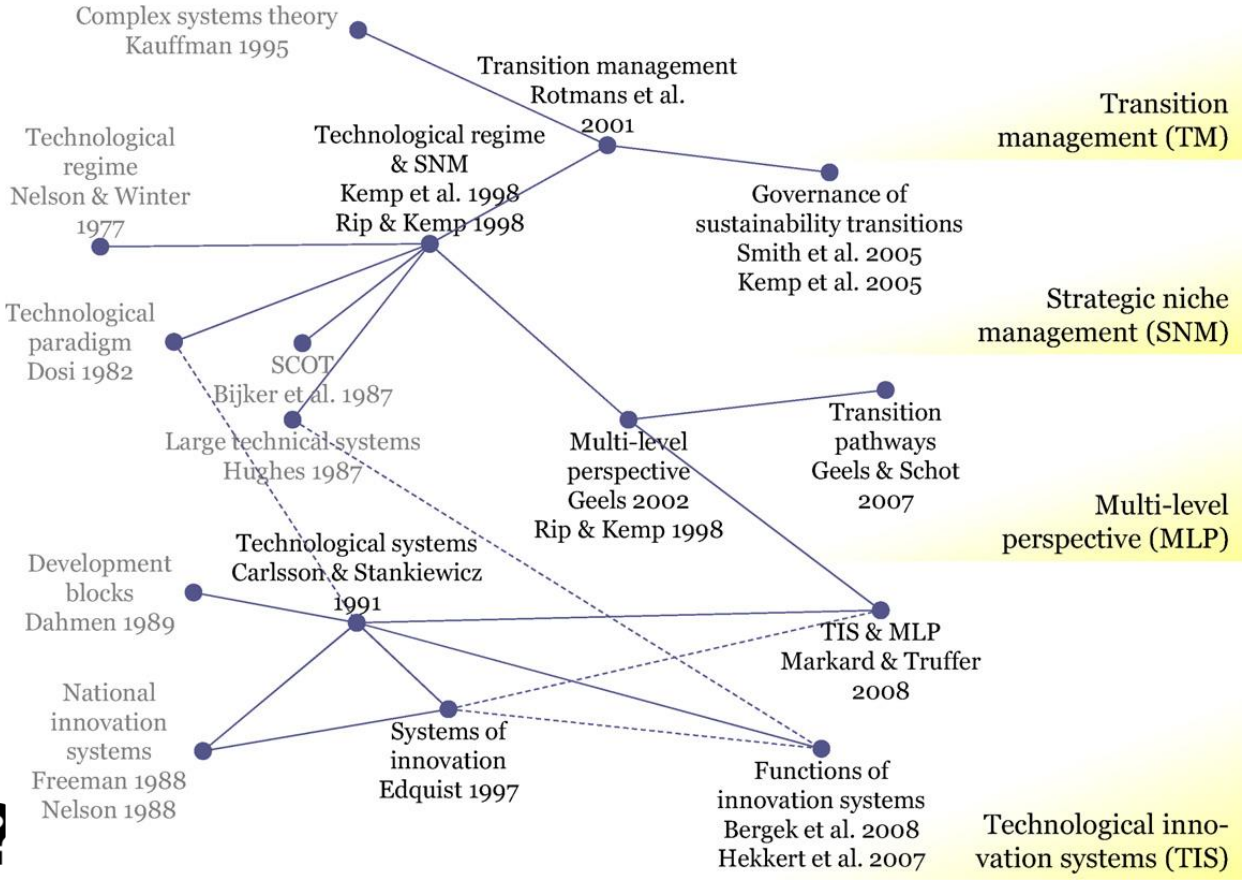
- **Different elements of the system interact providing services for the society**

Socio-technical transition

- **“*set of processes that lead to a fundamental shift in socio-technical systems*”**
  - Contains extensive changes along different dimensions: not just technological, but also organisational, institutional, political, economic, and socio-cultural
  - Include a large variety of actors
  - typically take a very long time (> 50 years).
  - During a transition, new products, services, business models, and organisations emerge
  - Technological and institutional structures undergo fundamental changes

