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6.4 Circular business models in the textile and clothing industry

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The objectives of the project concern Textile and Clothing (TC) sector, focusing on textile and clothing materials, sustainability and circular economy (CE). The project will create an open platform with study material and recommendations for developing an integrated formal and informal education which concerns the subjects mentioned.
https://www.metropolia.fi/en/rdi/rdi-projects/sustexedu-erasmus

The Coordinator: Metropolia UAS
The partners: Hogent (BE), Mome (HU), Omnia (FI), TTHK (EE), TTK UAS (EE), University of Borås (SE)
Funding: Erasmus +
Duration: 2022–2024

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About the use of study material

This educational material forms a learning package that will be tested in the project's partner organizations in the fall of 2023.

As this study material is still in the testing phase, it should not be distributed to people outside the course.

Students are asked for feedback about the study unit with an electronic survey, the answer to which is optional.

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Organizational aspects of learning …

CONTENT

- Circular economy concept
- Material cycles in the circular economy
- Circular economy strategies (to maintain or increase the value of the material)
- Circular economy business models

LEARNING OUTCOMES

After completing the course, the

- explain the meaning and necessity of the circular economy
- describe different material cycles
- name circular economy strategies and can create connections with this field
- know the main business models of the circular economy and knows how to apply them in the field of textiles and clothing

STUDENT WORKLOAD

At TTK, the study module corresponds to one (1) credit, i.e. xx hours:

- Lectures, 2 x 2 hours
- learning activities, 2x2.5 hours
- Independent reading assignment, 6 hours
- Electronic mini-exam, 12 hours

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Circular economy strategies

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Background of circular economic thinking

The circular economy has been talked about for decades in terms of different concepts and has many thinking models and ideologies associated with it, so it is difficult to trace its exact origins

- Knees 1988, Pearce and Turner 1990.

Examples are e.g. cradle-to-cradle product life cycle (life cycle), product-service systems, sharing economy.

Find out more *Ellen MacArthur foundation*
"*What is the circular economy?*"

Why it is important to use a circular materials?

1. According to Statistics Estonia, the Circular Material Use Rate in Estonia was 15.1% in 2021.
2. The rate of recycled material is an indicator that shows the share of recycled material in the total material use.
3. This means that 84.9% of the material entering the economy as an input is additional extracted raw material.

In order to limit the pollution of the planet and slow climate change, it is necessary to start applying the principles of the circular economy throughout the current economic system.

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Source: Statistikaamet
https://tamm.stat.ee/tulemusvaldkonna d/keskkond/indikaatorid/204

Self-reproducing system

- **The circular economy** is an alternative to the prevailing linear **"take-make-dispose"** economic model of production and consumption, which requires a large amount of relatively cheap material and input, and at the same time produces a lot of waste.
- A circular economy is a **self-reproducing system** where products, components and materials are kept at their highest useful value.
- To ensure sustainable economic development, we need a model that guides the more efficient use of natural resources through **material circulation.**

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Material circulation

- In the circular economy, we talk about closed (continuous) cycles.
- The circular economy is often described by the Ellen MacArthur Foundation's butterfly diagram, which separates **biological and technical cycles.**
- In the context of the textile and clothing industry, it is important that we look specifically at what happens in technical cycles.
- At the same time, we must take into account that the textile and clothing industry uses natural (biological cycle) materials such as cotton, linen, wool, hemp, etc.
- It is based on the **waste hierarchy/hierarchy of the material use.**

WASTE HIERARCHY

- Priority order means the order of importance of waste management operations.
  The waste hierarchy is defined in the EU waste directive.
- The hierarchy can also be seen in the circular economy butterfly diagram.

