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# Design Approaches to Sustainable Consumption

**Session 1 (Tuesday 9.1. 13:15–17:00):  
Introduction to the course and to Design for Sustainability**

*Tatu Marttila, Department of Design, Aalto University*

*Tuesday 9.1.2024*

# Agenda today

## **13:15–14:00 Course introduction**

- *Short round of introductions*
- *Course practicalities*
- *Sessions and schedule*

## **14:00–15:20 Introduction to Design for Sustainability (lecture part)**

- *Sustainability and its different emphases and discourses*
- *Design as a process and practice and how it connects to sustainability*

## **15:30–16:40 Activity in groups (based on session readings)**

- *Present results of group discussions in class at 16:00*

## **16:40–17:00 Project work preparations and the next session**

- *Preparing for project work theme selection for week 2*

# Teacher introduction:



## Tatu Marttila

- Senior lecturer on Design for Sustainability
- Aalto University School of Arts, Design and Architecture, Department of Design
- Alumni of UIAH (Aalto predecessor), M.A. in industrial design in 2007
- Doctoral studies 2010–2018
- Post-doctoral research 2018–2023
- [https://people.aalto.fi/index.html#tatu\\_marttila](https://people.aalto.fi/index.html#tatu_marttila)
- [tatu.marttila@aalto.fi](mailto:tatu.marttila@aalto.fi)

*My research interests...*



My general area of interest has been in **strategic codesign for sustainability transitions**:  
*How design can be of help in transforming our socio-technical systems to achieve sustainability.*



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# Round of introductions

- *Your name & educational, geographic background*
- *Specific sustainability interests?*

# Course introduction



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# Course introduction

**Design Approaches to Sustainable Consumption (DASC)** -course introduces students to the topic areas of design for sustainability and frameworks including product-service-systems, service design and material circulation.

**Intended learning outcomes – after the completion of the course students will:**

- 1) Understand the principles of sustainability in product, service and system design.
- 2) Be able to approach sufficiency and sustainable consumption with design.
- 3) Be able to assess and argue for design solutions for sustainable consumption.

**Teachers:** Tatu Marttila, Mikko Jalas as visiting teacher (@aalto.fi)

**Schedule:** Tuesdays (13:15–17) and Thursdays (9:15–12)

**Teaching period:** III (9.1.–15.2.)

# Course practicalities

**MyCourses acts as the main platform for materials and information:** See section "Materials" for readings and slides, "Assignments" for Learning diary and few other tasks, and "Project work" for teamwork with your case topic

**Main communication channel** "Announcements" in MyCourses and email

**Lectures organized** in F101/Q201/other rooms, see MyCourses for details;  
80% attendance requirement

**Main individual assignment:** Learning diary with weekly reflections

**Project work in groups:** Working in 5-6 student groups on selected sustainability themes, project work begins on week 2

**Project work output:** Presentations, concept poster, project report



# Learning diary

**During the course students write a learning diary**, which is also one main component in grading. The learning diary consists of weekly reflection on readings, lecture contents, and also your case work progress. The outcome is a complete and finalized document with ~10 pages.

**Weekly topics and more detailed instructions** will be listed to MyCourses under "Assignments"

**Will be submitted via MyCourses; Deadline at the end of course (18.2.?)**

# Completing the course and grading

To pass, the students are required to attend the lectures (80%) and perform all the assigned exercises, readings and written tasks given each week.

## Assessment methods and criteria:

- Individual writing task: Learning diary = 30%
- Active presence at the course (also discussion) = 20%
- Project work, inc. presentations & final report = 40%
- Peer-evaluation of group work performance = 10%

# Project work

**Besides lectures, the course includes a project work assignment in which the students work in 5-6 person groups.**

Groups work independently and produce speculative design concept ideas that are communicated in presentations (idea + final presentation) and a more detailed project report.

## **Presentation days:**

- Idea presentations on 25.1. (10 minute presentations)
- Final presentations on 13.2. (<15 minute presentations)

**Groups are formed for week 2 based on your preference of theme/topic, voting after Thursday session!**

# Course and case work schedule

Working days	Tuesdays (13:15–17:00)	Thursdays (9:15–12:00)
Week 1 (9.1 & 11.1.)	Introduction to course; DfS introduction (F101)	Designing for sufficiency (visitor: Mikko Jalas) (Q201)
Week 2 (16.1. & 18.1.)	<b>Project work: Kick-off</b> (Q201)	Sustainable PSS design & systems design (Q201)
Week 3 (23.1. & 25.1.)	Socio-technical experimentation & social innovation (F101)	<b>Presenting case work ideas</b> (F101)
Week 4 (30.1. & 1.2.)	Design for sustainability transitions (Q201)	Communicating sustainability (Q201)
Week 5 (6.2. & 8.2.)	Promoting and scaling-up sustainability (location TBA)	<b>Project work tutoring &amp; finalisation</b> (Q101)
Week 6 (13.2. & 15.2.)	<b>Project work: Final presentations</b> (F101)	Feedback session (Q101)



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**Questions? Comments?**

# Introduction to Design for Sustainability



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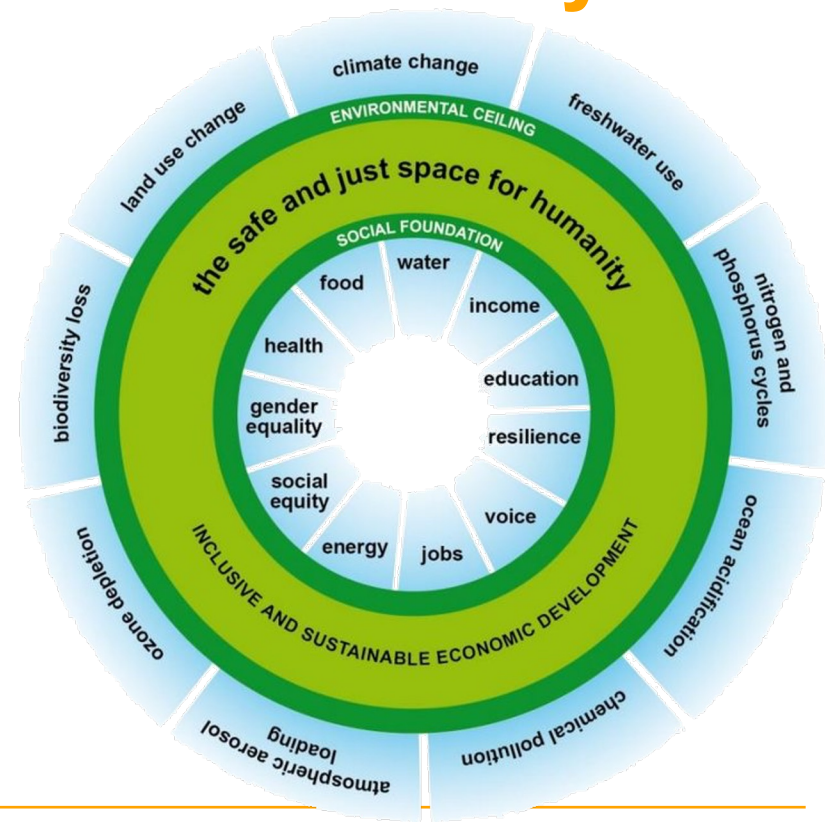
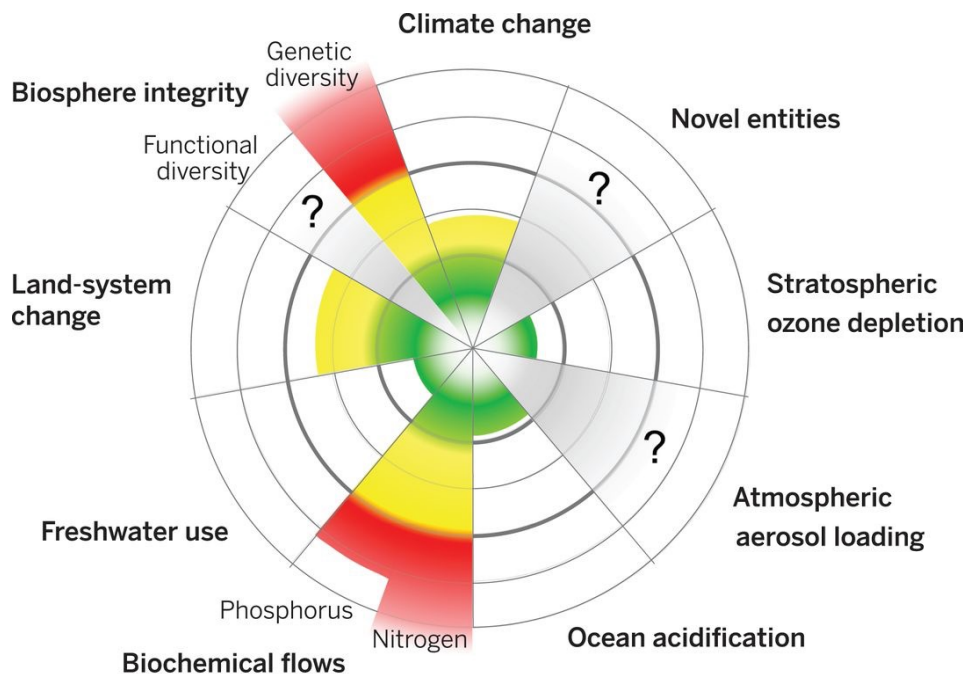