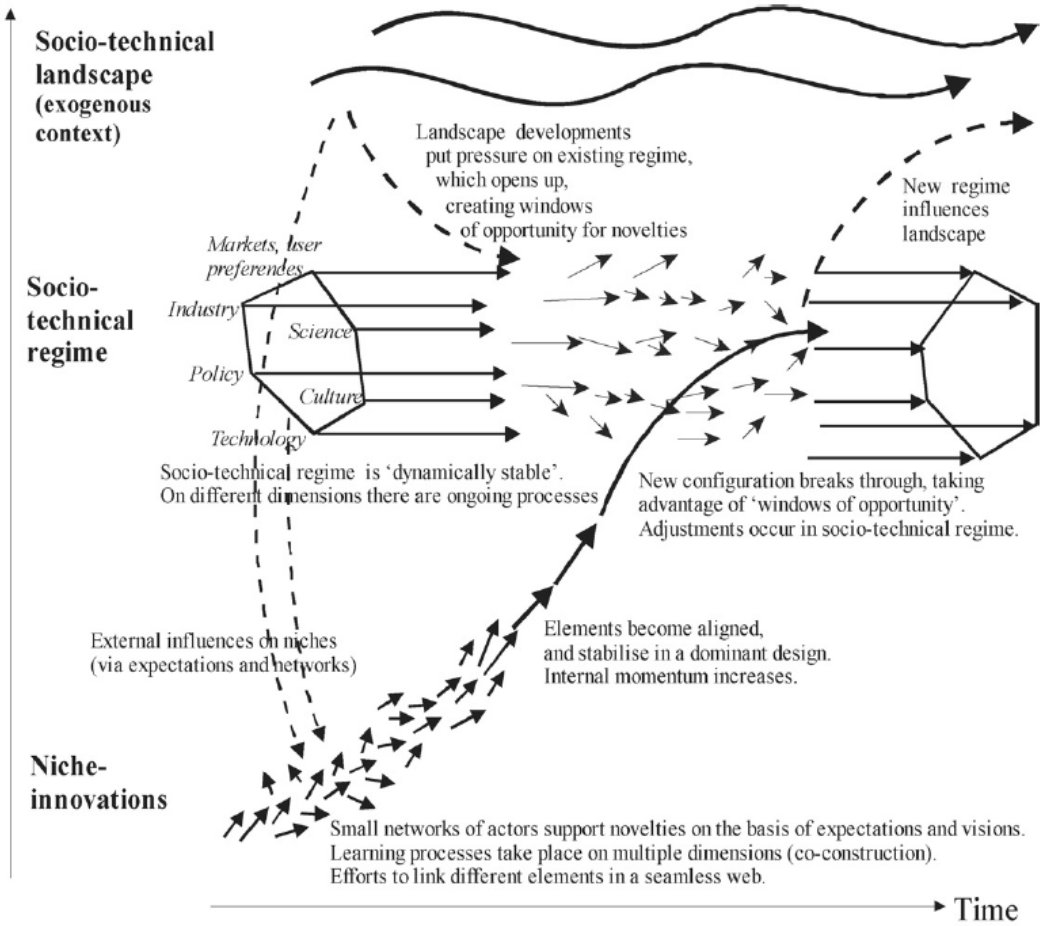
Markard et al. 2012

Different approaches



Markard et al. 2012

Multi-level perspective on sustainability transitions



Geels & Schot (2007)

Technological innovation systems (TIS)

- **TIS adopts a systemic perspective to analyse the links between different actors, networks and the institutional contexts around a specific emerging technology (Bergek et al. 2008).**

- **A well-functioning TIS is regarded as a requirement for the development and diffusion of a technology**

- **Seven functions and ‘motors of innovation’**



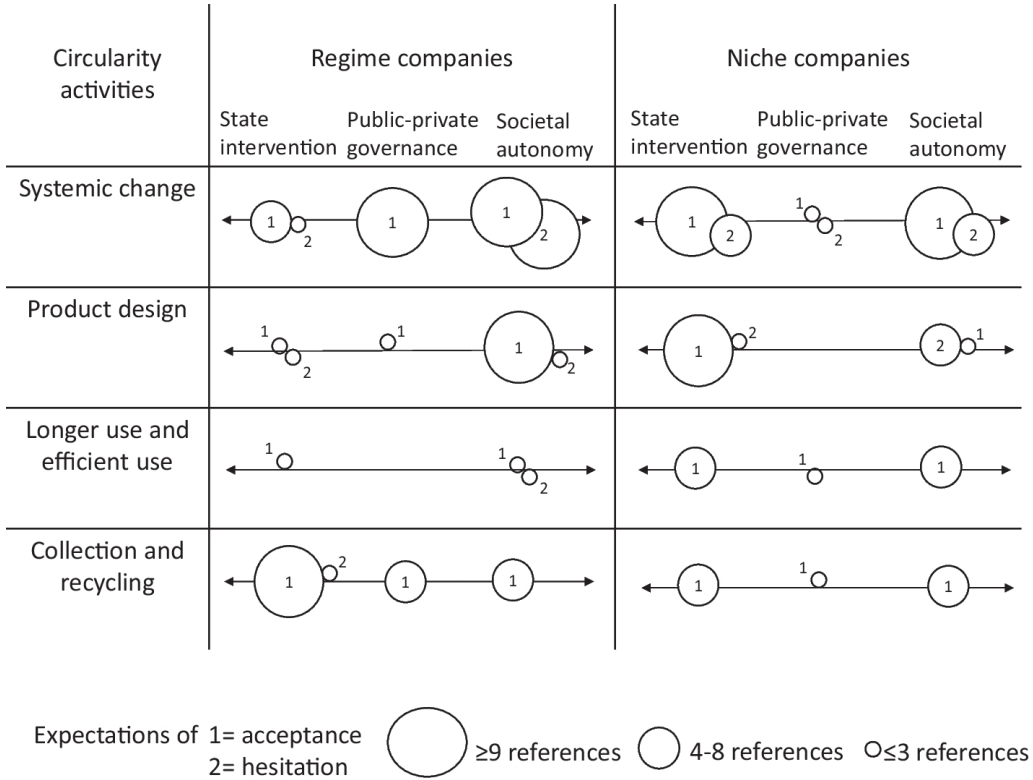
Technological innovation systems

Seven core functions of technological innovation systems:

- **Knowledge development and diffusion**
- **Entrerpreneurial experimentation**
- **Influencing the direction of the search**
- **Market formation**
- **Development of positive environmental economies**
- **Legitimation**
- **Resource mobilization**

(Bergek et al.2008)

Circularity transitions – textiles example



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Salmenperä, 2022

Critiques of CE

Based on what you have learned/read so far, what do you see as key problems and challenges related to circular economy?