European Circular Economy Stakeholder Platform

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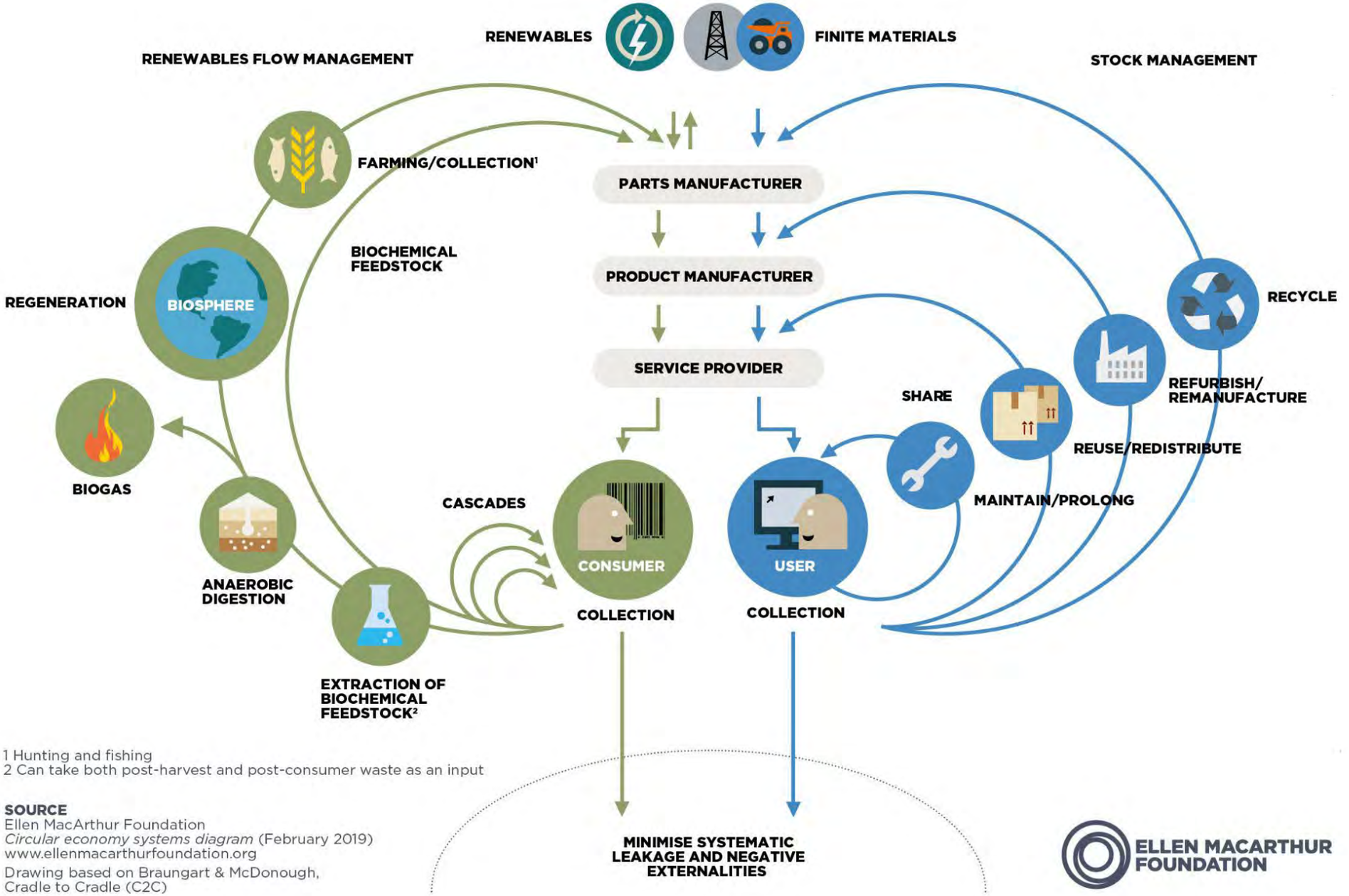

1 Hunting and fishing
2 Can take both post-harvest and post-consumer waste as an input

SOURCE
Ellen MacArthur Foundation
Circular economy systems diagram (February 2019)
www.ellenmacarthurfoundation.org
Drawing based on Braungart & McDonough, Cradle to Cradle (C2C)

ELLEN MACARTHUR FOUNDATION

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Lesson activity 1.

Give examples from your field using the Butterfly Diagram

Pair/group of 3

Draw a diagram similar to a butterfly diagram on A4-A3 paper and add explanations and examples based on your protein to the concepts related to the technical and biological cycle.

Use the website of the Ellen MacArthur Foundation for information *https://ellenmacarthurfoundation.org/.*

30min

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GOALS

Circular economy strategies

The purpose of the circular economy is to decouple economic growth from the use of primary raw materials by creating a circular production and consumption system with as few losses as possible.

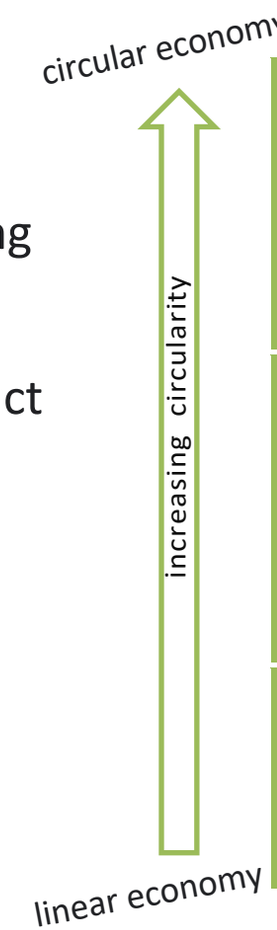
- as little waste as possible (zero- or non-waste cycle)
- closed circle/cycle (“cradle to cradle” LC if possible)
- material recycling with the highest possible value (upcycle), if increasing the value is not possible, then with the same or lower value
- production and/or diversification of material/products or use in the same way (in unaltered form)
- rethinking the business model
- recycling of hazardous waste chemicals
- energy recovery in the new cycle (biogas collection and energy use

... Circular economy strategies

R-ladder

Divides strategies into 3 blocks:

1. Utilization of material (recycling or energy use)
2. Extending the life of the product / product components, i.e. strategies aimed at extending the life cycle and durability
3. Smarter product use



Smarter product use and manufacturing	RO Refuse	Make product redundant by abandoning its function or by offering the same function with a radically different product.
	R1 Rethink	Make product use more intensive (e.g. by sharing products).
	R2 Reduce	Increase efficiency in product manufacture or use by consuming fewer natural resources and materials
Extend lifespan of a product and its parts	R3 Reuse	Reuse by another consumer of discarded product which is still in good condition and fulfils its original function.
	R4 Repair	Repair and maintenance of defective product so it can be used with its original function.
	R5 Refurbish	Restore an old product and bring it up to date.
	R6 Remanufacture	Use parts of discarded product or its parts in a new product with the same function.
Useful application of materials	R7 Repurpose	Use discarded product or its parts in a new product with a different function.
	R8 Recycle	Process materials to obtain the same (high grade) or lower (low grade) quality.
	R9 Recover	Incineration of material with energy recovery.