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# Sustainability

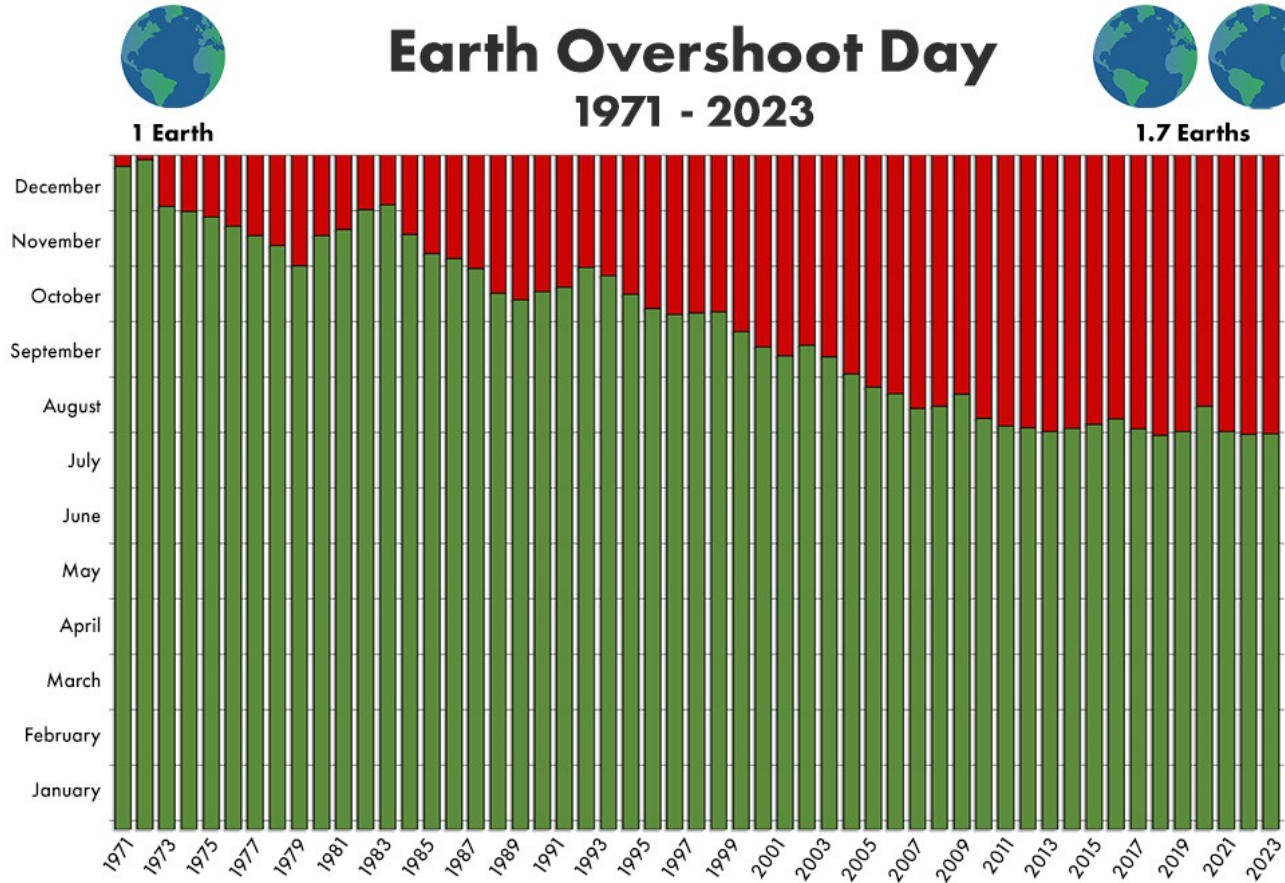
*...in our contemporary world*

# Context of action – the planetary boundaries and social foundations for sustainability





# Resource use in 1971 vs. 2012:



## 'Peak everything' at hand?

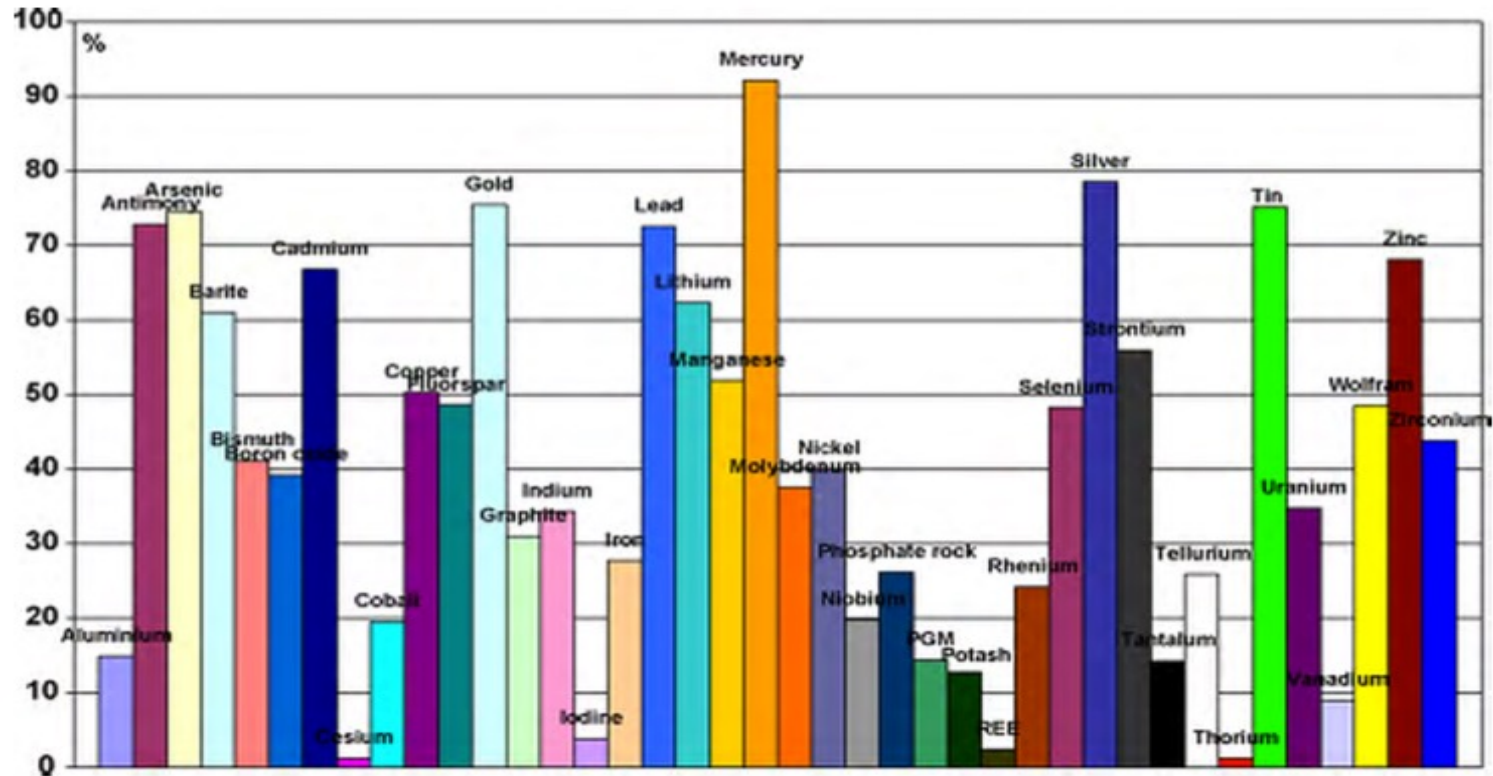
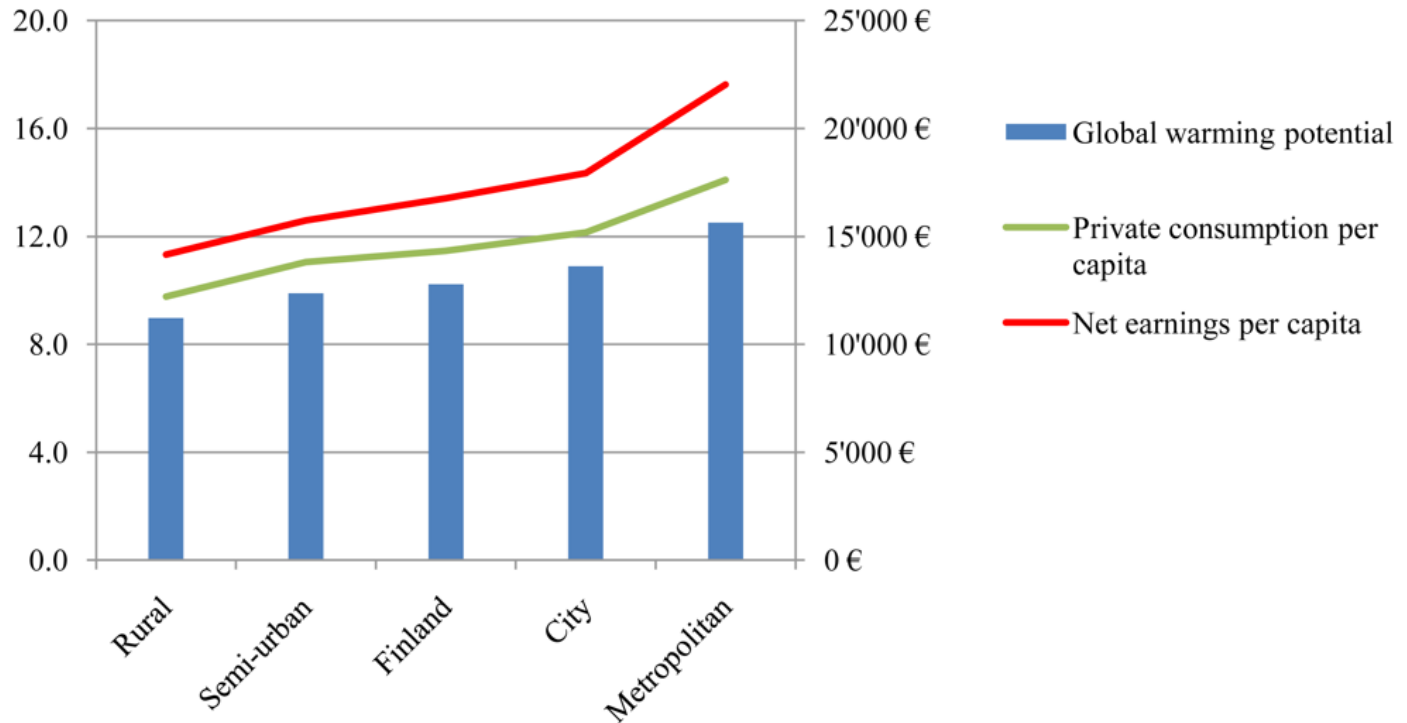


Fig. 3. Depletion degree in % of the main non-fuel mineral commodity reserves.

