System Design for Sustainability

July-October 2023

Week 2

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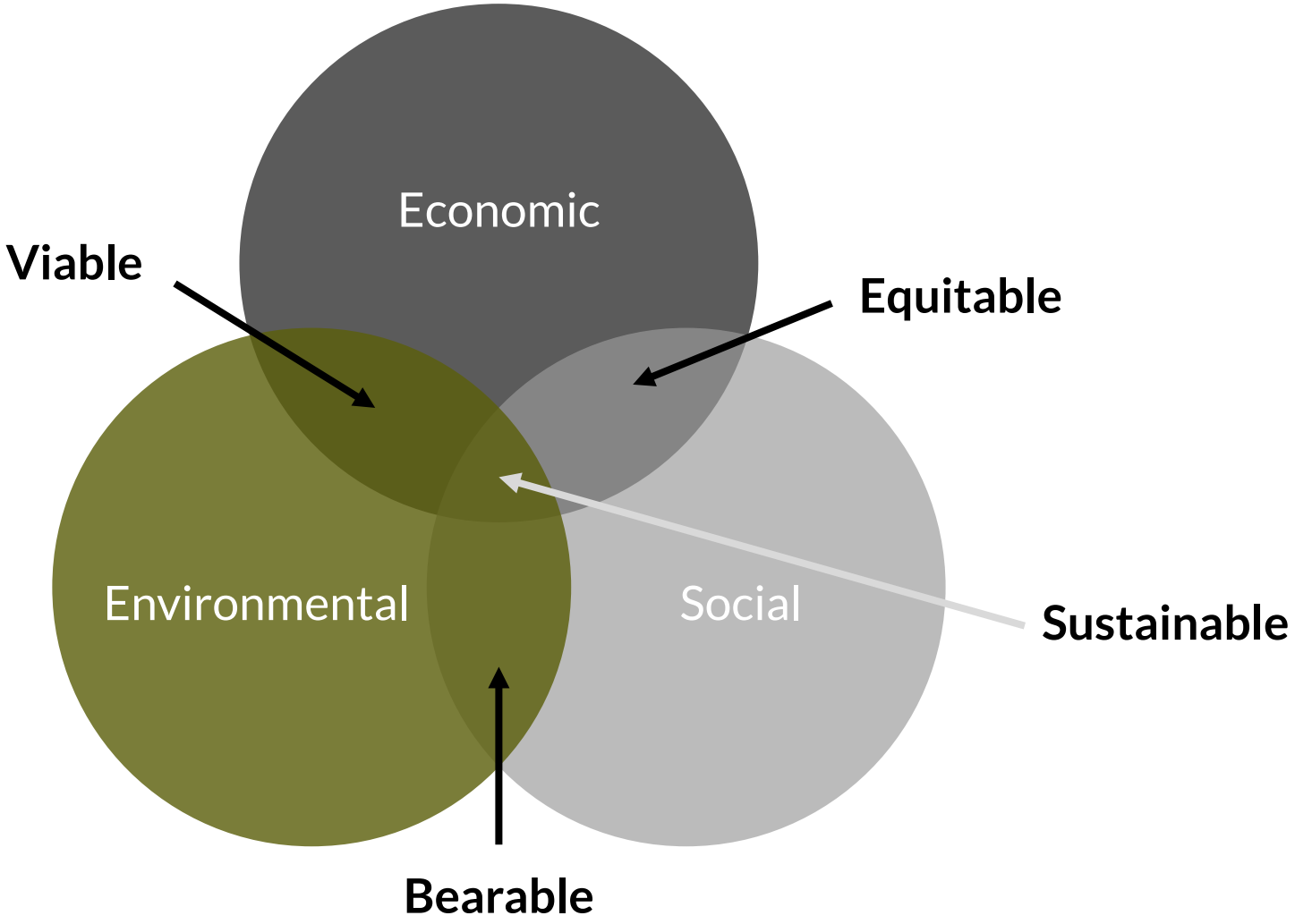
Timeline of D4S, different approaches to D4S.