The 9R Framework. *Source: J. Kirchherr, D. Reike, M.P. Hekkert. Conceptualizing the Circular Economy: An Analysis of 114 Definitions. 2017.*

... Circular economy strategies

1. **Utilization of material** (recycle or energy use)

R9 Recovery - energy use (including burning for energy)

R8 Recycle – recycling material to obtainNEW material of equal, lower or higher value.

R7 Repurpose - repurposing use of a discarded product or its parts in a new product with a different function.

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... Circular economy strategies

2. **Extending the life cycle of the product/product components**

R6 Remanufacture - Parts of a discarded product are used in a new product with the same function.

R5 Refurbish - Restore and update the old product.

R4 Repair - Repair and maintain the defective/broken product so that it can be used with its original function.

R3 Reuse – Reuse of the product by the next (2nd, 3rd, etc. circle) users.

... Circular economy strategies

3. Smarter product use

R2 Reduce - Reducing, increasing product production efficiency (including resource, material and energy efficiency).

R1 Rethink - Change the intensity of product use (expand the number of users, e.g. sharing service).

R0 Refuse - Multifunctionality of the product. Giving the product different functions or giving a different function zone than before.

Circular Strategies in textile and clothing industry

- New materials based on secondary raw materials. Recycling of materials.
- Reduction of material use, including digital optimization (direct dematerialization in modeling, material cutting, use of auxiliary materials).
- Secondary markets, reusing.
- Life cycle extension during maintenance (repair and maintenance workshops, service provision)
- SHARING - e.g. sewing, knitting, repair and maintenance workshops on a sharing platform (also considered a manifestation of social innovation, less need to produce sewing machines and accessories, etc.)
- Construction of the garment uses parts of previous garments (modulation techniques, possible in small-scale operations), adaptability
- More environmentally friendly materials and optimized resource use (water, electricity, raw materials, digitization help in optimization)
- “Green" supply chain (GSS)
- Long-life materials and products (emphasis on high-quality product, slower material and product chain, including the use stage of the product).
- Use of more standard solutions (possibly, in turn, better adaptability)
- Homogeneous materials (easier processing) vs mixed fibres (more durable product)
- Timeless fashion etc.

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Circular business models

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Inputs …

- Renewable resources (water, solar radiation, wind, hydrogen, plants)
- Renewable bio-based or organic materials, e.g. bio-based materials (from agriculture, forestry) cotton, linen, wool, wood fibers, etc.
- Artificial materials (man-made or engineered materials)
- Recyclable materials

Key word: Materials development / innovation

Enablers and carriers of innovation

Enablers

- Education, awareness, changes in consumption behavior, decision-making (the latter concerns both individuals, groups and companies)
- Policies (international agreements, EU recommendations and requirements, national policy, company environmental policy setting own environmental goals)