- **Problems with circularity as a vision/goal?**
- **Challenges related to implementation of CE?**

Flinga: FK9R5YF

Limits and boundary conditions of CE

- **Business case is assumed, obscuring potential trade-offs**
- **Physical limits (e.g. entropy) are not considered**
- **CE and sustainability assumed as synonymous**

Broadening perception of agency in CE

- **High emphasis on business models and piecemeal solutions obscures a more systemic view**
- **Lack of attention on the role of other sectors (esp. NGOs) and partnerships**
- **Focus on the developed economies and the global North**

Examples

- **In India alone, over <u>40,000 children</u>, between the ages 10 to 14, are employed in recycling facilities.**
- **Dumping textiles into some countries in Africa causes considerable social and local economic impacts:**
  - Health impacts
  - Displacing local production
- **Receiving countries often lack infrastructure to properly deal with the waste**

CE and strong(er) sustainability

- **Economic growth assumption embedded to CE, danger of rebound effect**
- **Relies on views of natural capitalism**
- **Technocentrist views are common for CE**

Examples

Jevons paradox: increasing efficiency doesn't always lead to less consumption—it can lead to more.

"In this case, the consumer feels good about resource savings in one area (contributing to the circular economy by donating old clothes), allowing them to rationalize using more resources in another (restocking the closet with new purchases)."

Worldwide, the apparel and footwear market is projected to grow about 5% per year to 2030

Here's What Could Go Wrong with the Circular Economy—and How to Keep it on Track | World Resources Institute (wri.org)

What might be done to ensure a more sustainable circular economy?

Ways forward

- More thorough analyses of CE and sustainability, esp. social
- Better understanding of the limits of the business case, e.g. considering trade-offs
- Considering how CE can work in a low-growth or degrowth environment
- More systemic analyses, going beyond business models
- Considering regional differences and the role of Global South in CE development

Summary

- **Overview of high-level CE policy developments in EU and Finland**
- **EPR is a key regulatory mechanism for advancing CE**
- **Sustainability transitions are important for understanding sustainability change on a systemic level, and roles of different actors**
- **Discussion of critical views on CE**

Thank you!

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Global perspectives of CE / course wrap-up

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Session outline

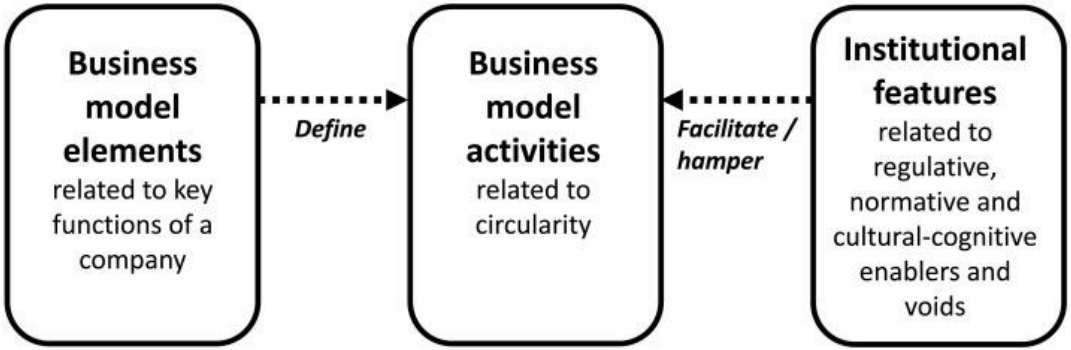
- CE models outside of the Global North
- Summary of course content
- Q&A

CE models outside of the Global North

- **Much of CE research has focused on CE models in the western and developed countries**
- **A better understanding of CE in different institutional contexts, developing economies and low-income economies is important for a more comprehensive perspective of CE**

CE and different institutional contexts

- **Developed countries (esp. EU) have many formal institutions (e.g. regulations) to develop CE-based business models**
- **Countries in different stages of economic develop might not have the same resources available to support CE**



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Levänen et al. 2018

Case: battery recycling in Finland and Chile

Business model elements	Enablers in Finland	Enablers in Chile	Voids in Finland	Voids in Chile
Value proposition	Recycling efficiency standards	*No functional enablers*	Disparities in global norms on recyclability	No regulations for improved recycling efficiency Lack of active search of recycling technologies
Value creation / supply chain	EPR-based requirements for the take-back system	Corporate social responsibility-based organization of e-waste recollection	Low social awareness about the importance of battery recycling Lack of efficient take back system	Challenges related to social organization of recycling The role of informal recycling
Customer interface	No functional institutional enablers End-of-WasteRegulation (potential)	Responsible Recycling Standard R2 EPR regulation (potential)	Lack of incentives for remanufacturers to reuse recovered materials Remanufacturers' reluctance to pay extra for recycled cobalt	Lack of formally defined targets for recovery efficiency Tradition of disposing encapsulated batteries underground
Value capture	EPR revenues for negative value waste	*No functional enablers*	Volatile metal prices together with costs incurred from negative value waste	Lacks in understanding the logic of recycling of negative value waste

Levänen et al. 2018

How do sustainability and CE pressures effect manufacturing facilities in developing countries?

Example - Finix project – Ongoing field research in textile manufacturing facilities in Pakistan (by Iqra Khan)

- Interviews in 30 textile manufacturing facilities visited
- Exploring the sustainability and CE-related challenges of the manufacturing facilities

Key findings

Lack of top management commitment towards sustainability

Definition of sustainability not clearly defined in the mindset of professionals

Lack of available of technology locally

Middle management awareness issues on how to gather data and how to describe/report to the concern departments

Lack of regulatory incentives and aid from authorities

No common portal or platform for data sharing

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Key findings

To meet the sustainability requirements factories experience a huge costs

Lack of training and expertise on sustainability and CE issues

Difficulties arrives from sourcing in supply chain: Factories are compliant according to the costumer, but their supply chain show negligence to comply with sustainability requirements due to the lack of knowledge and resources

Most of the costumers require different certifications while their scope is same, but factories must pay fees for these varying list of criteria to stay in business