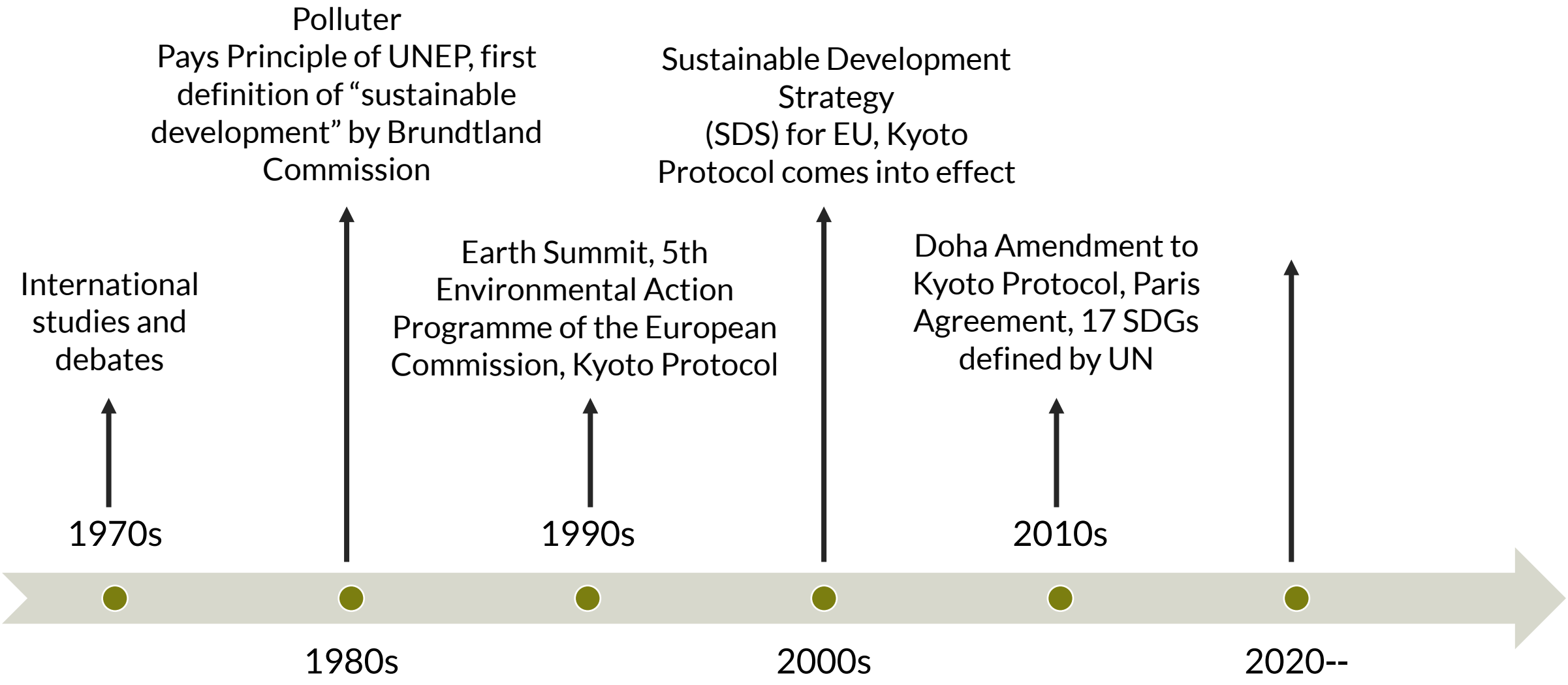
Recap

- What is sustainability
- What are natural resources
- Cradle to Cradle Design
- Systems Thinking

Three Pillars of Sustainability



History of Environmentalism




1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

Transformation of DfS

- Intervention after process-caused damages
- Intervention in processes
- Intervention in products and services
- Intervention in consumption patterns

Green Design

- The shift happened in the late 1980s and 1990s.
- Primary focus on lowering environmental impact by altering **specific** qualities of individual **products.**
- Meant efficiency improvements in product and process engineering.
- Early shifts towards renewable energy, eg, solar street lamps.
- Emphasis on using recyclable materials.

Reduce-Reuse-Recycle was one of the defining mottos of Green Design, echoing through the 90s to the 2000s.

Example: Usage of plastic bottles, cans etc as planters.