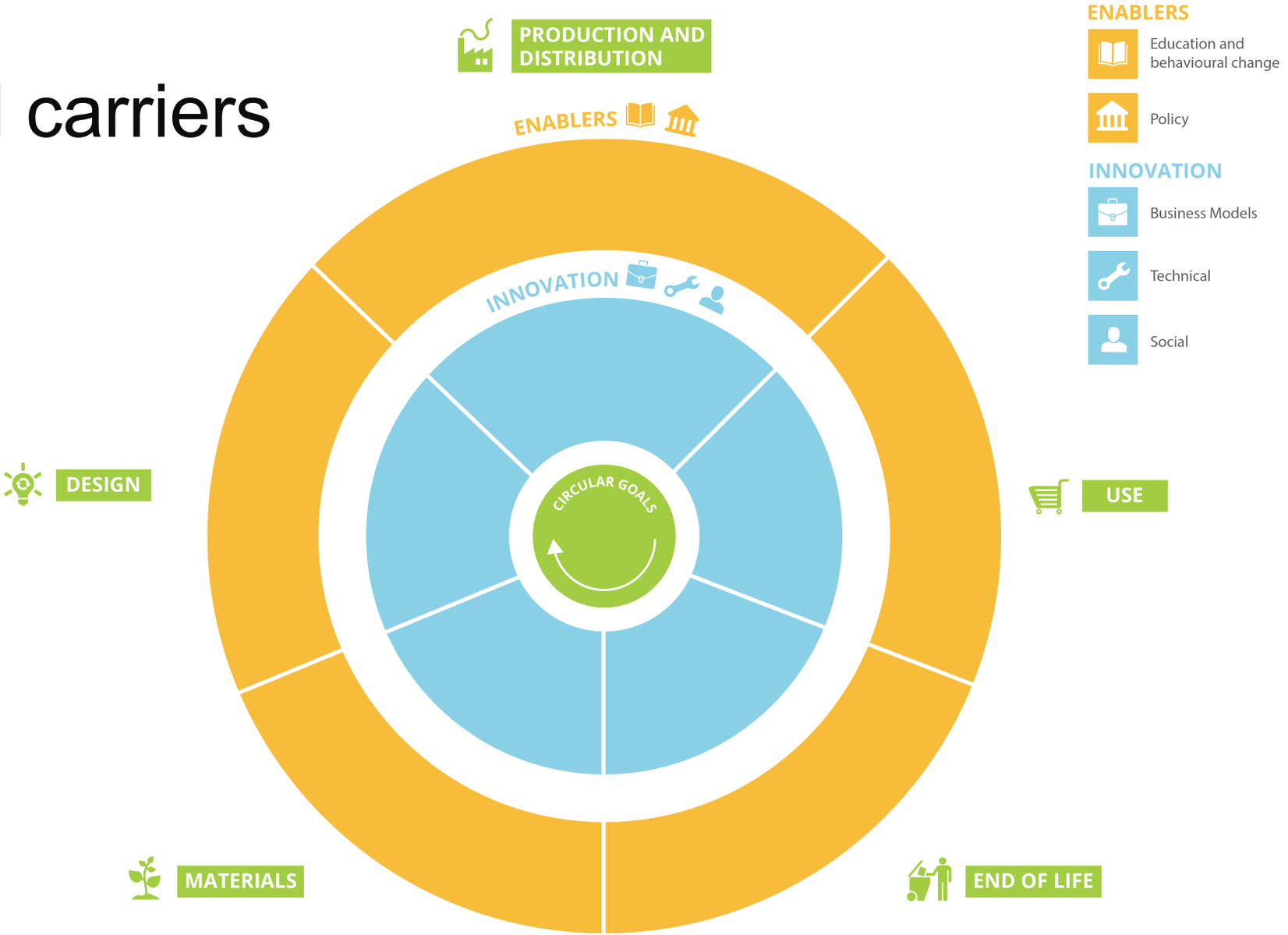
Innovation

- Technical developments (drive economic development)
- Social/societal (including political, cultural) developments
- Business models of organizations/companies

See the figure on the next page

Enablers and carriers of innovation

ETC/WMGE Report 2/2021: Business Models in a Circular Economy



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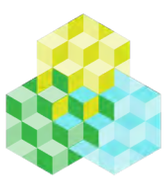
Source: EEA, Coscieme et al 2022

More value, less waste

- Getting more value from resources and creating less waste (increasing efficiency).
  Twin transition (ecological and digital).
- Less environmental impact.
- By effectively applying the principles of the circular economy, companies can reduce costs, increase growth potential and promote the company's image.
- For the sake of competitiveness and sustainable economic growth, it is important to switch to a resource-efficient circular economy, where the main attention is directed to the use of existing materials and products:
  - for reuse
  - to repair
  - for recycling

… that is, to the strategies of longevity and durability



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Life cycle design

- The transition to a circular economy requires changes in the entire product value chain, from product design to new business models and consumption habits.
- For new and existing products, the main focus is on whole life cycle design.
- Focusing on sustainable material selection, quality (long product life, repairability), optimization of the supply chain and reuse and recycling (universality, possibility to separate components) or using bio-based materials that break down easily in nature.