-> Customer-enforced sustainability action, which may lead to unintended consequences

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Necessity-driven CE

- Necessity-driven circular economy- *”a set of locally embedded and interlinked formal and informal practices aimed at restoring and retaining the value of goods and materials for as long as possible, based on economic necessity and opportunities for income generation”*

- Study based on field research from India, Tanzania and Brazil

Korsunova et al. 2022

Examples

Repurposing

Repair services

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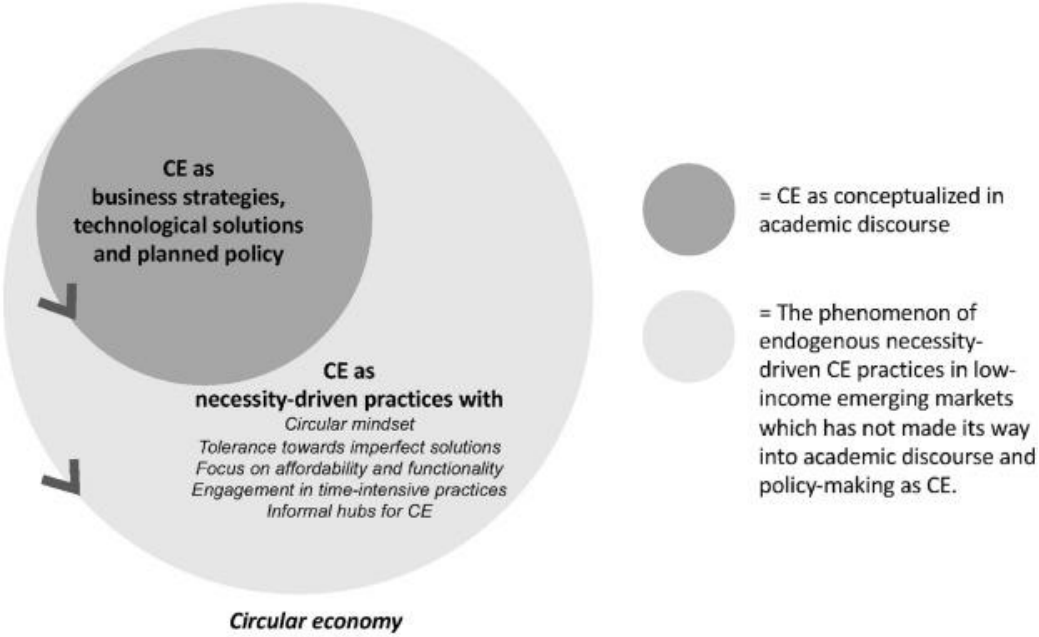
Korsunova et al. 2022

Characteristics of necessity-driven CE

- **The “circular mindset” – depending on resource scarcity**
- **Tolerance for imperfect solutions**
- **Focus on affordability and long-term functionality**
- **Engagement in time-intensive practices (e.g. repair, reuse)**
- **Existence of informal hubs reinforcing CE (cooperatives, etc.)**