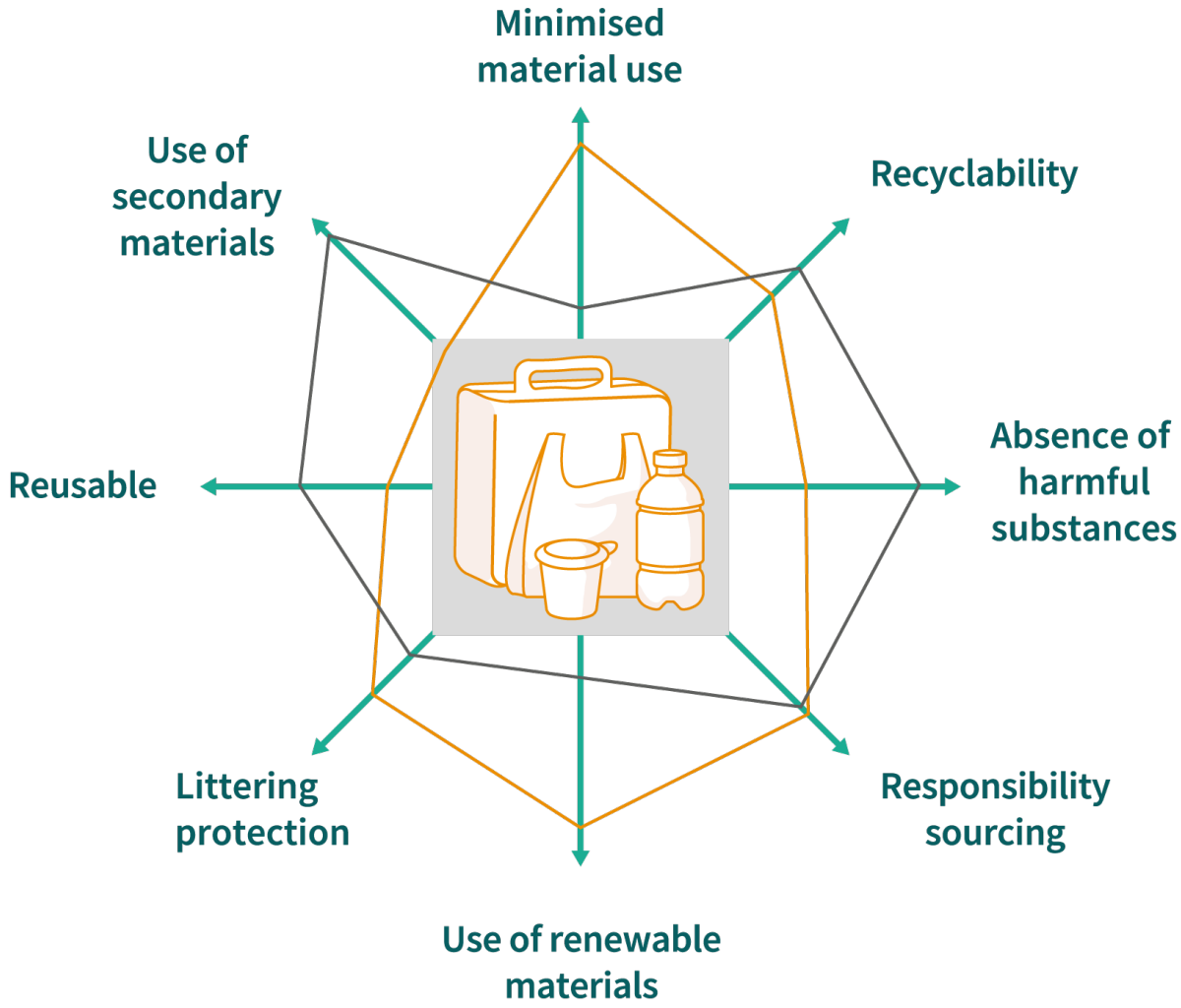
Streetlights with solar panels are an example of redesigning a product to use renewable energy.


Adidas x Parley shoes
made of recycled ocean
plastic

Tetra Pak: Furniture from Repurposed Cartons

Product Eco Design

- Ecodesign puts emphasis on the whole lifecycle of products.
- Started with 2 government-funded projects in EU and Australia in 1989, 1990.
- Identifies the environmental impact through different phases of the product, gives strategic direction to design interventions.
- Is supported by Lifecycle Assessment (LCA) methods.


Minimised material use
Recyclability
Absence of harmful substances
Responsibility sourcing
Use of renewable materials
Littering protection
Reusable
Use of secondary materials