## Wealth = More greenhouse gas (GHG) emissions?



A Carbon Consumption Comparison of Rural and Urban Lifestyles  
Jukka Heinonen and Seppo Junnila (2011)

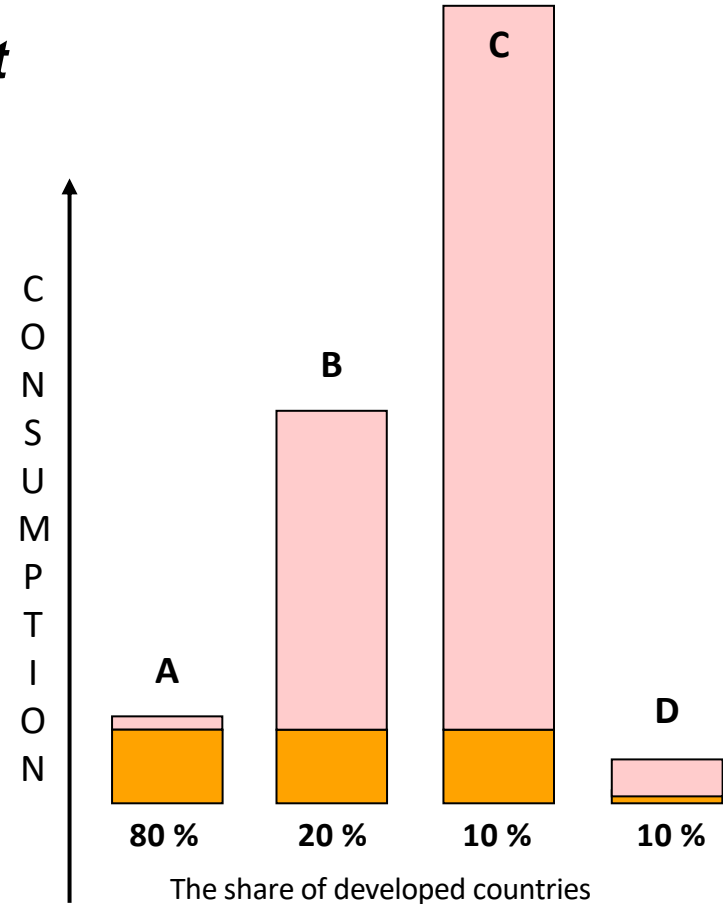
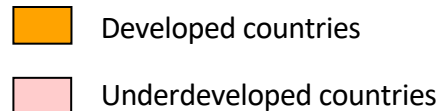
# Increasing (eco-)efficiency to meet consumption?

**A** = current level of consumption

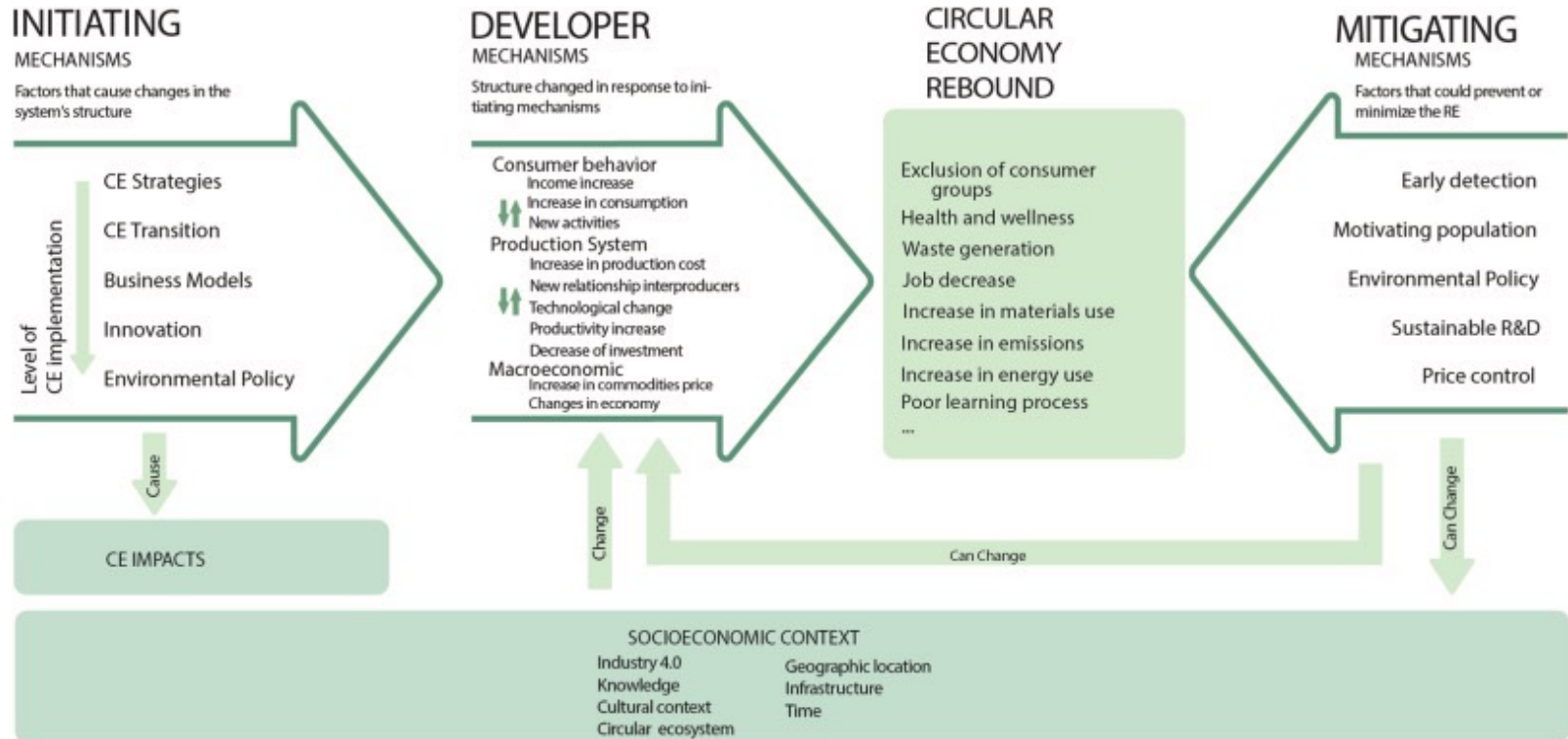
**B** = raising undeveloped countries to the level of developed countries -> 4 x present

**C** = in addition to B population will grow to 10 billion -> 8 x present

**D** = sustainable consumption ~half of the present -> consumption in developed countries must be cut into 1/10 (**factor 10**), if targeting to globally equal setting



# Rebounds from eco-efficiency to increased consumption?



# un THE HAPPY PLANET INDEX 2.0

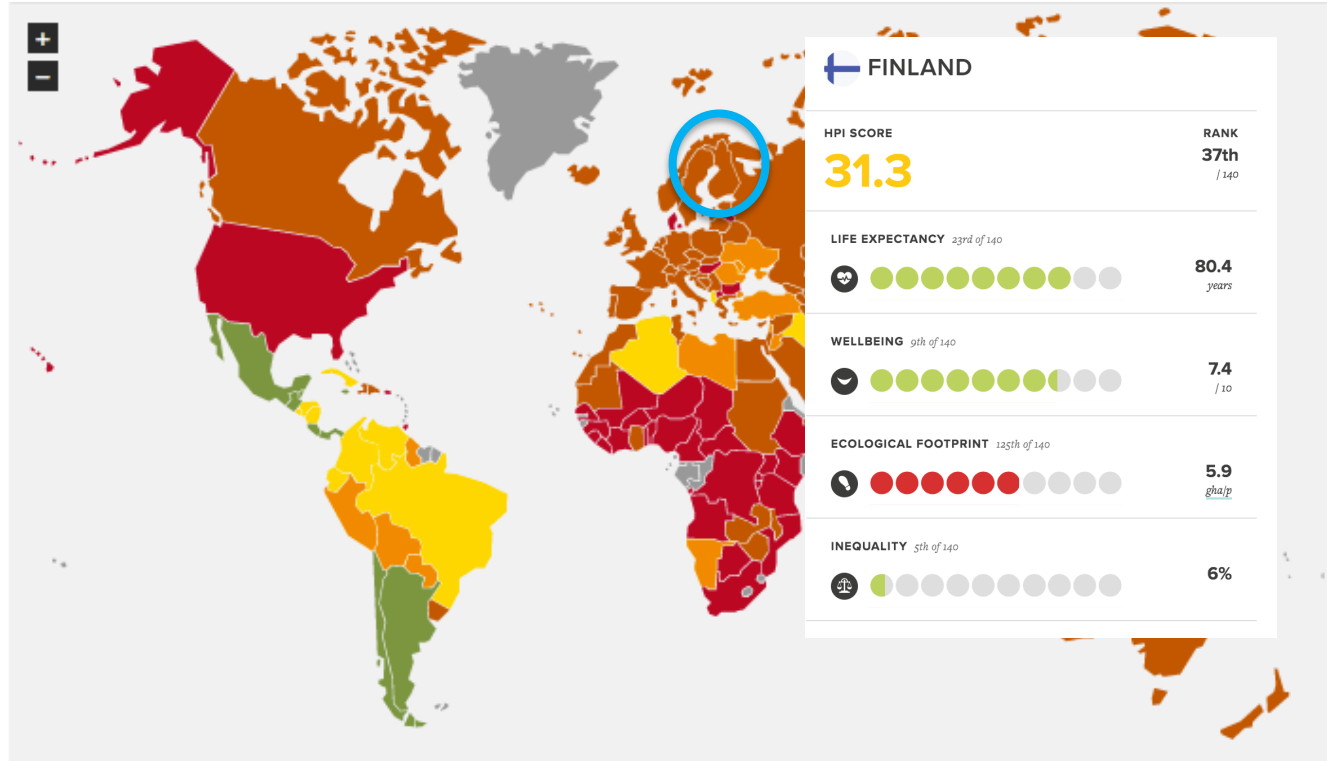
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GO

- GLOBAL HPI >
- LIFE EXPECTANCY >
- LIFE SATISFACTION >
- ECOLOGICAL FOOTPRINT >
- HPI DATA OVER TIME >
- EUROPEAN HPI >



Source: <http://www.happyplanetindex.org/> (picture from before 2019 until which the site was hosted by NEF...)



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# Sustainable development (SD)

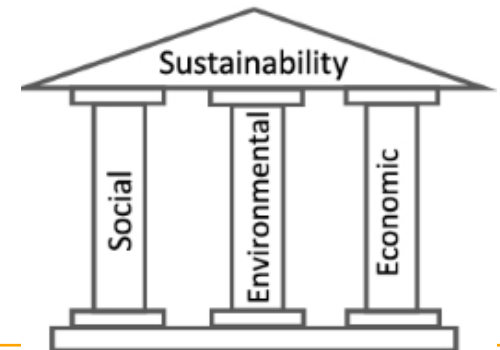
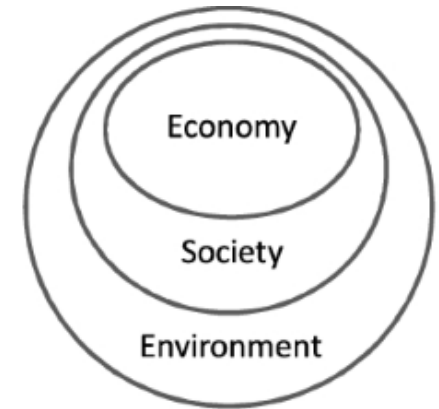
*...its historic origins and its different emphases and discourses*

# Sustainability and sustainable development

**Origins of the concept in United Nations 1972 conference on the Human Environment and the work that followed.**

The concept was popularized since 1987 *Our Common Future* (aka Brundtland Report), and the 1992 UN *Conference on Environment and Development* (UNCED), also known as the Earth Summit.