Korsunova et al. 2022



Korsunova et al. 2022

Course summary

Week 1 – Introduction to CE

Challenges

ECONOMIC LOSSES & STRUCTURAL WASTE

PRICE RISKS

SUPPLY RISKS

NATURAL SYSTEMS DEGRADATION

REGULATORY TRENDS

Enablers

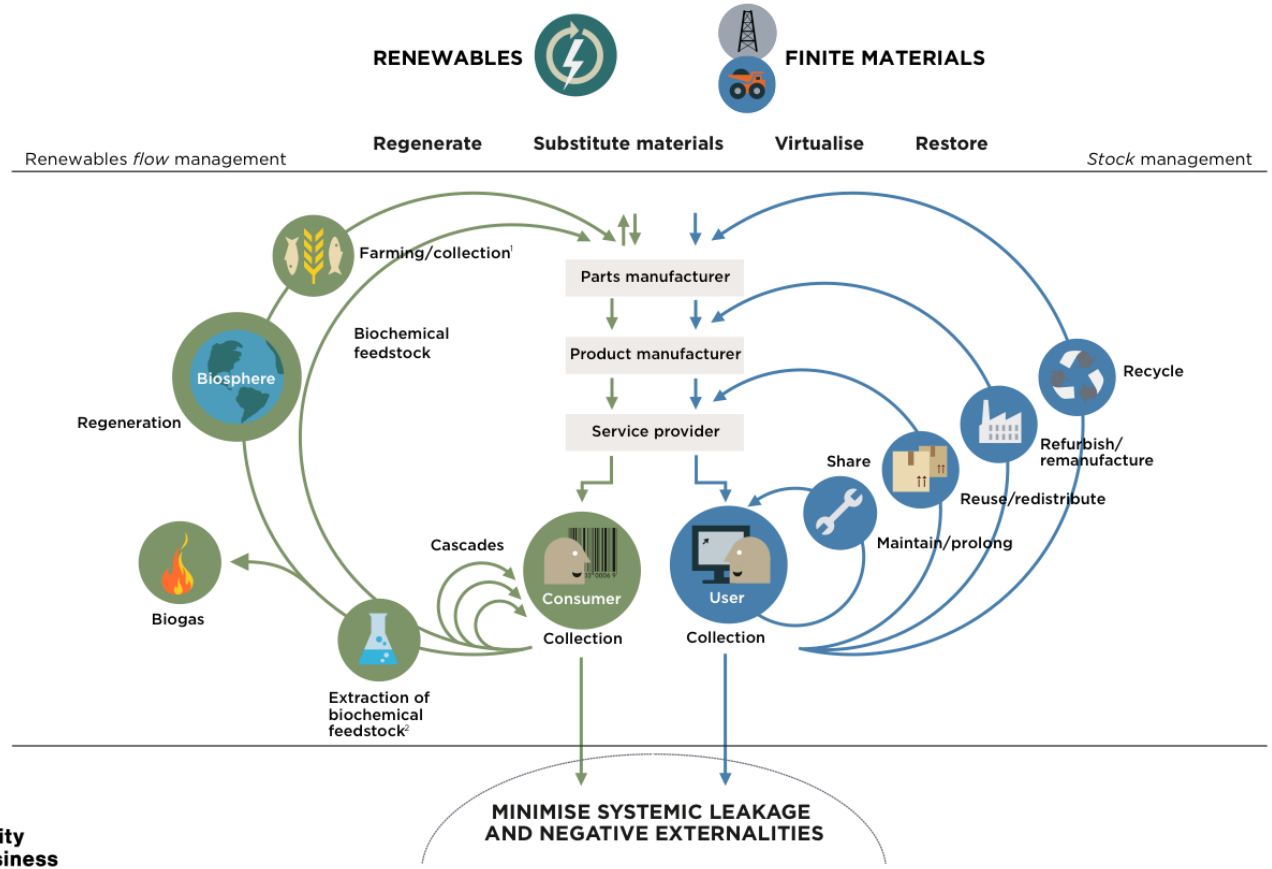
ADVANCES IN TECHNOLOGY

ACCEPTANCE OF ALTERNATIVE BUSINESS MODELS

URBANISATION

SOURCE: Ellen MacArthur Foundation, SUN, McKinsey Center for Business and Environment - Growth Within: a circular economy vision for Europe

Week 1 – Introduction to CE



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SOURCE: Ellen MacArthur Foundation; drawing from Braungart & McDonough Cradle to Cradle (C2C)

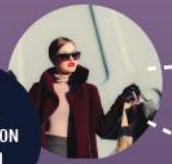
Week 2 – Systems thinking and CE

System: An interconnected set of elements that is coherently **organized in a way that achieves something.**

Key characteristics of systems:

- Interconnectedness
- Feedbacks
- Adaptive capacity/resilience
- Self-organization
- Emergence

SYSTEMIC CHALLENGES OF THE TEXTILE INDUSTRY



MACRO

MESO

MICRO

LARGE CORPORATIONS DOMINATE FASHION BUSINESS

CURRENT CONSUMPTION PARADIGM

FAST FASHION BUSINESS MODEL

CLIMATE EMISSIONS

DEPLETION OF NATURAL RESOURCES

WATER SCARCITY

MICRO PLASTICS

EXTERNALITIES NOT TAKEN INTO ACCOUNT

MIXED MATERIALS

USE OF PESTICIDES AND CHEMICALS

SYNTHETIC FIBRES

INCINERATION/ LANDFILLING/ DUMPING IN DEVELOPING COUNTRIES

PRODUCTION IN LOW-COST LABOUR COUNTRIES

VIOLATION OF HUMAN RIGHTS

MAXIMIZING SHORT-TERM PROFITS

FASHION IN IDENTITY-BUILDING

LOW RECYCLING RATE

LOW QUALITY

CHEAP PRICES

POOR TRACEABILITY OF CLOTHING

SHORT USAGE TIME

IMPULSE PURCHASES

Week 3 – Circular Business models

Slowing loops:

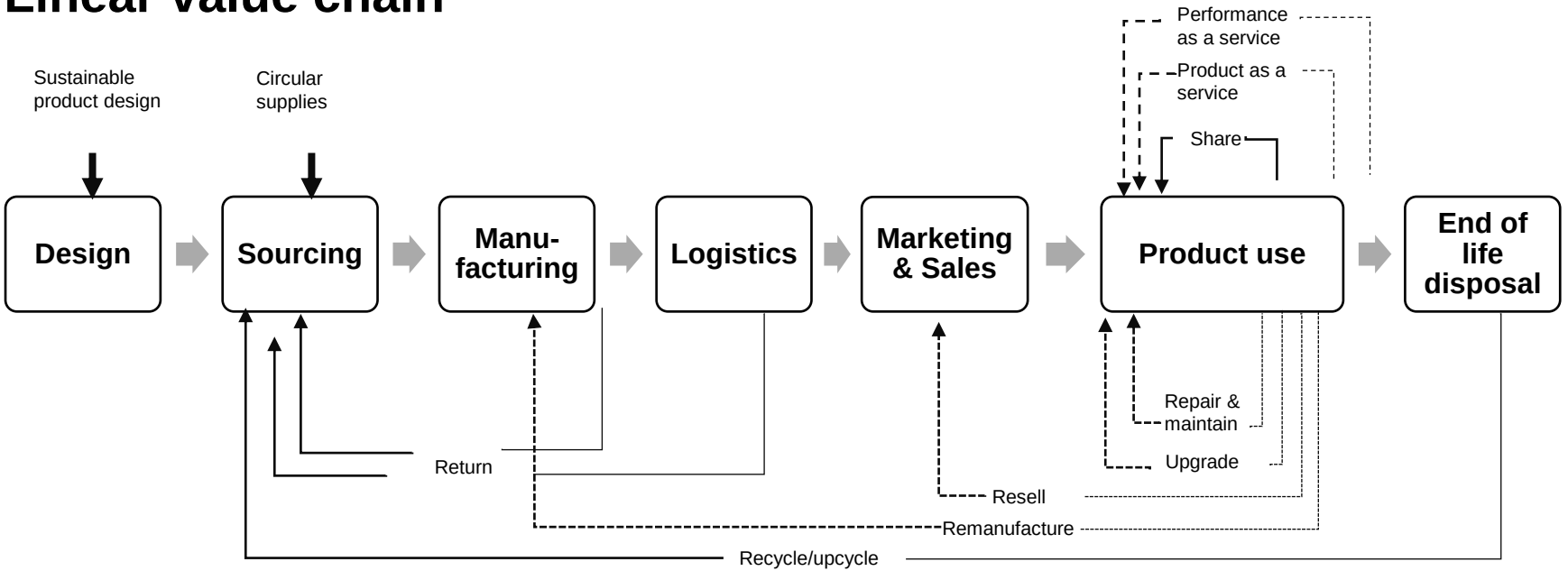
1. Access and performance model
2. Extending product value
3. Classic long-life model
4. Encourage sufficiency

