

**Project Publication**

# 3D ECO Fashion

3D-ECO-Fashion - Circular Economy by Design

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Initiative Mittel- und Osteuropa e.V. in collaboration with the Green Elephant Foundation



Co-funded by  
the European Union



**InMOE**

Initiative Mittel- und Osteuropa e.V.

# **Circular Economy & Fast Fashion**

**for Fashion Designer**



Co-funded by  
the European Union

# Problems of Fast Fashion



# | Environmental impact

- Water consumption
- Water pollution from chemicals
- High CO<sub>2</sub> emissions & climate change
- Textile waste & throwaway mentality ( 81 truck loads/h)
- Loss of biodiversity

## Environmental impact

- Cotton production is extremely water intensive
- Withdrawal of large amounts of water leads to water shortages and environmental damage
- 17-20 percent of global water pollution is caused by textile dyeing treatments alone
- ~110 Bathtubs for 1 Jeans

## Water consumption



Foto: REUTERS

## Environmental impact

## Water pollution from chemicals

- Variety of chemicals in the production of clothing
- Dyes and chemicals for finishing
- Improper handling - water pollution and health problems

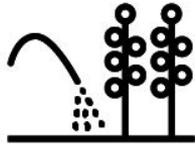


Buriganga River, Bangladesh



Yellow River, China

# Use of chemicals along the clothing value chain



**fertilizer**  
**Cotton fields**



**Oil refining**  
**for polyester**  
**production**

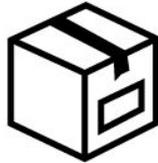


**Fabric production in textile**  
**factories (weaving mills,**  
**spinning mills, tanneries)**



**Coal-fired power**  
**plants to supply**  
**energy to factories**

Grafik: Nikola Berger



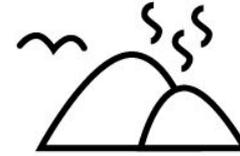