Let´s remember …

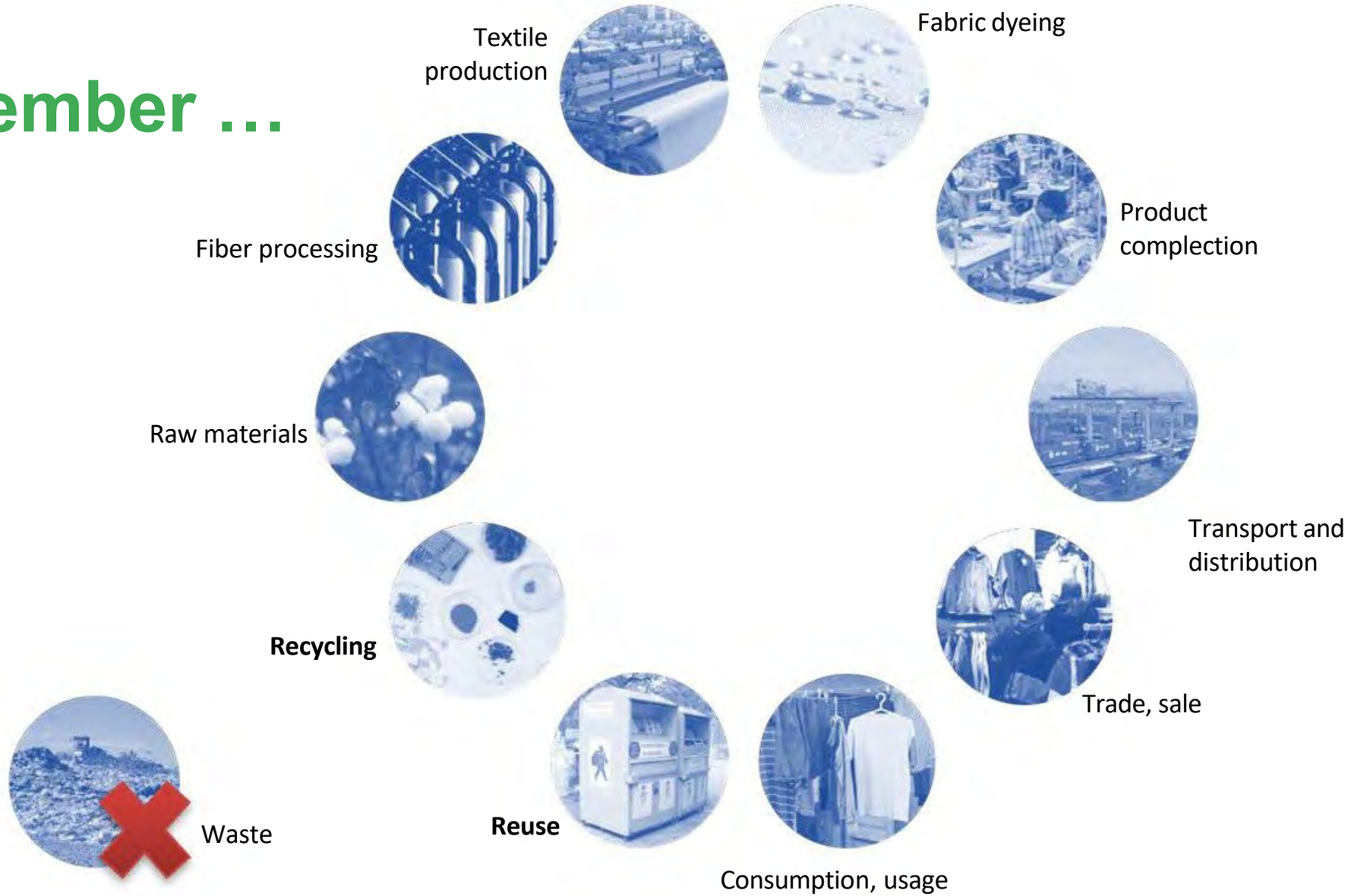

Image: Essi Karell

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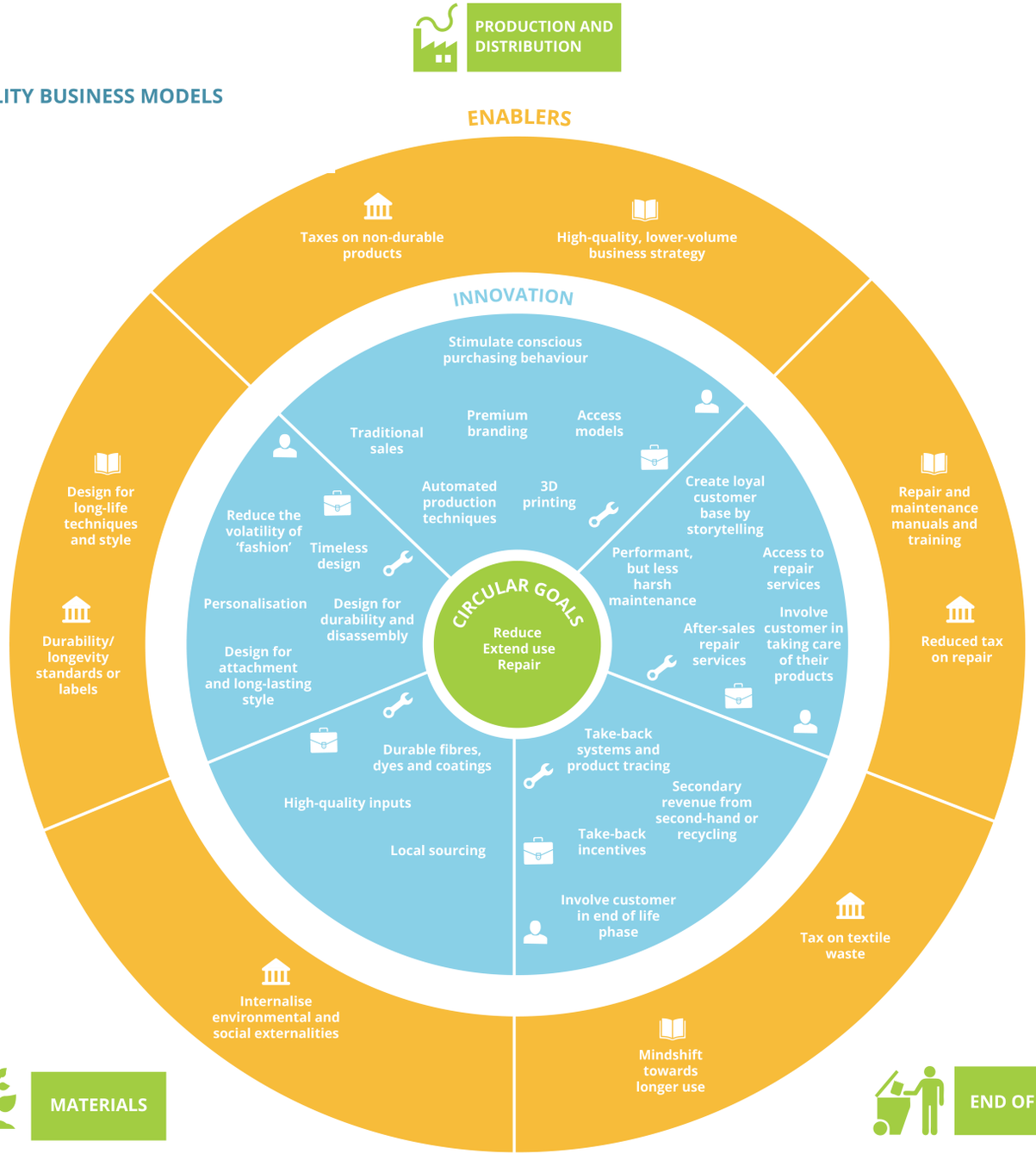
Business models built on longevity and sustainability strategies