Closing loops:

5. Extending resource value
6. Industrial symbiosis

Week 3 – Circular Business models

Linear value chain



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Adapted from Sitra, 2022

Week 4 –Collaboration for CE

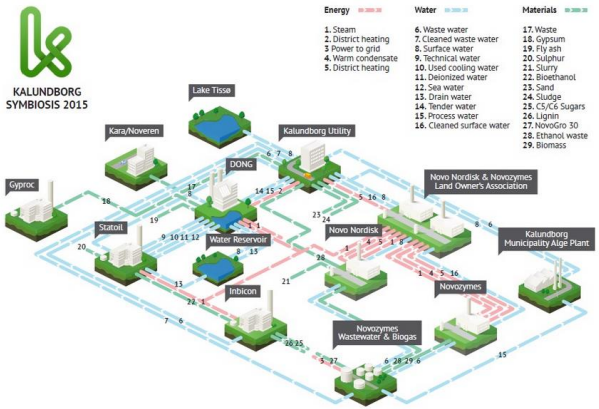
Collaboration for CE can involve collaboration between supply chain parties, or it can happen between industries, which is often referred to as industrial symbiosis

The objective of industrial symbiosis is to form closed-loop material cycles among industrial firms

Creating value from wastes and byproducts

- Other activities: Infrastructure, energy and utility sharing among a group of firms

Cross-industrial collaboration is common, geographica



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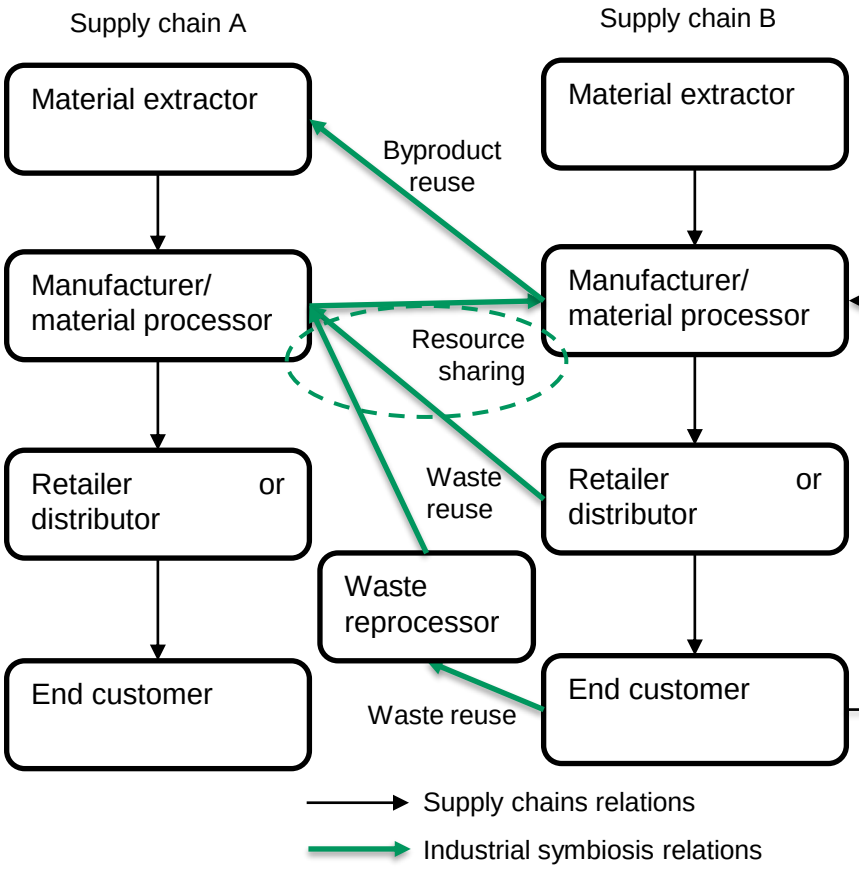
Week 4 –Collaboration for CE

Contrasting Industrial Symbiosis with Conventional Supply Chain Approaches

	Industrial Symbiosis	Forward and Reverse Supply Chains
System level		
Coordination	Based on norms of community and cooperation	Often dominated by a large, powerful firm, and/or competitive market mechanisms
Idiosyncratic relationship	Supply chain relationships take advantage of unique fit between firms — i.e., geographic proximity	Supply chain relationships designed based on need — i.e., buys and sells globally
Firm and flow heterogeneity	Cooperating firms are diverse and drawn from multiple industries	Cooperating firms focus on delivering a single type of product
Structure	A dense network structure, with interconnecting ties in many directions	Generally, a linear structure with multiple suppliers and multiple customers
Firm level		
Product identity	Products produced are independent of a firm's identity	Products produced are consistent with a firm's identity
Product manufacturing	Multiple products produced from a set of inputs — sold to multiple industries	Single product produced from a set of inputs — sold to a single industry
Strategic logic	Firms sell products that they have — seeking a higher value use of waste, byproducts and chemical intermediaries. Effectuation logic	Firms design and sell products to meet customer needs. Causation logic
Perception of waste	Waste is seen as feedstock for other production processes	Waste is to be minimized