**Packaging**



**Transport**



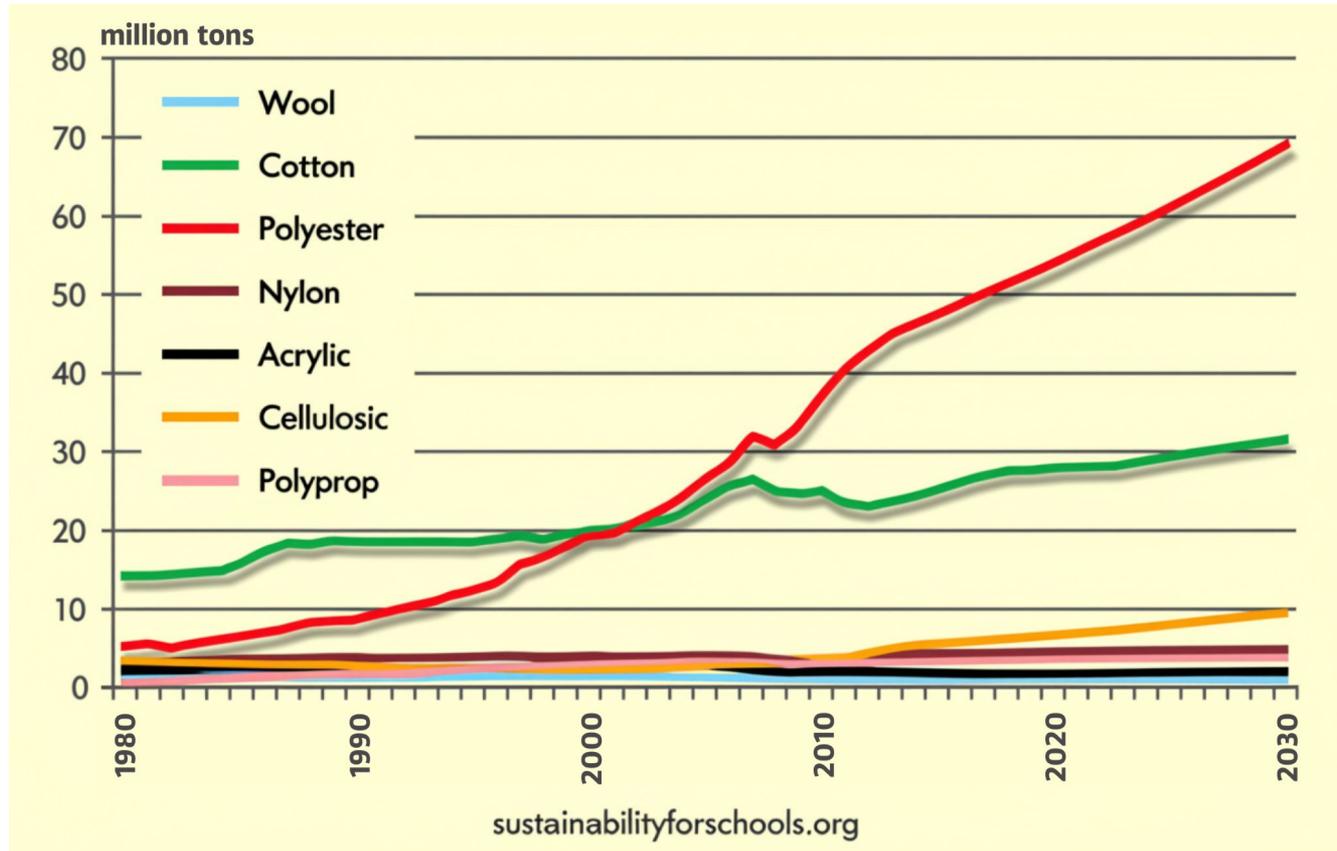
**on the skin**  
**when worn**



**disposal (landfill,**  
**incineration/**  
**combustion)**

# Environmental impact

# Petroleum consumption



- 57% of the clothing produced annually ends up in landfill, 12% recycling, 31% still in use
- Problems with disposal
- Overproduction



Foto: Martin Bernetti / AFP

## Environmental impact

- Polyester clothing - a lot to microplastics the small threads are already microplastics
- When washing - threads and microplastics are released into the water
- ~500,000 tons of microplastics from clothing (~50 billion bottles) are washed into the waterways
- be aware when working with Plastic materials!  
(protection)

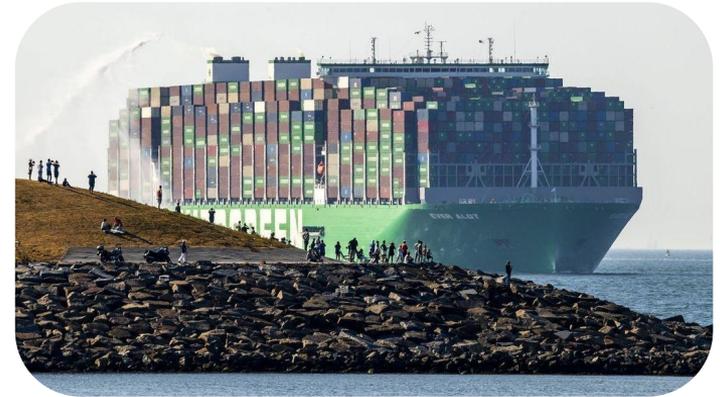
## Microplastic



## Environmental impact

## Transport / CO2

- Long distance transportation - increase in greenhouse gas emissions
- Sulfur in ship fuel, air pollution
- Exploitation in the supply chain
- 50% of all clothing ordered will be returned



The largest container ship in the world  
Evergreen, MSC Irina  
Foto: Imago Images / ANP

## | Social impact

- Labor exploitation
- Dangerous working conditions
- Inequality & gender equality
- Impact on local communities
- Consumer behavior
- Psychological pressure



Foto: Thomas Grabka

## | Circular Economy & Fast Fashion

# Circular Economy



# | Let's build a circle!

## Circular game

We throw a ball:

- Say your Name what you tend to throw away during your creative process or in your daily life.
- The next Person catching the Ball gives a solution to the first Person regarding their trash and shares what they tend to throw away....and so on...