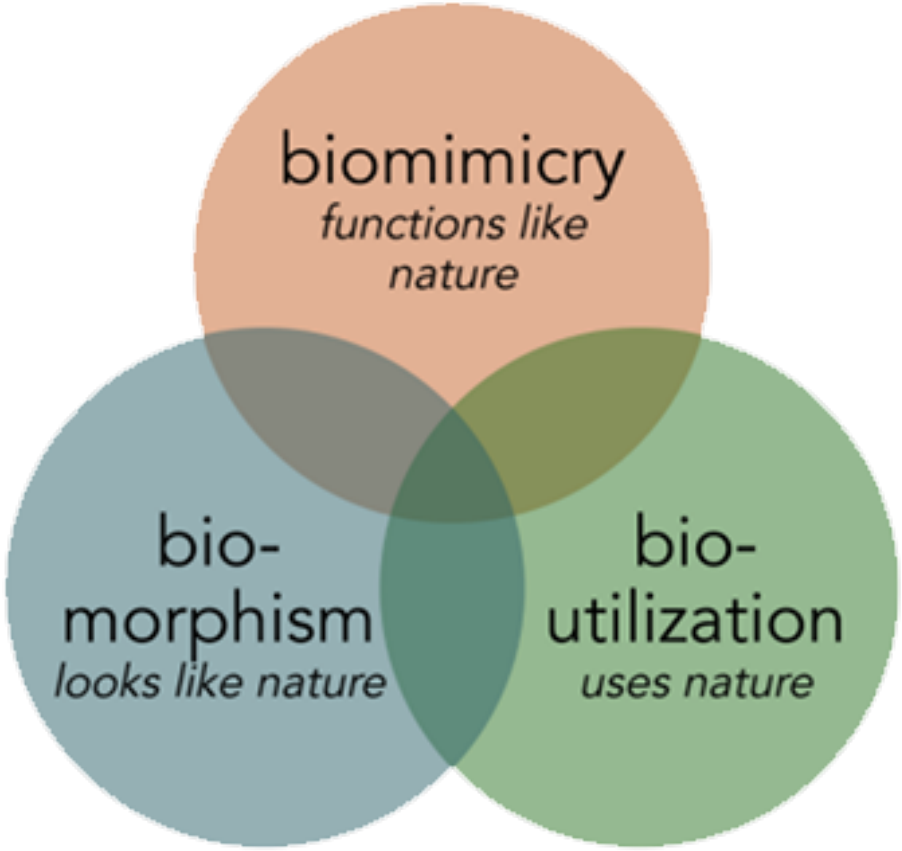
Biomimicry Design

It grows from the understanding that nature's ways are precise and prefect in many ways.

- To achieve optimized design solutions, we need look no further than nature itself.
- To do this, we need 3 essential ingredients:

* Emulate
* Ethos
* (Re)Connect

Biomimetics



Velcro

- George de Mestral was inspired to invent Velcro after noticing how easy it was for burrs to stick to his dog's hair.
- He started the process of mechanization in 1941.
- He filed for a patent in 1951.
- The patent was granted in 1955.
- Used by NASA astronauts in 1960s.
- Used universally now.
- Watch Video >