ETC/WMGE Report 2/2021: Business Models in a Circular Economy



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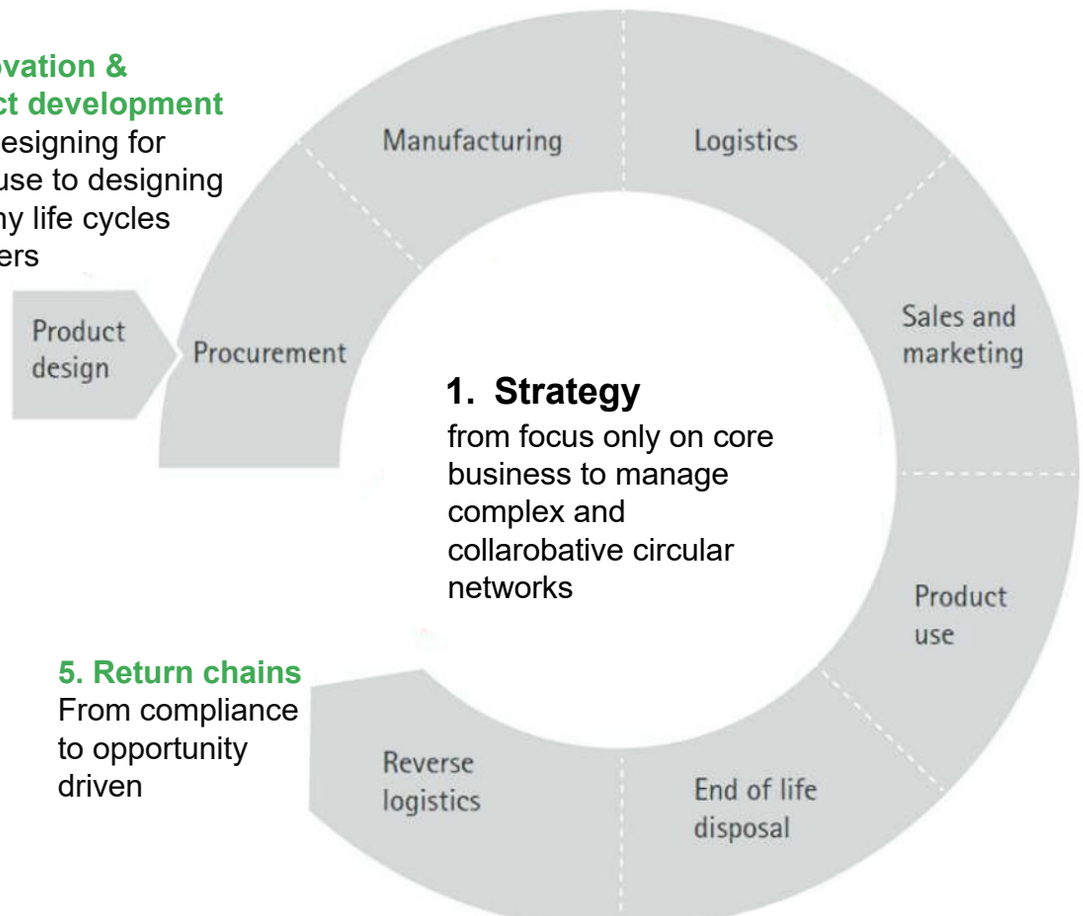
Circular business models (Accenture)

3. Sourcing and manufacturing
From homogeneous supply chain to heterogeneous resource flow innovation and cascading

2. Innovation & product development
From designing for single use to designing for many life cycles and users



1. Strategy
from focus only on core business to manage complex and collarobative circular networks

4. Sales and product use
From never seeing your product to customer and asset life

5. Return chains
From compliance to opportunity driven

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... Circular business models (Accenture)

Circular Supplies: Provide renewable energy, bio based- or fully recyclable input material to replace single-lifecycle inputs

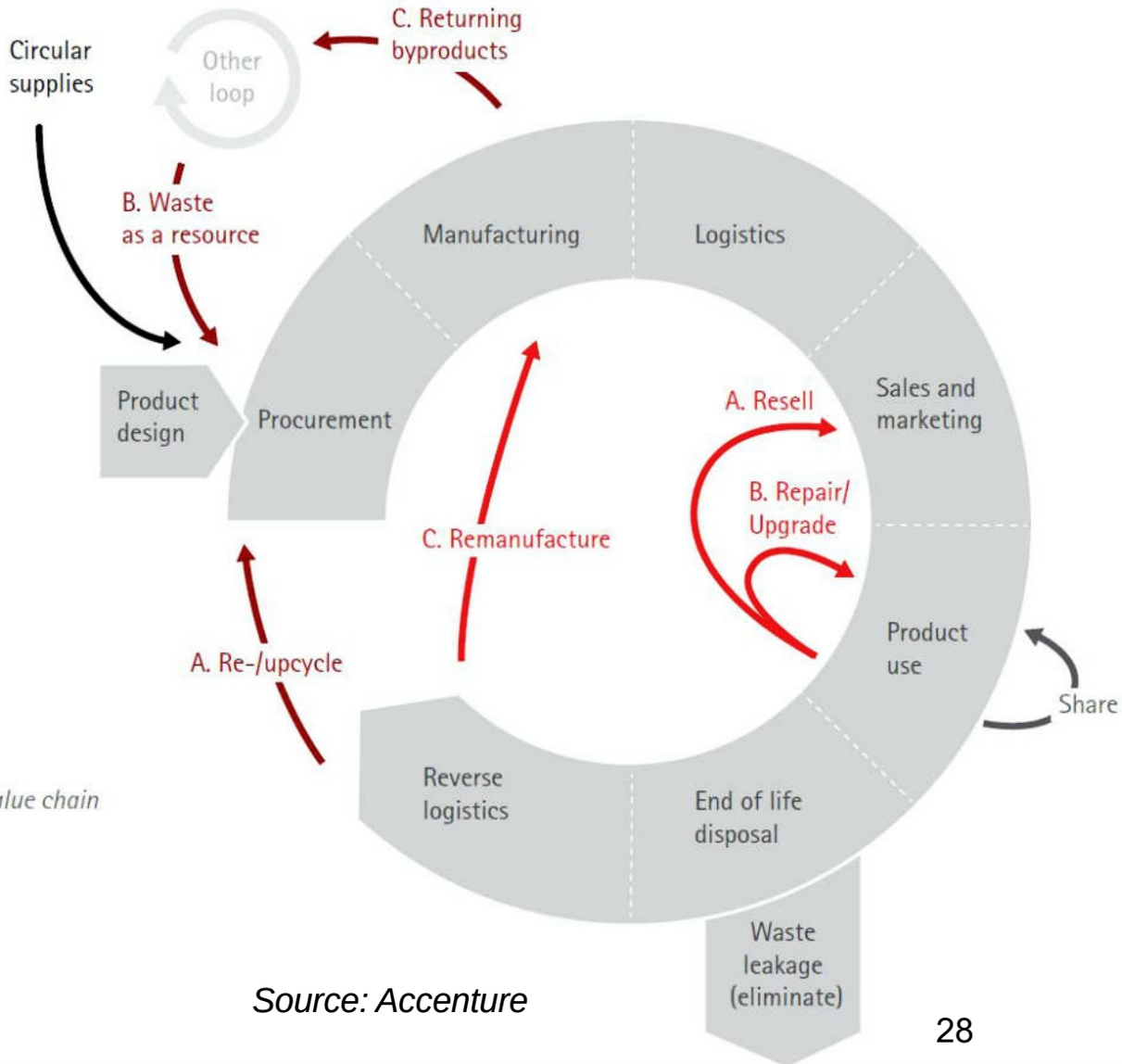
Resource Recovery: Recover useful resources/energy out of disposed products or by-products