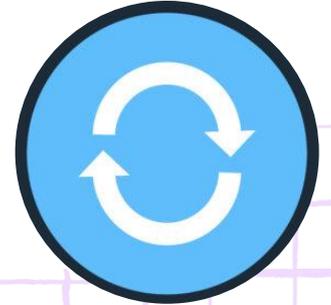
## | Discussion

- Which design decisions influence the life cycle of a garment?
- Have you applied circular economy principles yourself for your creations?



# | Circular economy- Key Principles

- **Design Out Waste & Pollution** (Zero waste design, cradle to cradle, no use of glues)
- **Keep Products & Materials in Use** (modular Design, Repair & Upcycle, secondhand & Sharing)
- **Regenerate Natural Systems** (Biomaterials, regenerative agriculture, circular production)



# | Circular economy- Key Principles

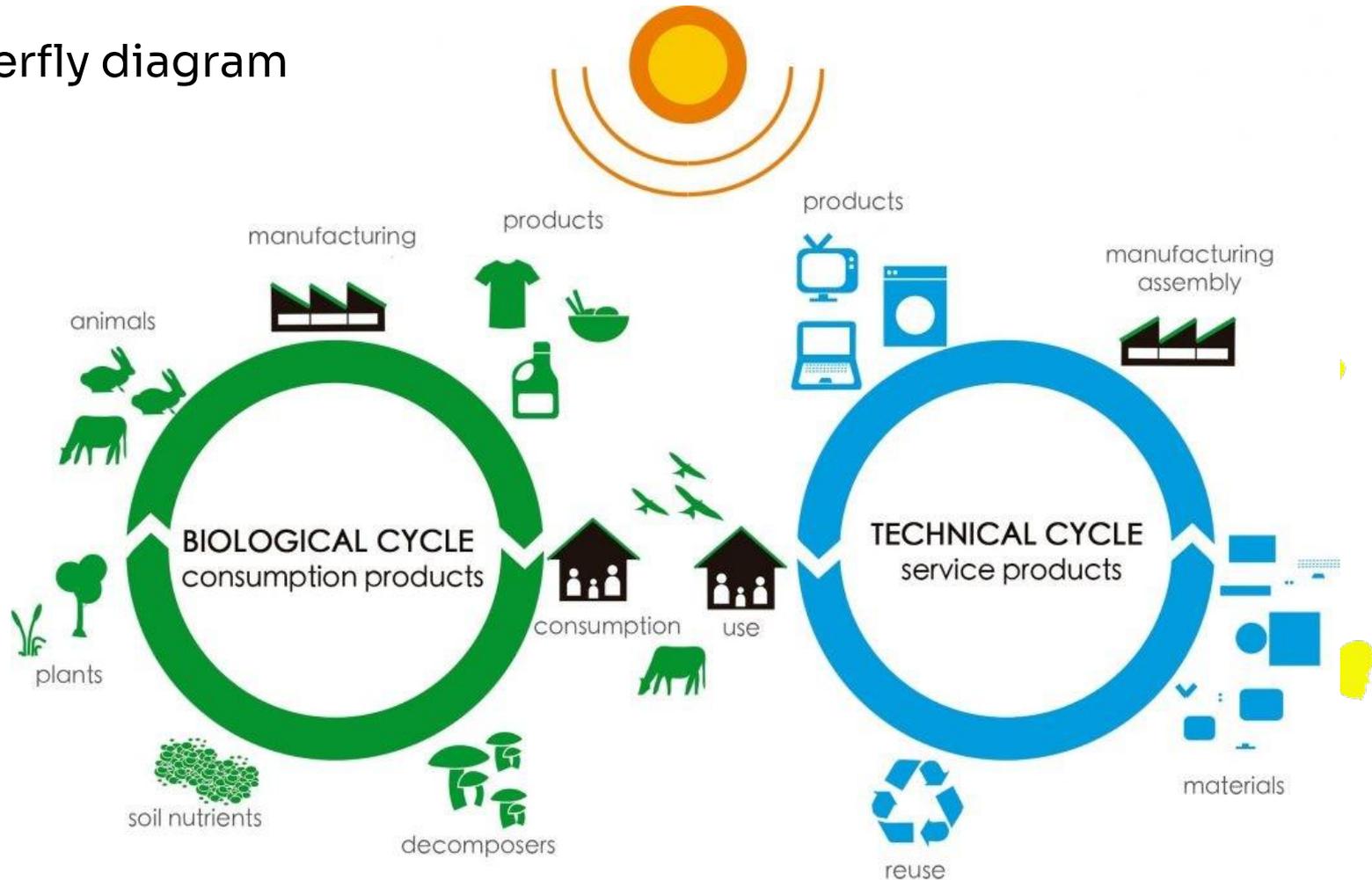
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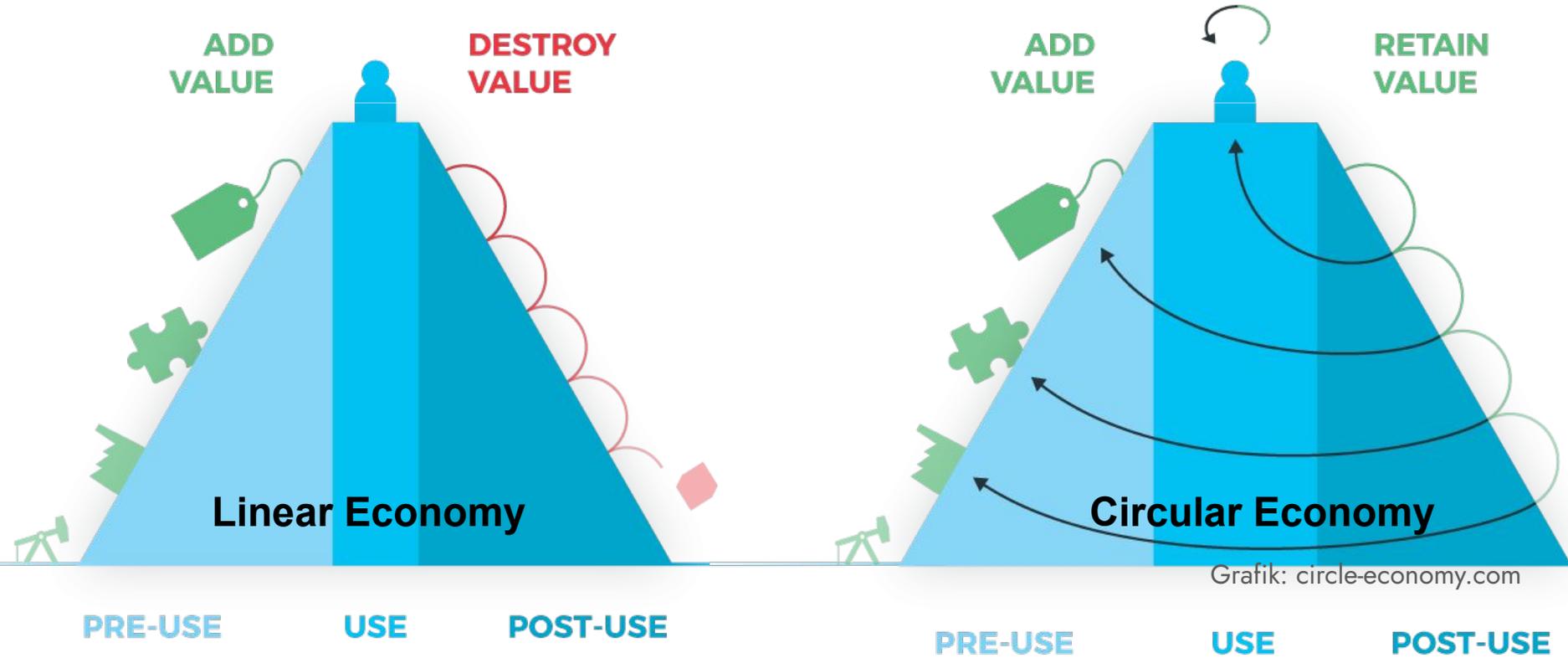
# Circular economy