Brundtland Report defines sustainable development as “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*”



8.1.2024  
24



# Sustainable Development Goals



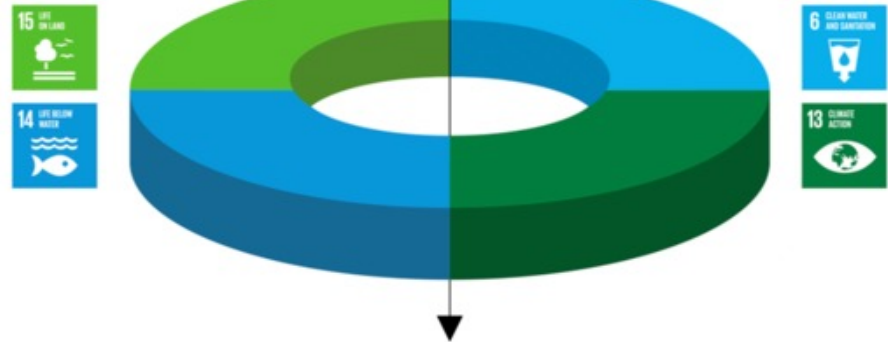
## ECONOMY



## SOCIETY



## BIOSPHERE

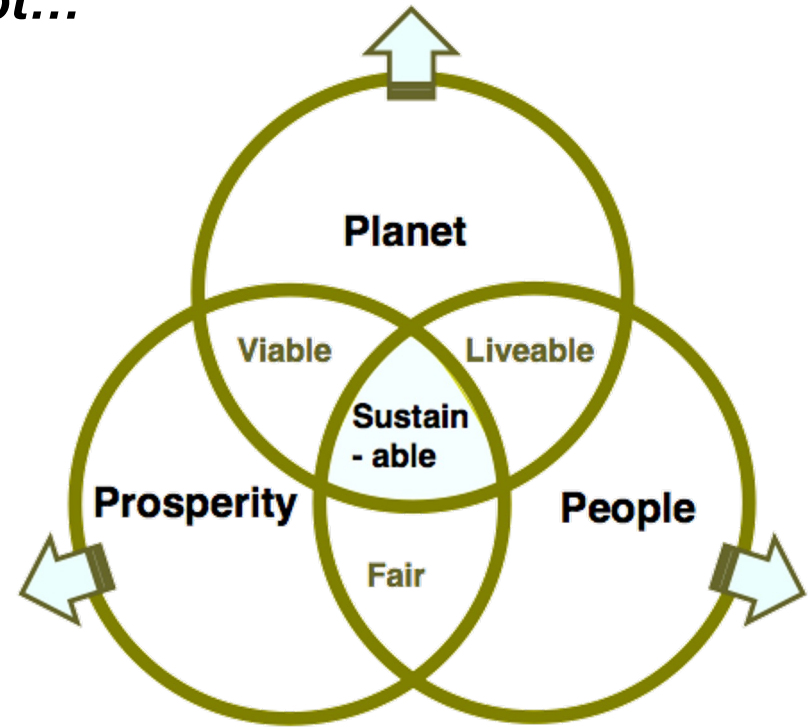


The SDG 'wedding cake'. Source: Stockholm Resilience Institute.

# ***Sustainability as a contested concept...***

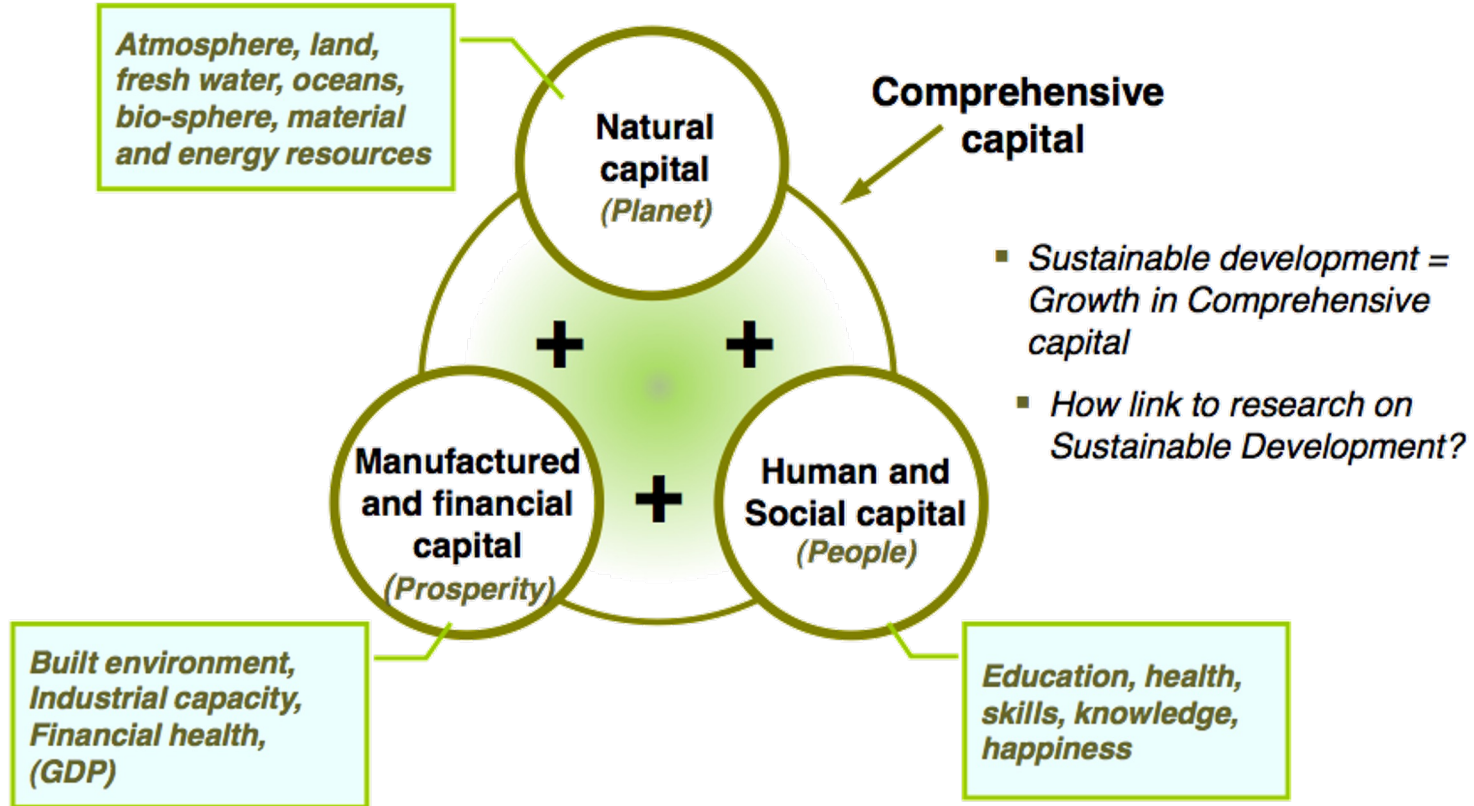
## **Triple bottom line (TBL) focus:**

- Financial bottom line
  - Social / ethical performance
  - Environmental performance
- (Elkington, 1994)
- **Decouple the circles – unpack their meaning... Is there any trade-offs?**
  - **“Sustainability” vs. “Sustainable development” – is it the same thing?**
  - **Who is defining challenges and solutions?**