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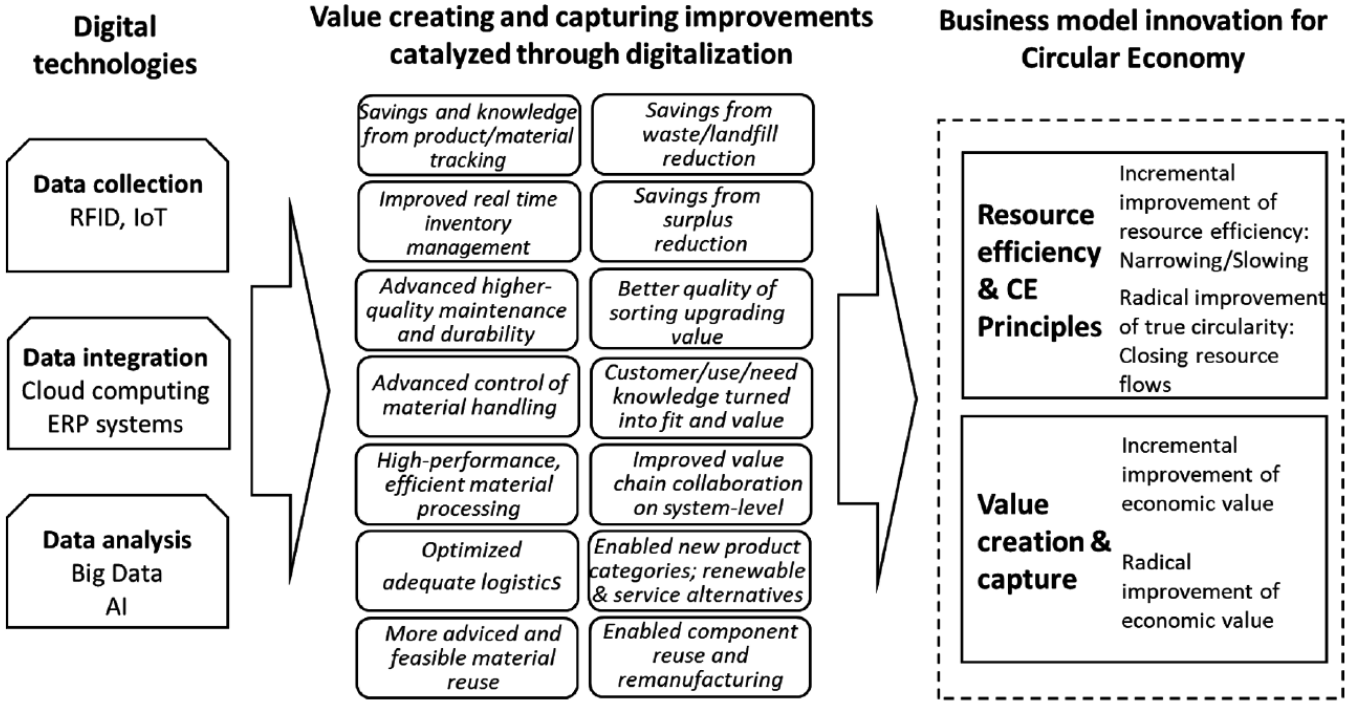
Bansal & McKnight, 2009

Week 5 – CE and new technologies



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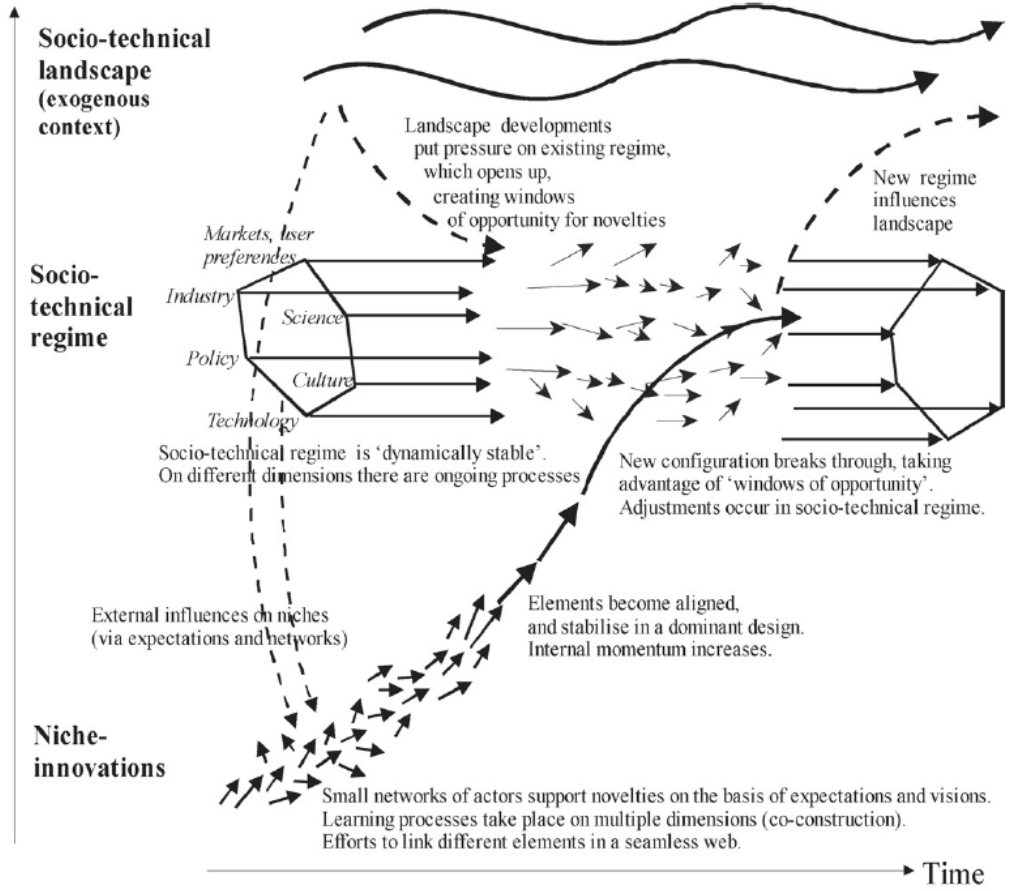
Source: Ranta, Aarikka-Stenroos, Väisänen (2021). Digital technologies catalyzing business model innovation for circular economy—Multiple case study