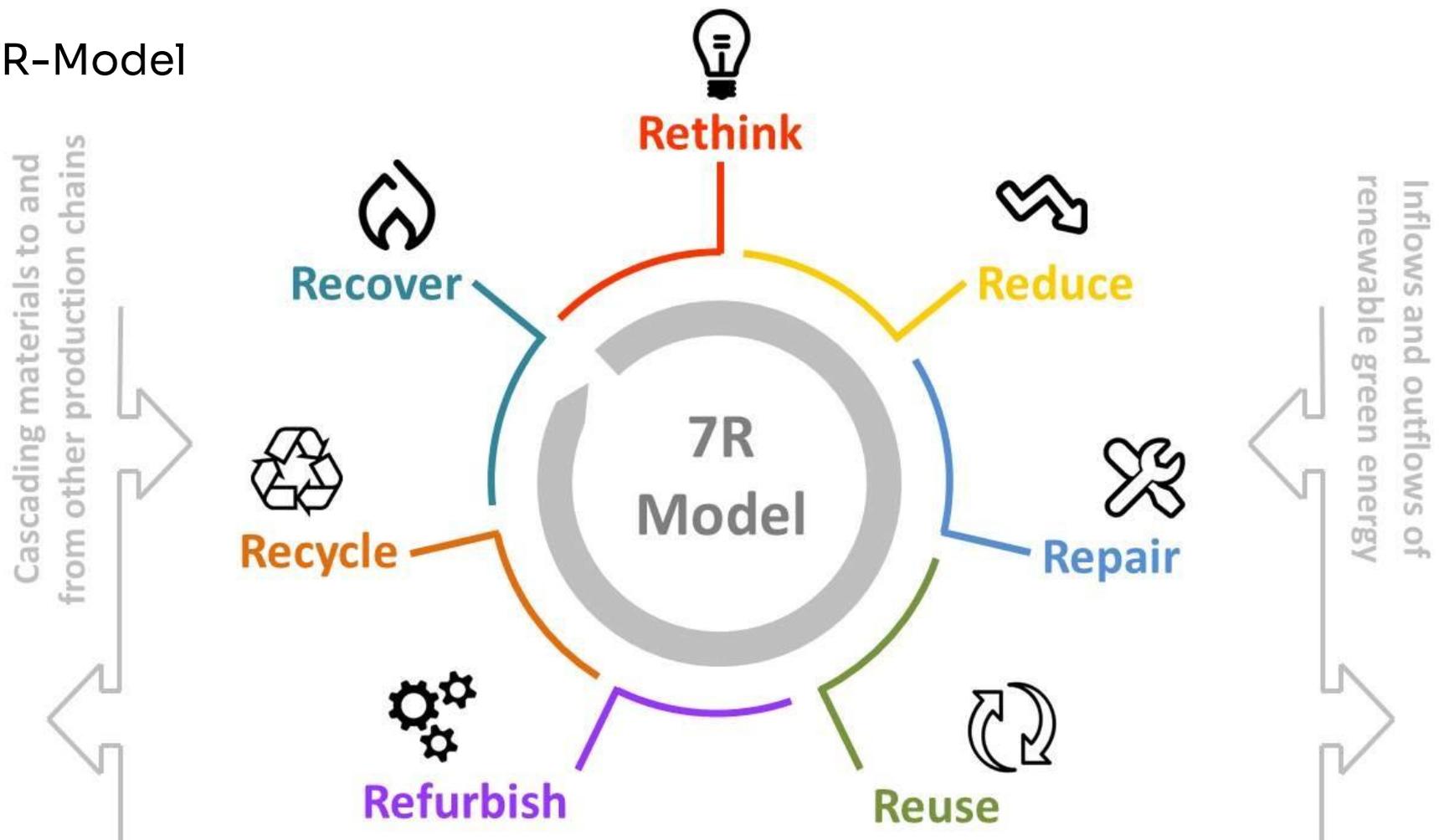
# Butterfly diagram



# Value Hill



# 7R-Model



# | Fashion in a circular economy

- **Design**

Designing products that are durable and recyclable, using recycled content and minimizing waste, looking good for longer - clo3d