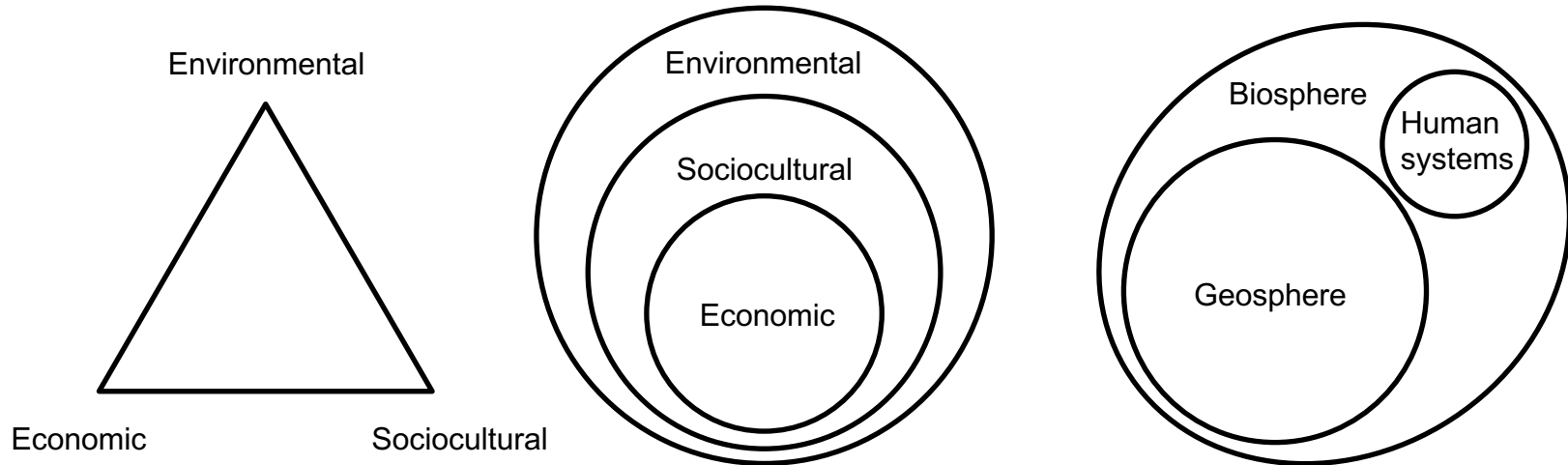


Source: Ashby et al. (2013) Materials & SD

# ***Sustainability developing 'comprehensive capital':***



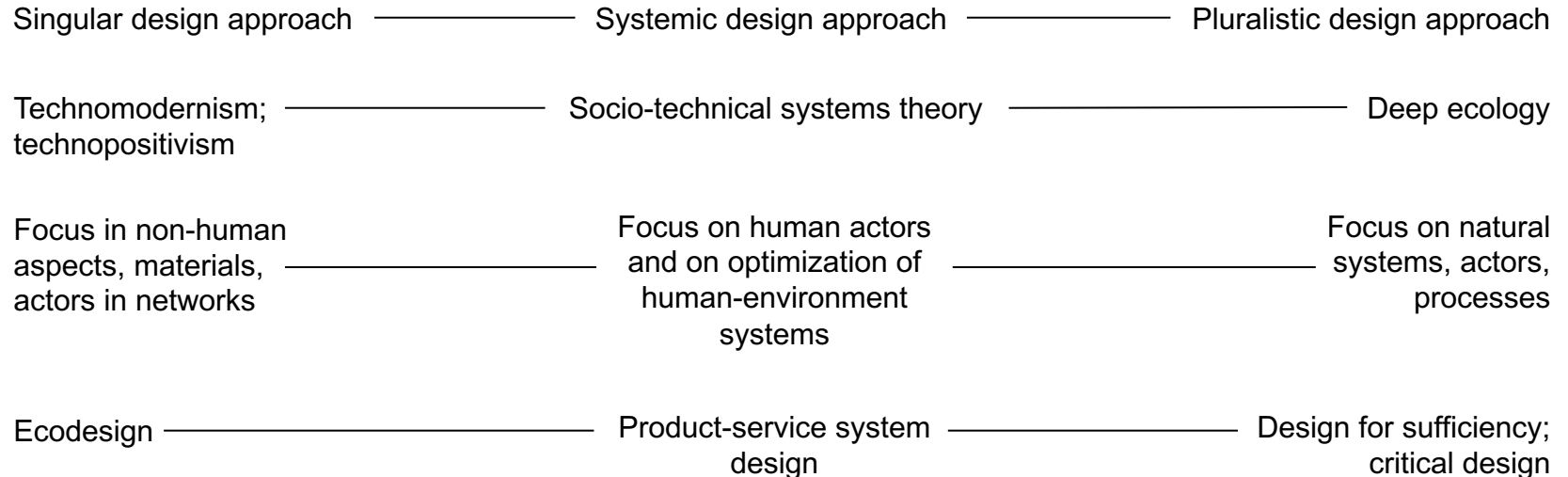
# Different models to present sustainability



***Different systemic approaches to sustainability issues: Triple-bottom line perspective (Elkington, 1994), nested model (IUCN), and a model that is not anthropocentric.***

# Different discourses of sustainability

***Some elements of discourse, and emphases in focus and practice in DfS action today:***





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# Assessing sustainability

- *Golden standards for sustainability impact assessment*

# Sustainability impact assessment

To be able to compare products and materials and make design choices, there is a need for **comparable data to support impact assessment**.

- Carbon footprint as a general way of assessing environmental impacts; However, the assessments are depending on used values and assessment boundaries, and is limited to some general environmental metrics
- Also several indicators for social well-being are available (e.g. Human Development Index)
- Granta EduPack database (on Aalto computers) package provides a computer-based resource that can be used to help to gather information on materials (and also nations), support material selection, or to perform eco audits.
- A separate course on eco-auditing on Thursdays (3 sessions)

## ***Key elements in sustainability assessments:***

### **Materials (of a product):**

- Mass, density, price; recycled, recyclable?
- Critical materials? (rare, no substitutes, supply chain risks, geopolitics)

### **Energy / carbon footprint:**

- How much energy is needed?
- When and where is it needed?

### **Environment:**

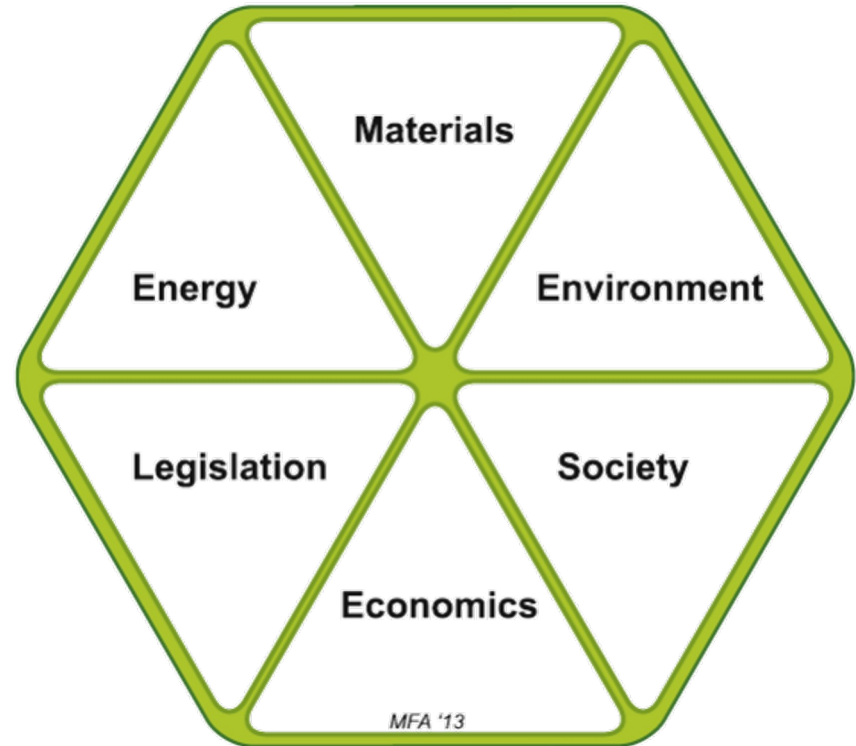
- Ecological footprint/handprint
- Toxicity/accumulation

### **Legislation:**

- Policies & legislative frameworks
- Guidance & Costs

### **Society and Economics:**

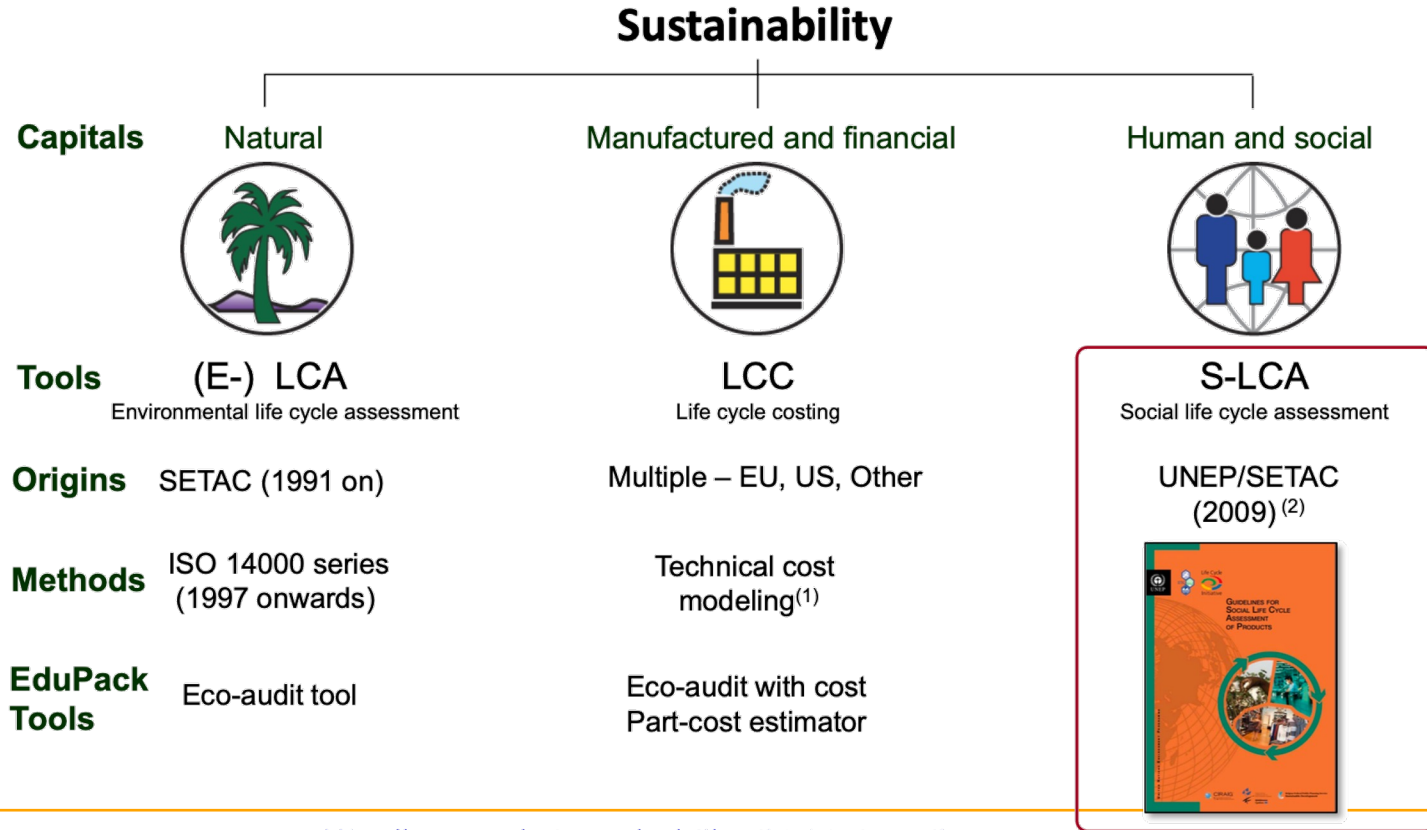
- Fairness and quality of life, good jobs
- Risk, investments, competitive advantage



Source: Ashby, M. (2013) Materials and the Environment: Eco-Informed Material Choice



# The 'golden standards' for sustainability impact assessments:





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# Design (for Sustainability?)

- *Design as a process and a practice, and for sustainability*

# Design for Sustainability – starting points

**Initial notions very early on** (19th century), popularized first by Buckminster Fuller (concept of 'Spaceship Earth'), later for example by Victor Papanek and his book *Design for the Real World*

Discussions have continued first in promoting **ecodesign** in the 1990's and then increasingly with **system focus in design** (PSS design). Lately **Circular Economy** (CE) has been increasingly in focus.

**UN development on sustainable development since 1987**, and several strategies and frameworks by different organizations, including OECD and the EU; Also visible in Sustainable Development Goals (SDG)

Current discourse is also connecting increasingly with technical and social innovation, open design, discussions on the role of 'Global North' and developing contexts, etc.

# The traditional role of design and planning: 'Locking-in' the environmental impacts

The environmental (and social) performance is largely established early in the product development cycle, when critical decisions are made on key product attributes

- Design for the whole life-cycle!
- From product redesign to system innovation...
- From designing products to designing sufficiency...?