Product Life Extension: Extend working lifecycle of products and components by repairing, upgrading and reselling

Sharing Platforms: Enable increased utilization rate of products by making possible shared use/access/ownership

Product as a Service*: Offer product access and retain ownership to internalise benefits of circular resource productivity

** Can be applied to product flows in any part of the value chain*



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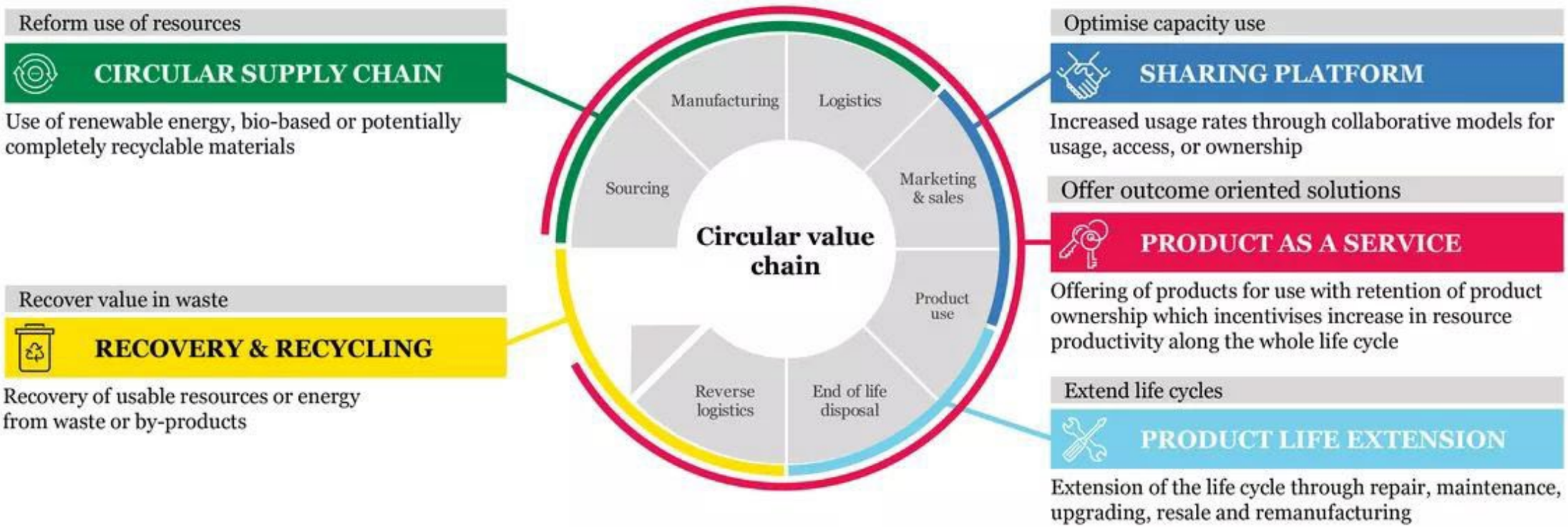
Source: Accenture

5 circular business models



Source: Accenture

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Circular supply chain

Built to last

Built to last Design durable and easy to repair products, e.g. with modular components, to reduce the level of production and resulting negative impacts

- Applicable value chain phases: Sourcing, Manufacturing, Logistics

Circular supplies

Phase out the use of scarce nonrenewable resources and use recyclable materials in production, e.g. renewable & bio-based materials, chemicals and energy to increase recovery rates and resource life.

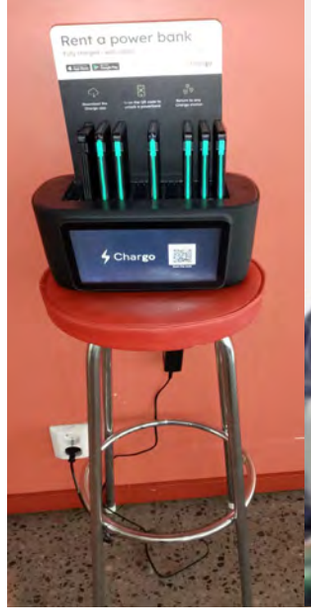
- Applicable value chain phases: Sourcing, Manufacturing, Logistics

Sharing platforms

Share

- Increase product usage through collaborative ownership, use and **access models**.
- Deliver platforms and solutions so products can be shared, e.g. pay per use, product leasing, sharing or renting.
- Applicable value chain phases: Marketing & sales, Product use

How many sharing services do you see in the pictures?