- **Implementation of circular business models**

Piloting and scaling new, innovative business models that extend product life - circular business canvas

- **Promote a change in consumer behavior**

Helping consumers understand how they can make lasting lifestyle changes - educate

# | Fashion in a circular economy

- **Testing reuse business models**

Resale, Rental and Subscriptions – join platforms

- **Building partnerships**

to provide and use recycled fibers in new products – network

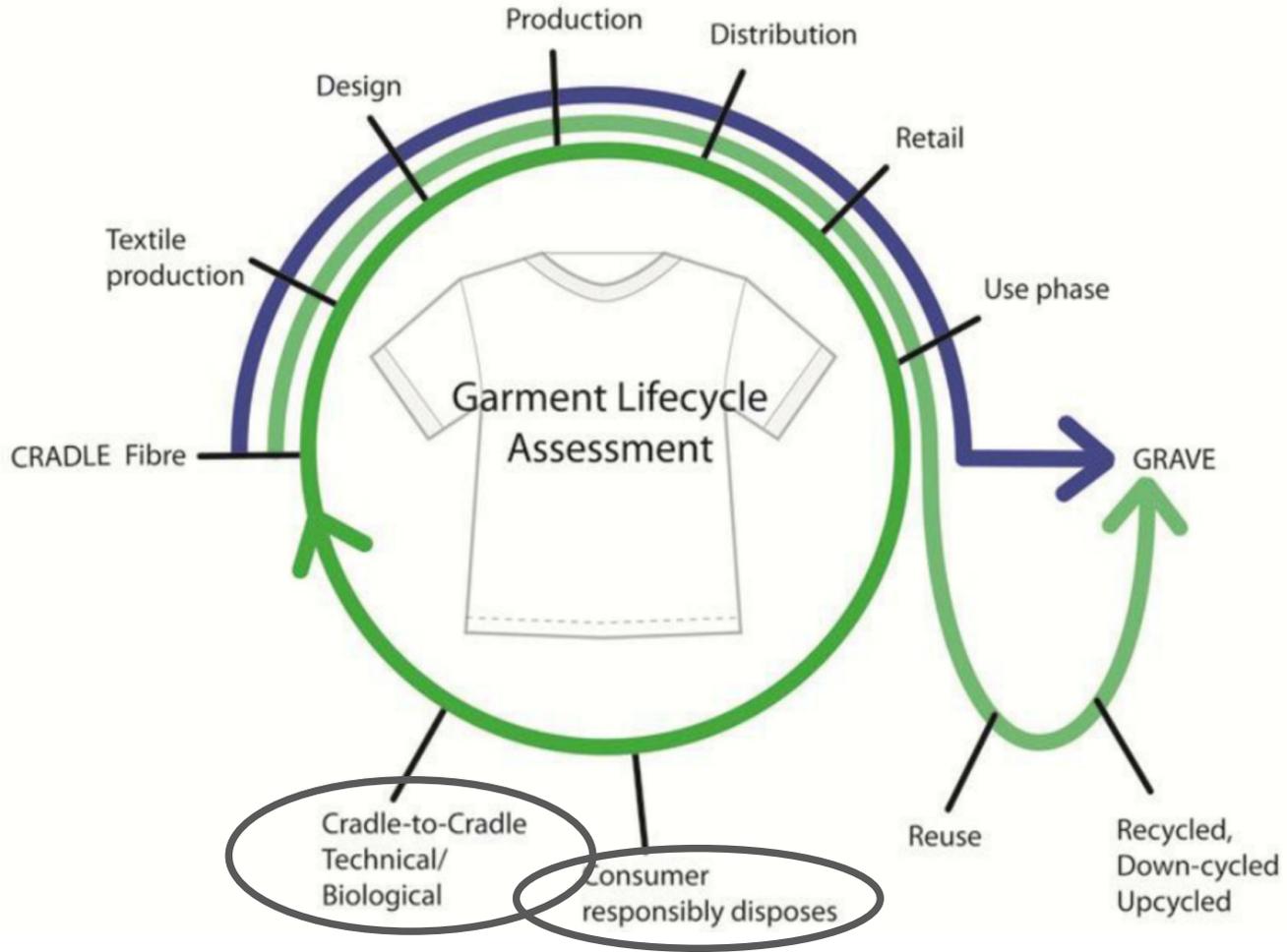
- **Close the material cycle**

Accelerating the commercialization of fiber-to-fiber recycling – find Locations

## | 5 Stages of Life Cycle Assessment (LCA)

The Impact of a garment from raw material to end-of-life.

LCA Stage	Impact Areas
<b>Raw Material Extraction</b>	Water use, soil degradation, CO2 emissions, chemical pesticides (e.g., cotton farming)
<b>Production &amp; Manufacturing</b>	Energy consumption, toxic dyes, textile waste, carbon emissions
<b>Distribution &amp; Transport</b>	Shipping emissions, packaging waste
<b>Use &amp; Consumer Phase</b>	Washing, drying, microplastic pollution
<b>End-of-Life</b>	Landfill waste, biodegradability, recycling potential



## | Case Studies

- Patagonia (take back & Repair system)
- Eileen Fisher (Fibre 2 Fibre, Take back & Special Collections)
- Stella McCartney (leather alternatives VEGEA)



## Case Studies

- Stella McCartney (leather alternatives)
- Zero Waste Daniel
- The Fabricant (Virtual Clothing)



## | Case Studies

- MUD Jeans (fibre 2 fibre, lease or buy)
- Repanui (recycle, send back)



## Discussion: The future of fashion

- What Does a Truly Sustainable Fashion Industry Look Like?
- How can designers help shape a future where fashion doesn't cause harm?