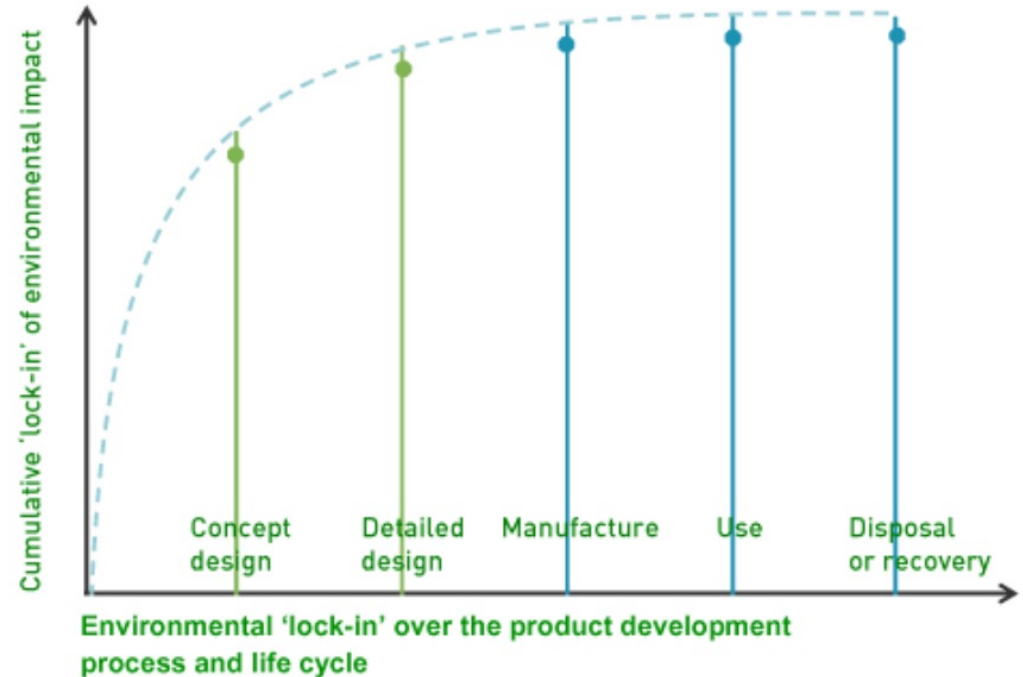
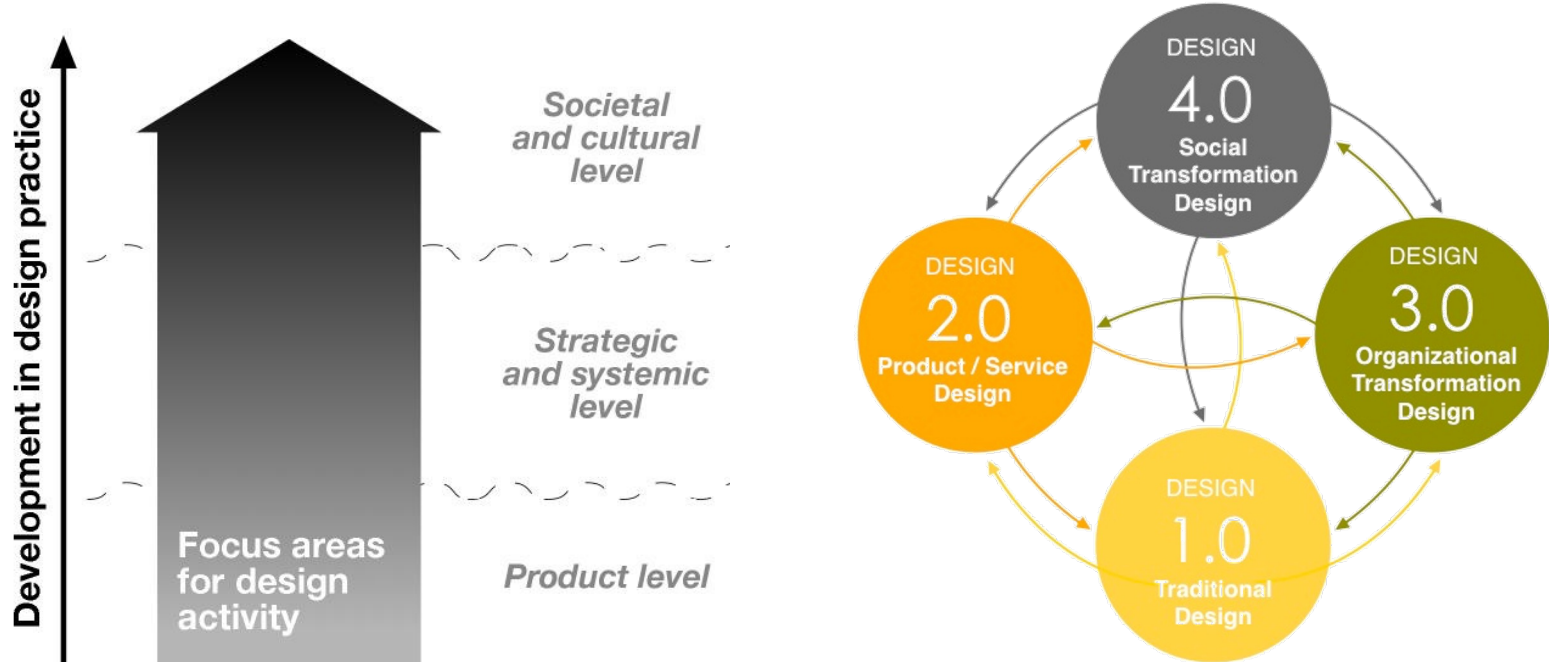


Figure 3 - Early design stages define key attributes that ultimately determine the environmental performance of a product throughout its life cycle. Adapted from "Design + Environment – a Global Guide to Designing Greener Goods", Lewis, H., Gertsakis, J., Grant, T., Morelli, N. & Sweatman, A., New York: Greenleaf Publishing 2001.

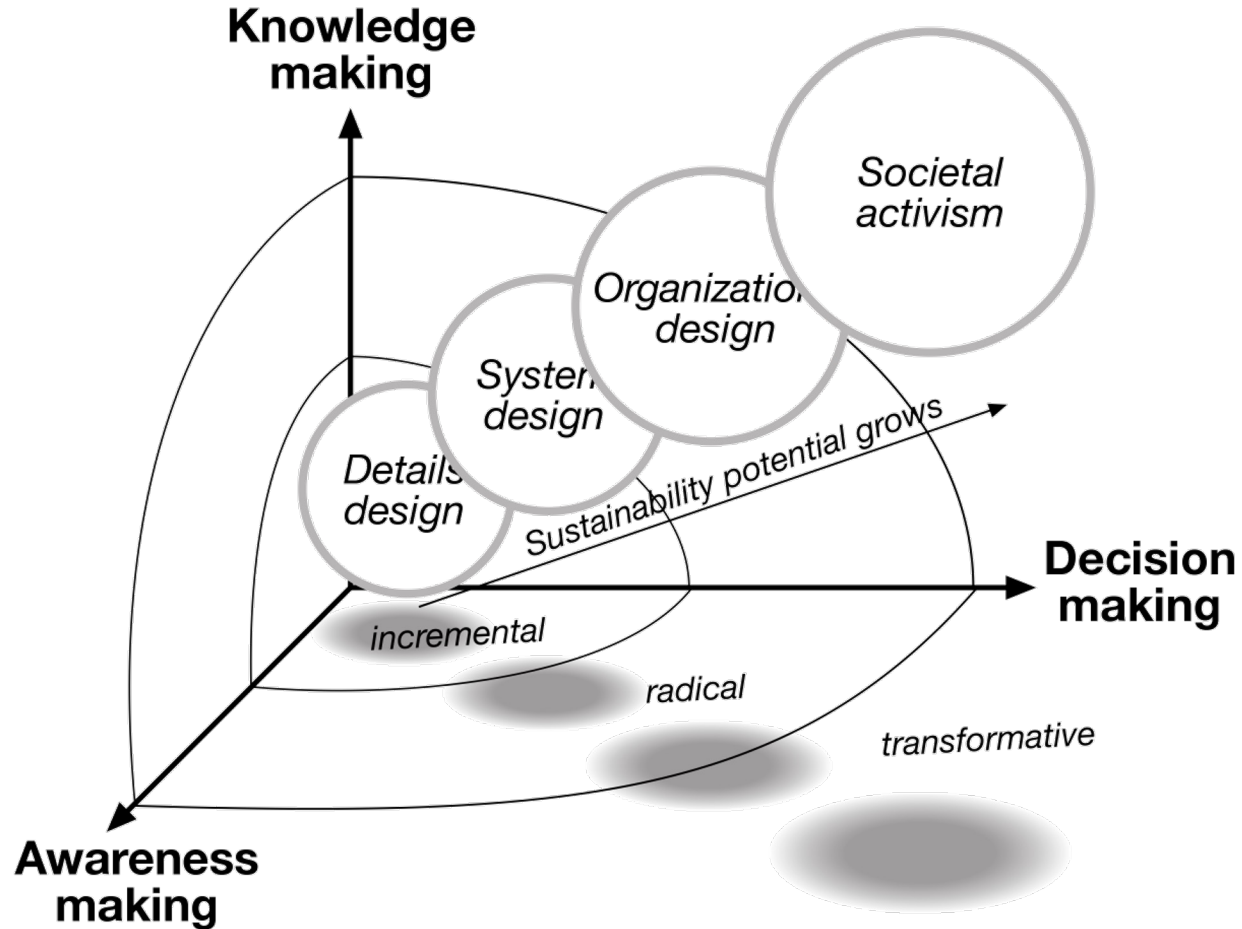
# Contemporary design action: Extending focus from products to transitions



Source: Author

Source: Aminoff, et al. 2011;  
GK VanPatter and Elizabeth Pastor, 2005

# ***Expanding design action for transformative innovation:***



# Summary: Strategies for DfS action

**Reading for the session concludes** (Ceschin & Gaziulusoy, 2020):

Design can (...) act as a catalyst to trigger and support innovation, and can help to shape the world at different levels: from materials to products, product–service systems, social organisations and socio-technical systems.

- There exists a multitude of DfS strategies, orientations, & methods; the right approach is a question of context, framing, aim and focus, and so on...