Pictures: Karin Lindroos and https://www.sewingcenter123.com/s ewing-club/

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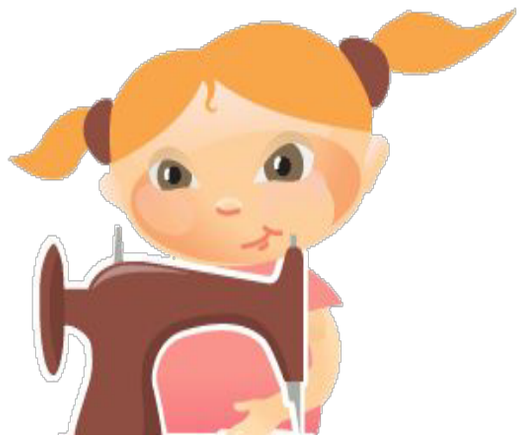
Product as a service

Maintain product ownership and encourage responsibility use and resource productivity throughout the full value chain

Product as a service

Allow customers access to the product through a subscription service or pay price based on usage. Maintenance is often included in the service to ensure product standard, upkeep and longer lifetime

Applicable value chain phases: All



Picture: liisbetiomblus.ee

Performance as a service

Allow customers to buy a pre-defined service and quality level and commit to delivering a specific result.

Applicable value chain phases: All

Product life extention I

Repair and maintain

Provide repair and maintenance services to extend the life of existing products.

Applicable value chain phases: Product use, End of life

Upgrade

Improve product performance be upgrading existing components with newer ones (especially if they've been designed and built to last)

Applicable value chain phases: Product use, End of life

Photo: Maaleht

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Product life extention II

Resell

Resell products at the end of their useful life in one market, to second- and third-hand markets

Applicable value chain phases: Product use, End of life

Remanufacturing, refurbish

Take back products and perform industrial level reparations for sale as refurbished products at a lower price

Applicable value chain phases: Product use, End of life

Resource recovery

Recycle / upcycle

Recover and collect materials from products at the end of life for reuse in new production processes

Applicable value chain phases: Reverse logistics

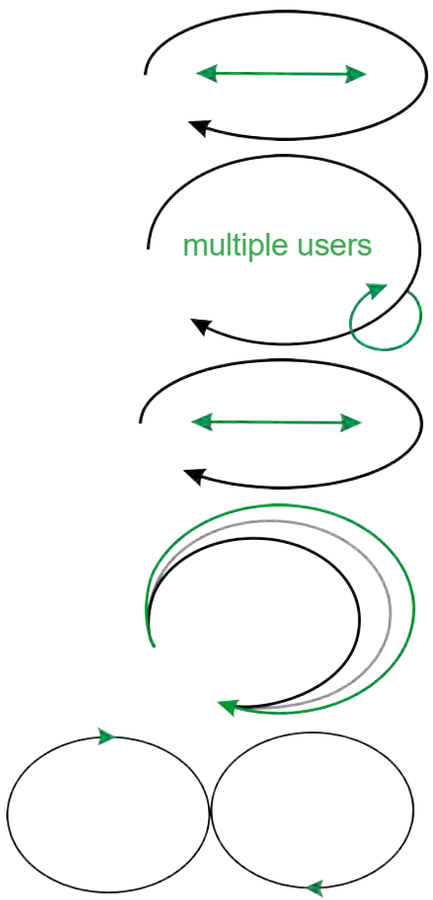
Return, energy recovery

Develop systems that utilize waste and by-products so that no resource is wasted, e.g. transform waste heat into energy or by-products into useful material

Applicable value chain phases: Reverse logistics

PlanB bags (FI) Photo by SusTexEdu

Circular business models in textile and clothing industries (Bocken 2016)



- *Longevity and durability:* This business-model approach is focused on extending the lifetime of garments, thus reducing the need for purchasing new items and allowing for various modes of reuse. It is often combined with design for repair, customized production for promoting emotional product attachment, and offers of repair and maintenance services.
- *Access-based models:* These business models are based on renting, leasing, and sharing of garments. Examples include renting of workwear or hospital or restaurant linen, single-occasion clothing (including wedding or dinner dresses), and baby clothes (including reusable diapers) or leasing everyday-wardrobe sharing. Access-based models aim to lower resource utilization by increasing the use rate of the product stock.
- *Collection and resale:* Business models related to resale focus on extending the useful life of textiles beyond the first user. Textile-collection and resale models include secondhand retail as well as collection and resale to the market for reuse and recycling.
- *Recycling and reuse of materials:* These models emphasize turning textile waste into raw materials to produce new textiles. They involve reusing parts and cuts and producing recycled fibers for re-spinning and use in other products.

Lesson activity 2.

Think about your product, choose your strategy(s) and design a circular economy business model

Pair/group of 3

Think of the product you want to bring, for example, and use circular economy strategies around it so that your business model is sustainable and circular.

Write and draw on A4-A3 paper.

30min

SusTexEdu project (Education Partnership of Textile and Clothing Sector Materials & Sustainability, Agreement number 2021-1-FI01-KA220-HED-000023002) was funded by the Erasmus+ programme of the European Union.

Visit the project website to see all the intellectual outputs of the project.

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