- Can circular fashion ever become mainstream?
- What responsibility do big brands have vs. small designers?
- What political and economic changes would be necessary?
- Where do you see the pros and cons of circular products?  
What could be challenging?



# Circular Design – Development of a circular product concept



- design approach
- used, reused, repaired and recycled sustainably throughout their life cycle
- maximize resource & minimize waste
- products as not just as consumer goods, but as valuable raw materials for future products

## | 6 Circular Economy Principles

- **Design for Longevity** - Extend product lifespan through durability, repairability, and timeless design
- **Design for Reuse & Repair** - Make products easy to repair, upgrade, and reuse
- **Design for Disassembly** - Use modular components and materials that can be easily separated and recycled
- **Use Regenerative Materials** - Use renewable, biodegradable, or recycled materials
- **Create Closed-Loop Systems** - Collect, remanufacture, and recycle materials within the same system
- **Product as a Service (PaaS)** - Shift from ownership to access, rental, or leasing models

## 6 Circular Economy Principles

Circular Principle	How 3D Printing Supports It
<b>Design for Longevity</b>	Durable, custom-fit designs
<b>Design for Reuse &amp; Repair</b>	Print replacement parts & components
<b>Design for Disassembly</b>	Print replacement parts & components
<b>Use Regenerative Materials</b>	3D print with recycled plastics or biodegradable materials
<b>Create Closed-Loop Systems</b>	Print from recycled plastics
<b>Product as a Service (PaaS)</b>	Print on-demand, reduce overproduction

## 6 Circular Economy Principles

- high-quality materials
- classic and timeless aesthetics
- sturdy construction methods