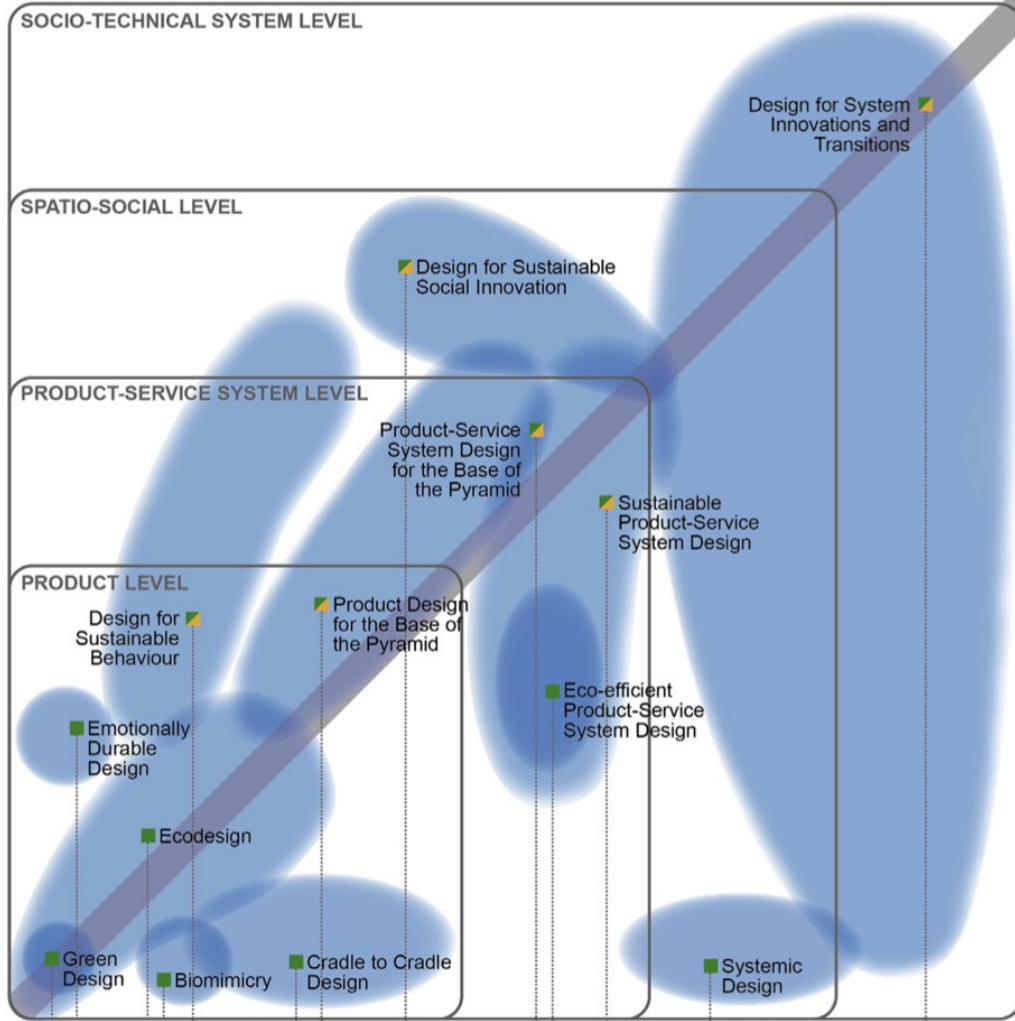
***Design for Sustainability* by Ceschin & Gaziulusoy (2020) lists following approaches:**

- Green design & product ecodesign
- Emotionally durable design
- Design for sustainable behaviour
- Cradle-to-cradle design
- Biomimicry design
- Product-service system design for sustainability
- Design for the base of the pyramid
- Design for social innovation
- Systemic design

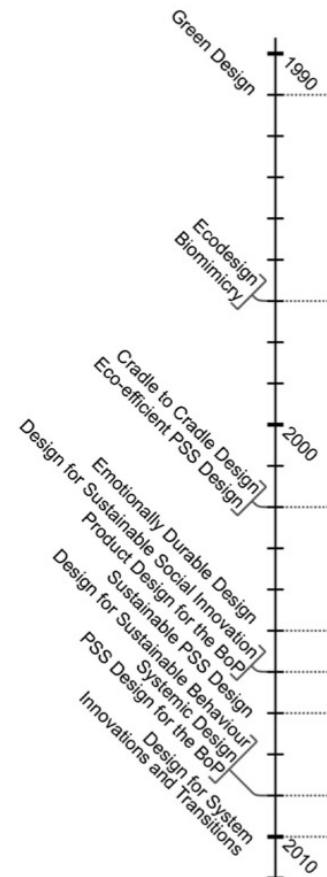
INSULAR

SYSTEMIC

Increasingly  
potentially  
sustainable



- Approach addressing the environmental and economic dimensions of sustainability
- ▣ Approach addressing the environmental, socio-ethical and economic dimensions of sustainability



A?



# Strategies for DfS action – anything missing?

**How well do these approaches cover what it takes to change our unsustainable systems of consumption and production?**

- There exists a multitude of DfS strategies, orientations, & methods but their impact to the increasing consumption has been minimal...

***...What else is needed from design action?***

# Session activity



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# Session readings

Hopefully you had time to check the readings for the session:

Ceschin, F., and İ. Gaziulusoy (2020). *Design for Sustainability – A Multi-level Framework from Products to Socio-technical Systems*. Routledge.

Besides Introduction, you were reading topics on:

- Green design & product ecodesign (Chapter 2)
- Emotionally durable design (Chapter 3)
- Design for sustainable behaviour (Chapter 4)
- Cradle-to-cradle design (Chapter 5)

# Session readings

- **Green design & product ecodesign** (Chapter 2) focuses on the negative sustainability impact of a product aspect and/or material use, ultimately covering all life-cycle phases of a product, from raw material extraction to end-of-life.
- **Emotionally durable design** (Chapter 3) aims to extend the use / mitigate sustainability impacts of products (and services) by connecting to feelings, sensations, memory, etc.
- **Design for sustainable behaviour** (Chapter 4) aims to develop systems that are effectively able to steer people's (and organizations') actions towards more sustainable choices
- **Cradle-to-cradle design** (Chapter 5), similarly than ecodesign, puts focus on mitigating the negative sustainability impact of a product-service-system; However, the ultimate aim is to connect end-of-life phases with material production, aiming into closed loop production

# Session activity

**Based on the readings and topics of this session:**

- Let's split into groups, based on which chapter was read (chapters 2–5):
  1. Green design & product ecodesign
  2. Emotionally durable design
  3. Design for sustainable behaviour
  4. Cradle-to-cradle design

**Let's get organised into groups and begin discussion:**

- Think of the strategy and different examples of utilizing it
- Are there any shortcomings/downfalls of the approach
- **Also consider DfS strategies that were discussed in readings, how are they visible?**

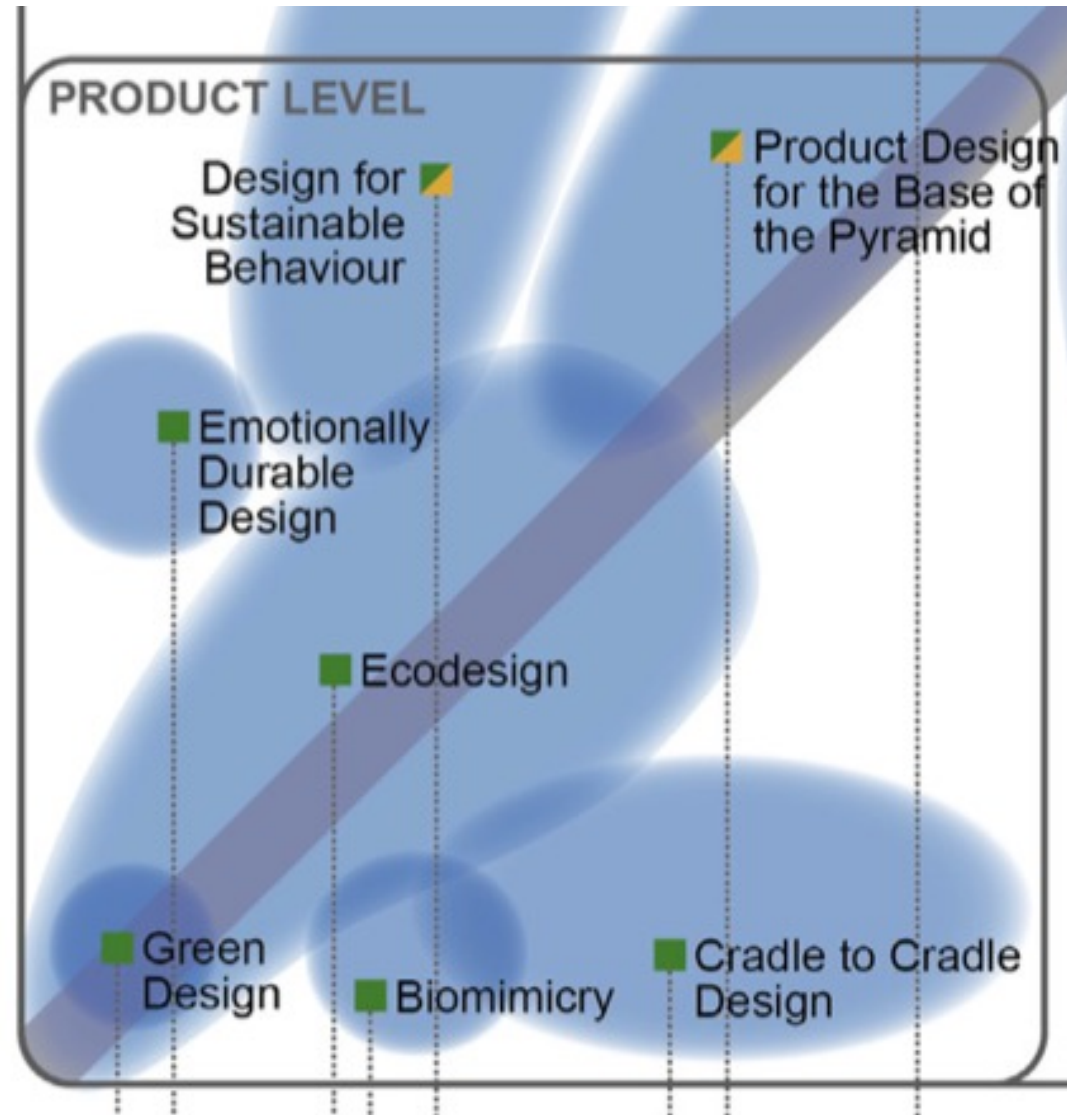
**Discuss in groups, ideate examples, reflect on shortcomings (30 mins)**

**Present the results to others in classroom after 16:00 (~5 min each group)**

## Get into groups based on reading:

1. Green design & product ecodeSIGN
2. Emotionally durable design
3. Design for sustainable behaviour
4. Cradle-to-cradle design

- Consider example design solutions; remember also examples from readings
- Discuss in groups, ideate few examples, discuss shortcomings (30 min)
- Present (5 min) main points and examples to others after 16:00!