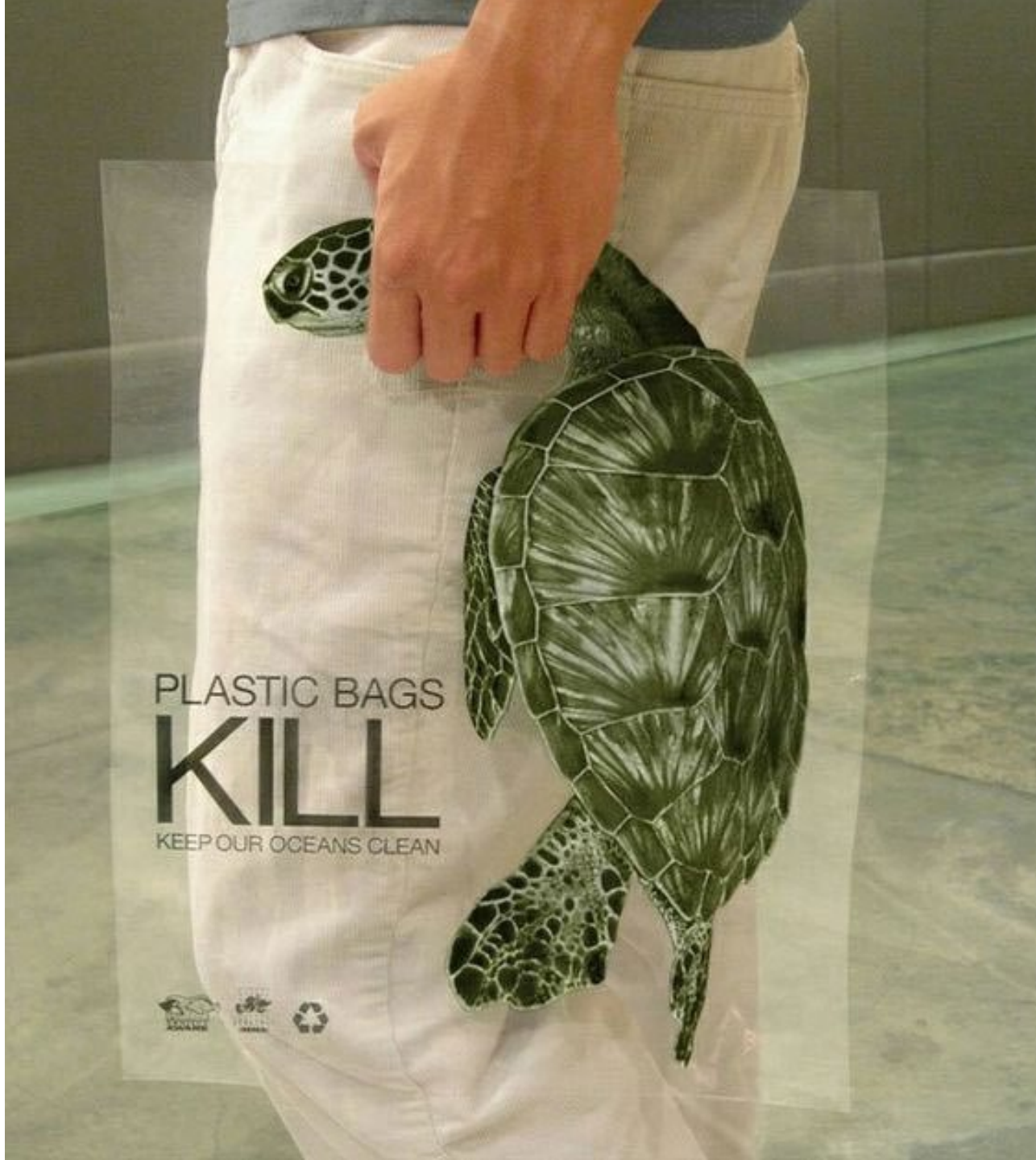
Shinkansen, Japan

Japanese bullet trains traveling at more than 300km/hr created a huge sonic boom every time they emerged from a tunnel. To solve this, they looked at the Kingfisher, which has a long-beaked nose and travels fast between mediums. [Watch video]

Design for Sustainable Behaviour

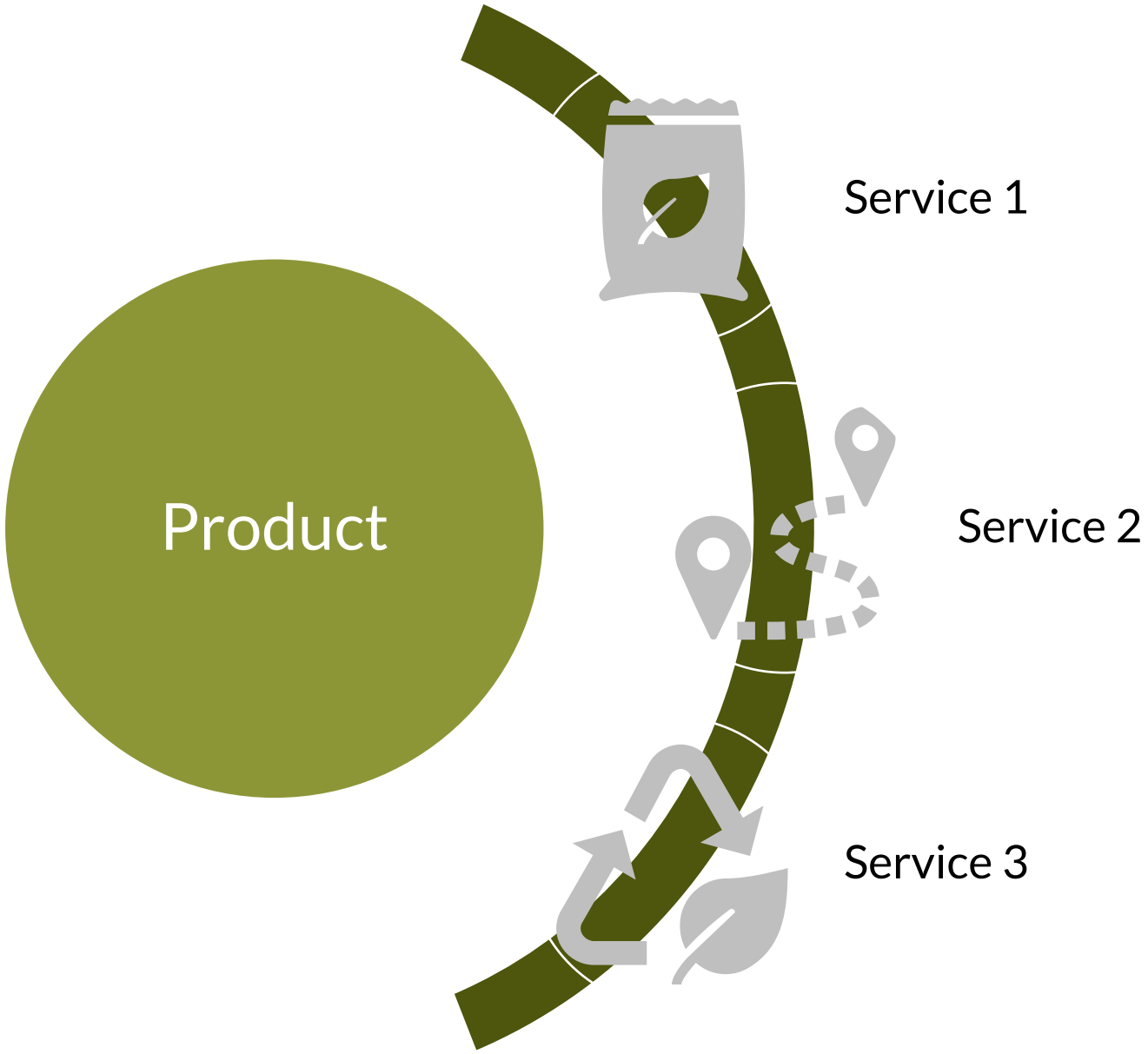
Design of tissue holders in washrooms to reduce the use of paper tissues.