## Design for Longevity

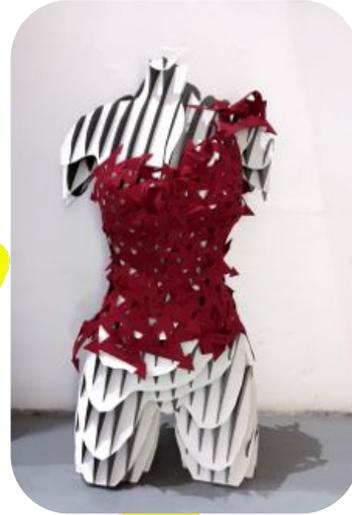


## 6 Circular Economy Principles

- modular components
- repair kits, spare parts, and repair guides
- non-toxic adhesives and removable fasteners

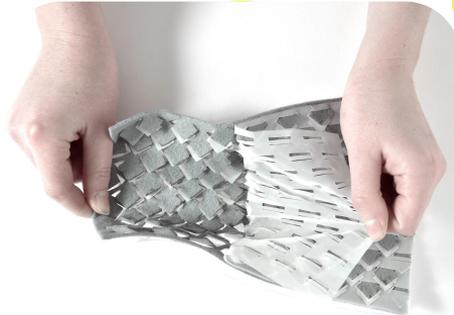


## Design for Reuse & Repair



## 6 Circular Economy Principles

- snap-on or screw-on parts
- easy sorting during recycling



## Design for Disassembly





**Green Product  
Award Nominee 24**  
Fashion Concept



## | 6 Circular Economy Principles

### Use Regenerative Materials

- organic, non-toxic, or compostable materials
- regenerative agriculture or renewable forests
- recycled or upcycled materials



## 6 Circular Economy Principles

- remanufacture them into new ones
- takeback programs
- biodegradable packaging



## Create Closed-Loop Systems

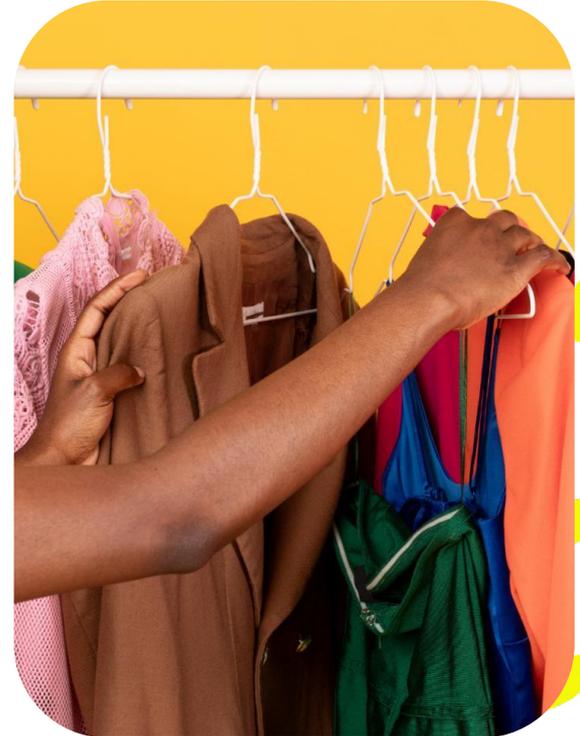


## | 6 Circular Economy Principles

- rental or subscription models
- performance or service
- product return and repair services



## Product as a Service (PaaS)



- 2 People-Group
- How would your ideal circular Fashion brand in Berlin look like?
  - How would you design your products?
  - Where would you source your Materials?
  - Where do your leftovers go?
  - How can your customer bring back Items and/or repair them?
  - What partners would you need?
  - Softwares?

- Everyone explains the other what he/she wants to design (2 - 5 min)
- Then discuss 3 points: (7 min)
  - where to get the material in Berlin (ideally) and what kind?
  - what circular principle could you implement?
  - How does the end of the Life Cycle of this garment look like?

| Thank you!

**Be the change you want to  
see in the world!**