Week 6 – CE and the society



CE development is facilitated by policy development around the world, e.g.

- EU CE Green Deal
- Strategic CE programme in Finland

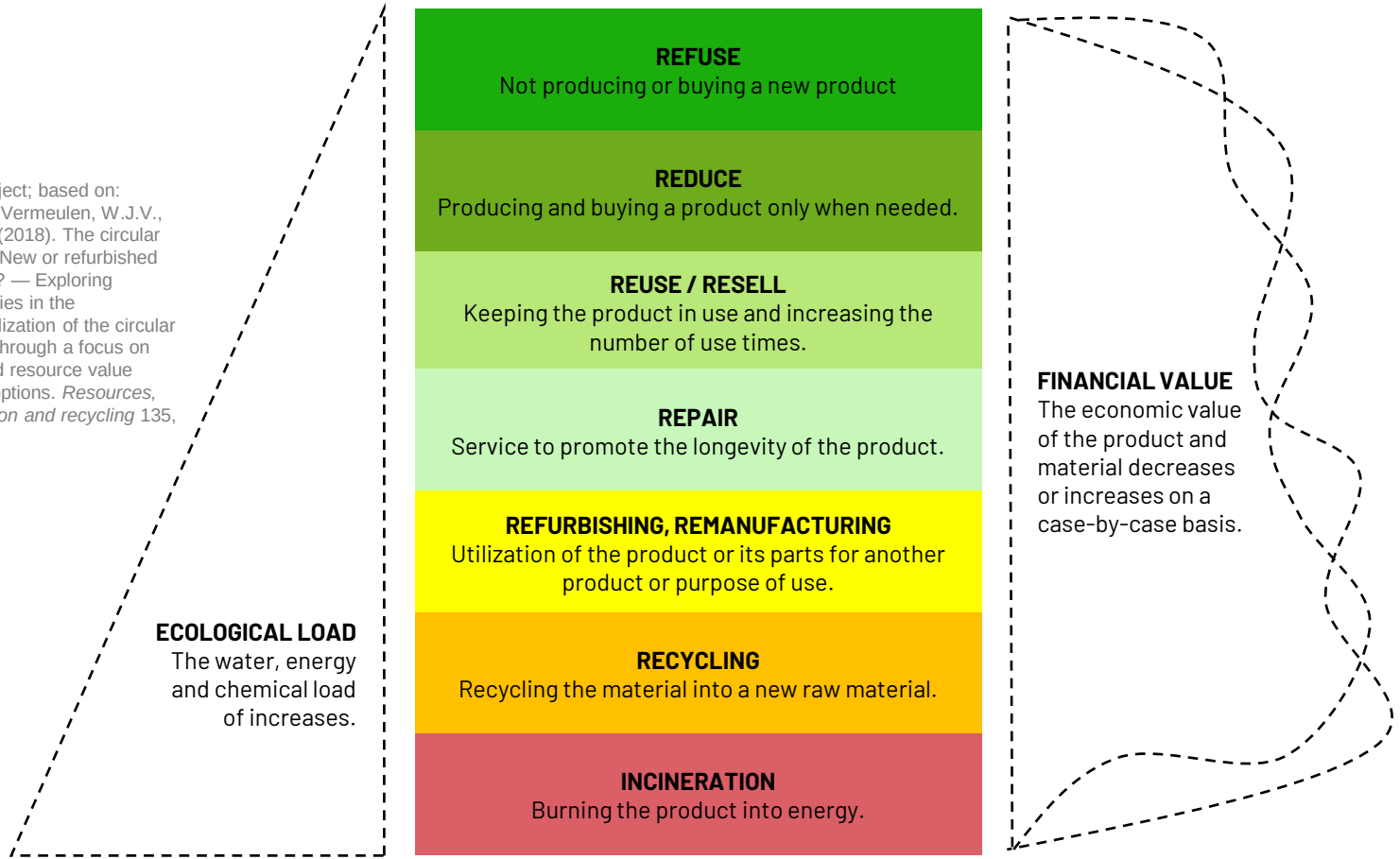
Extended Producer Responsibility (EPR) systems are one key policy form specifically to govern CE development

Week 6 – CE and the society

Critique of circular economy:

- **Considering limits and boundary conditions of CE**
- **Broadening notion of agency in CE**
- **CE and stronger sustainability**

Retaining value in circular economy



Q&A – remaining questions on course content

Course feedback

Please take some minutes to answer the course feedback

Giving feedback gives +1 point for the course evaluation

Feedback is anonymous, but we can see whether a student has given feedback or not

Feedback is open until 26th of April

Thank you for attending the course!