Carry bag design to raise awareness about the menace of plastic bags and its effects on marine life.

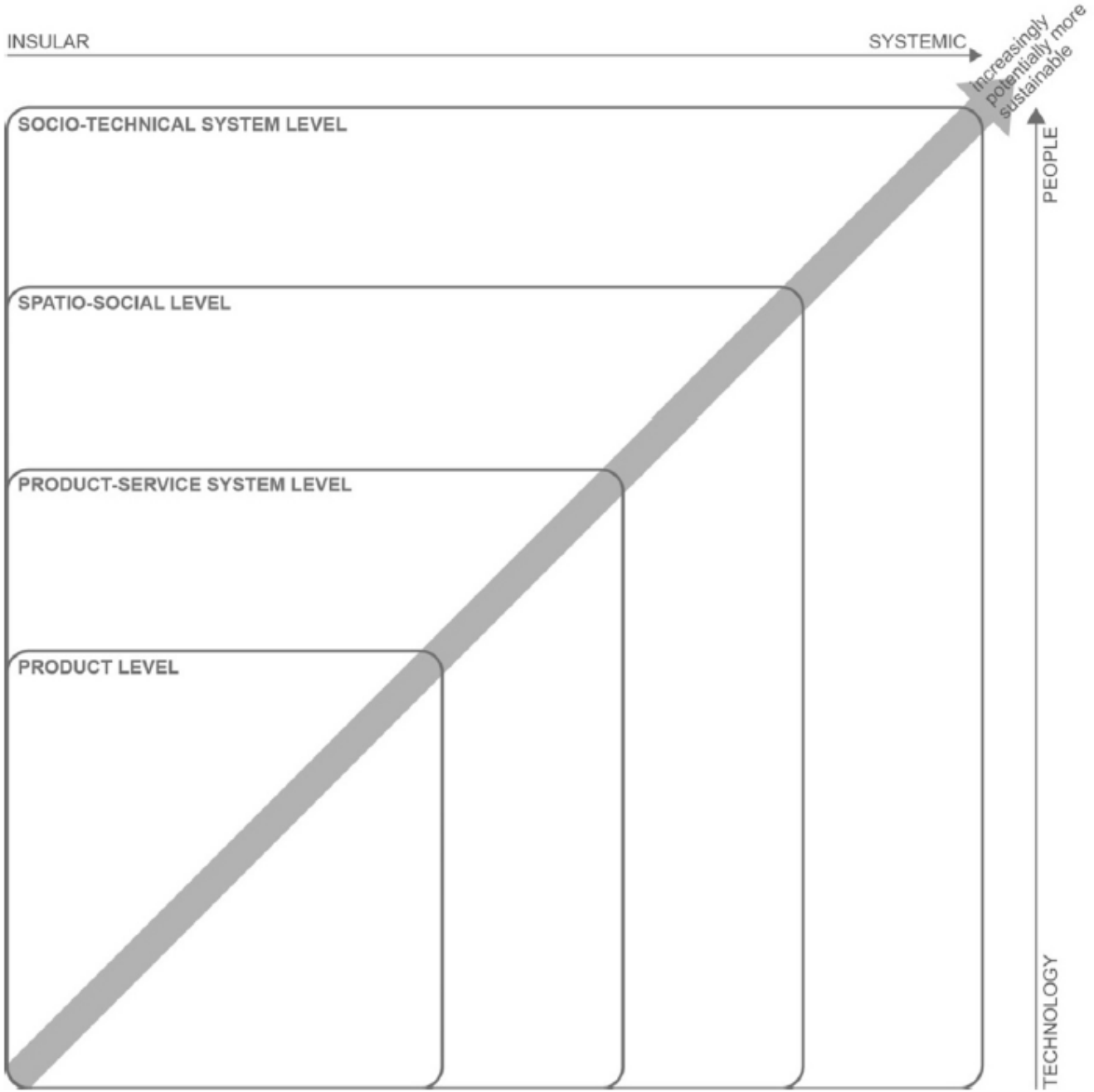


Encouraging people to not litter and dispose of toxic waste appropriately

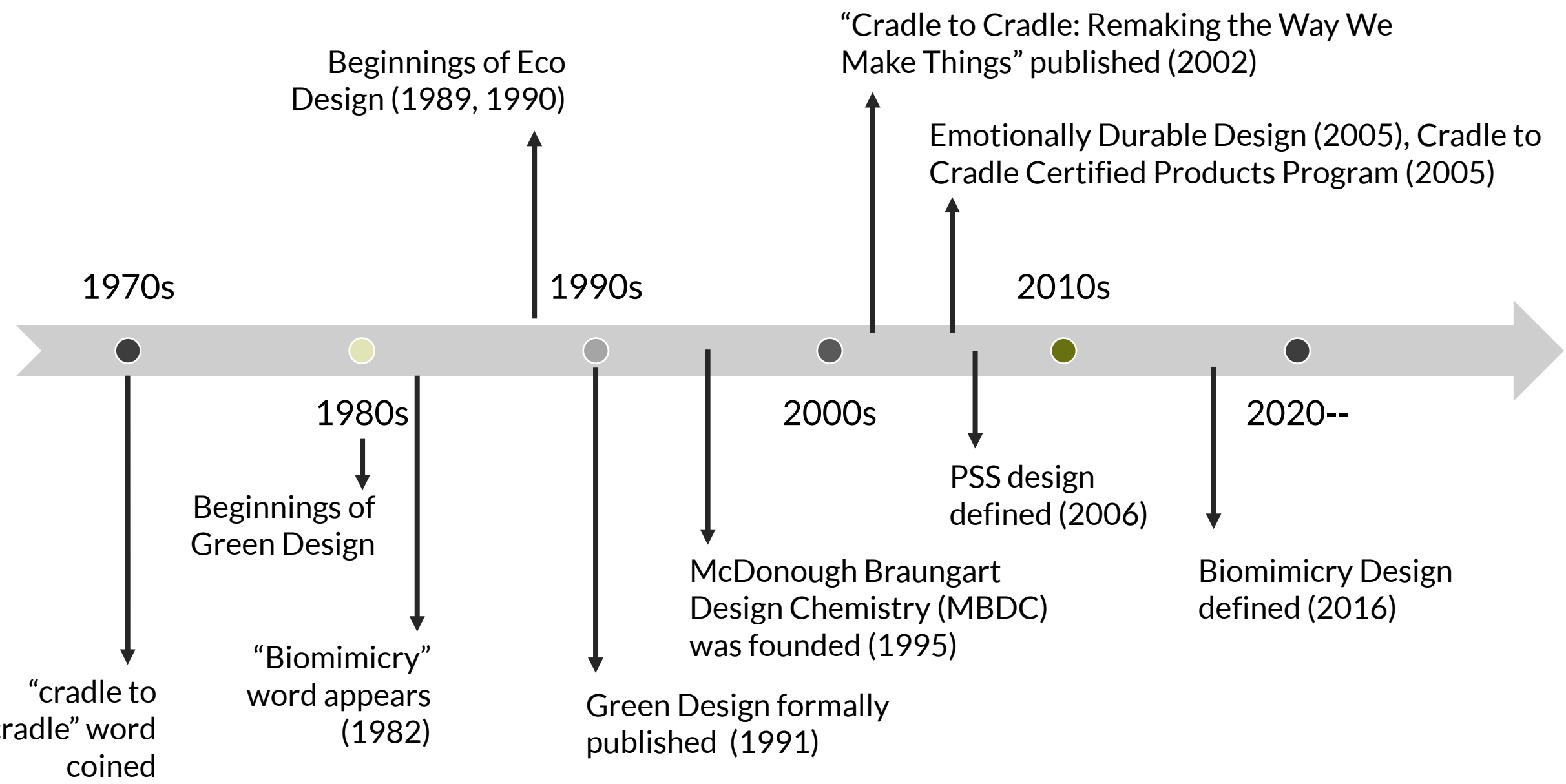
Product-Service System Design

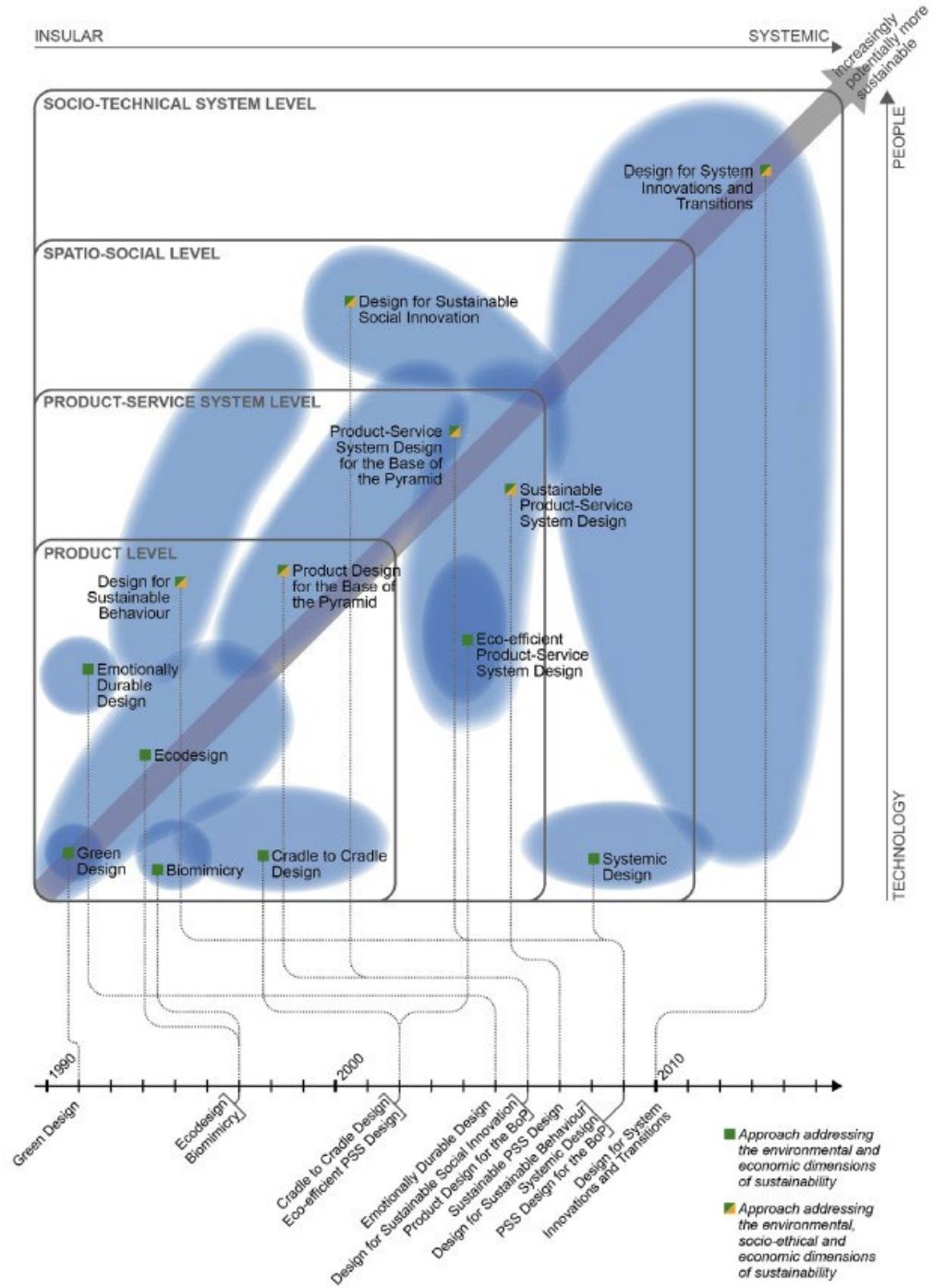

Product
Service 1
Service 2
Service 3

Evolution of Design Approaches



Evolution of Design Approaches




INSULAR
SYSTEMIC
Increasingly potentially more sustainable
PEOPLE
TECHNOLOGY
SOCIO-TECHNICAL SYSTEM LEVEL
Design for System Innovations and Transitions
SPATIO-SOCIAL LEVEL
Design for Sustainable Social Innovation
PRODUCT-SERVICE SYSTEM LEVEL
Product-Service System Design for the Base of the Pyramid
Sustainable Product-Service System Design
PRODUCT LEVEL
Design for Sustainable Behaviour
Product Design for the Base of the Pyramid
Eco-efficient Product-Service System Design
Emotionally Durable Design
Ecodesign
Green Design
Biomimicry
Cradle to Cradle Design
Systemic Design
1990
2000
2010
Green Design
Ecodesign
Biomimicry
Cradle to Cradle Design
Eco-efficient PSS Design
Emotionally Durable Design
Design for Sustainable Social Innovation
Product Design for the BoP
Sustainable PSS Design
Design for Sustainable Behaviour
Systemic Design
PSS Design for the BoP
Design for System Innovations and Transitions
Approach addressing the environmental and economic dimensions of sustainability
Approach addressing the environmental, socio-ethical and economic dimensions of sustainability

References

- Adidas x Parley
- The world is poorly designed. But copying nature helps.