# Design approaches to sustainability



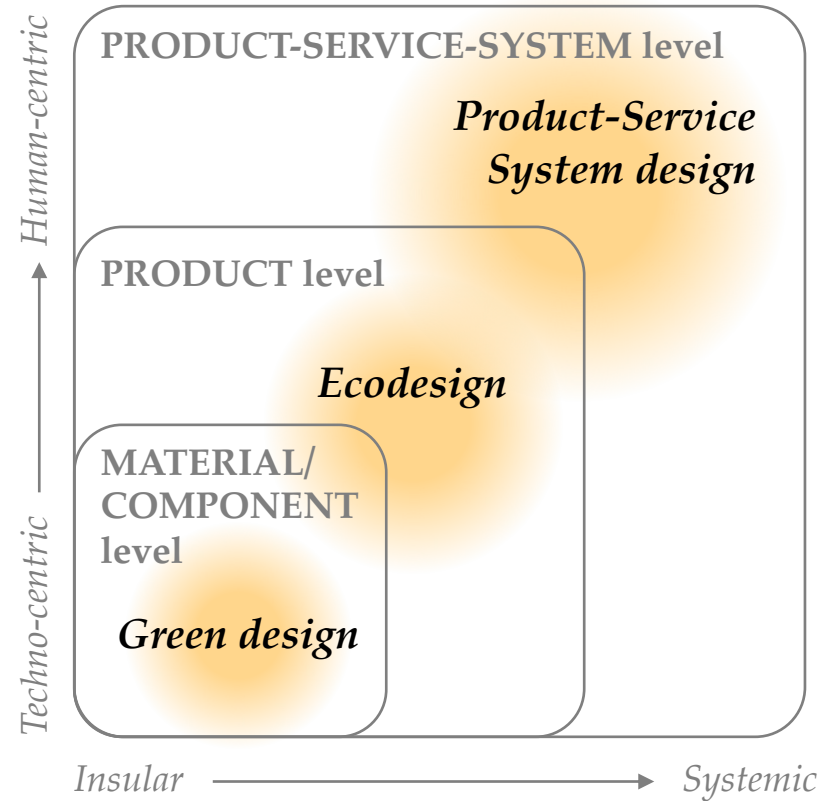
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# Expanding focus of DfS action from products to systems

**Initial DfS efforts** in the early 90's were focused on material and/or component redesign ('**Green design**')

**Ecodesign** moved focus to cover all life-cycle phases of a product, from raw material extraction to end-of-life.

**Product-Service System (PSS) design** continues to expand to systemic direction, moving the focus towards the 'functional' service offering, and systemic efficiency and/or value addition within.

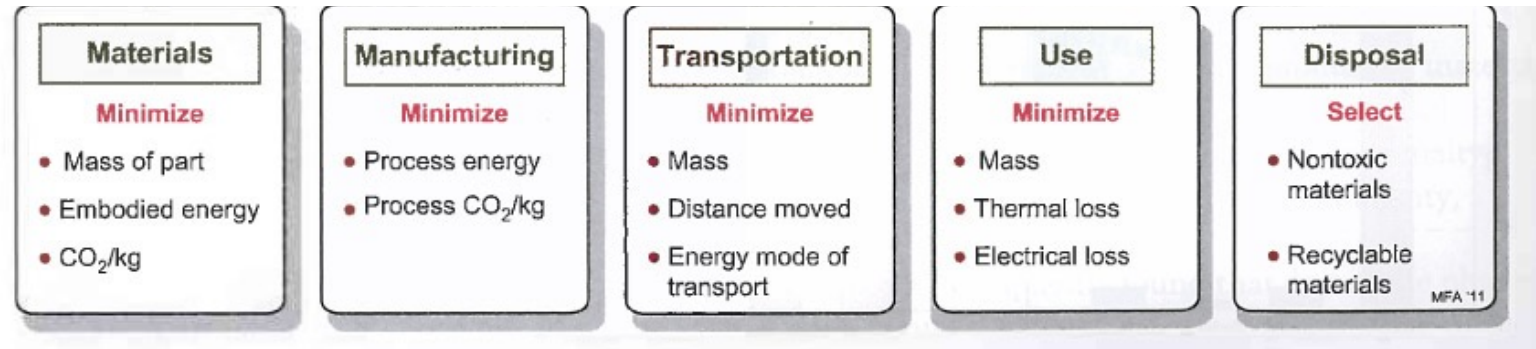




# Ecodesign & life-cycle assessment (LCA)

**Sustainable design includes assessment of impacts of every phase of product-life, from materials production to use and to disposal.**

**Life-cycle analysis or assessment (LCA)** acts as an overall term of the assessment of life phase impacts of products and systems.



Source: Ashby, M. (2012) *Materials and the Environment: Eco-Informed Material Choice*

# Studying and improving life-cycle impacts:



# Product-Service system (PSS) design

Product-Service System (PSS) design moves the focus of design action towards the whole system of service provision, and systemic efficiency and/or value addition within it.

- **Assessing impacts per service-unit rather than product**
- **Assessing sustainability on a 'system' level**

PSS design considers alternative business and service models that could provide improved sustainability by adjusting ownership and revenue models, and by adding more stakeholders to the process.

- **Changing product ownership: services instead of products**
- **Co-governance in design and management**

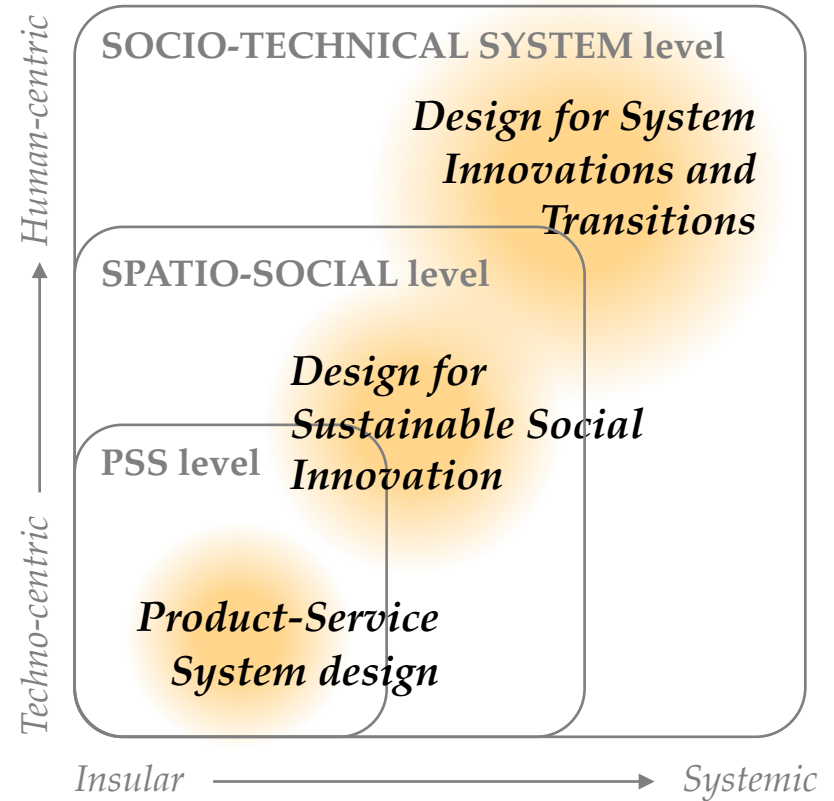
*...Towards new modes of sustainable consumption?*

# Moving focus of DfS to system innovations & societal transformations

After 2000, the focus in design action has gradually expanded to cover design for societal change.

## Design for sustainability transitions and systemic change:

- Sustainable PSS, social and system innovation
- Design for sustainability transitions
- Speculative design, critical design

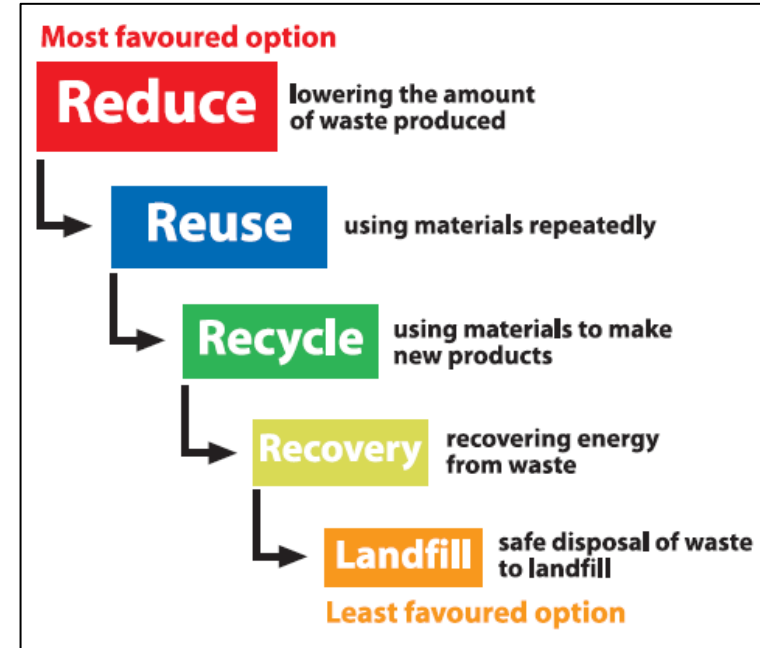


# Example: Redesigning plastics by Ellen McCarthy Foundation

Our current economy employs a linear, take-make-dispose, model (resources are **taken** from the ground, **made** into products and then **thrown away**). This model has contributed to both the positive but also negative effects of plastic being everywhere.



But what if we had an economic model that was more 'circular', and kept products and materials cycling within the system for longer? This vision for a 'circular economy' aims to optimise value by increasing the lifecycle of materials and designing out waste, thereby decoupling growth from the consumption of finite resources.



Source: Ellen McCarthy Foundation: Redesigning plastics

# A framework for DfS approaches

DfS framework by Ceschin & Gaziuluysoy (2020) collects various DfS strategies and approaches together into a shared framework.

The framework is characterised by three key elements:

- Five 'levels of innovation' connecting to different DfS strategies
- The 'scope of the design intervention' axis from insular to systemic
- The 'framing the design problem' axis from technocentric to human-centric

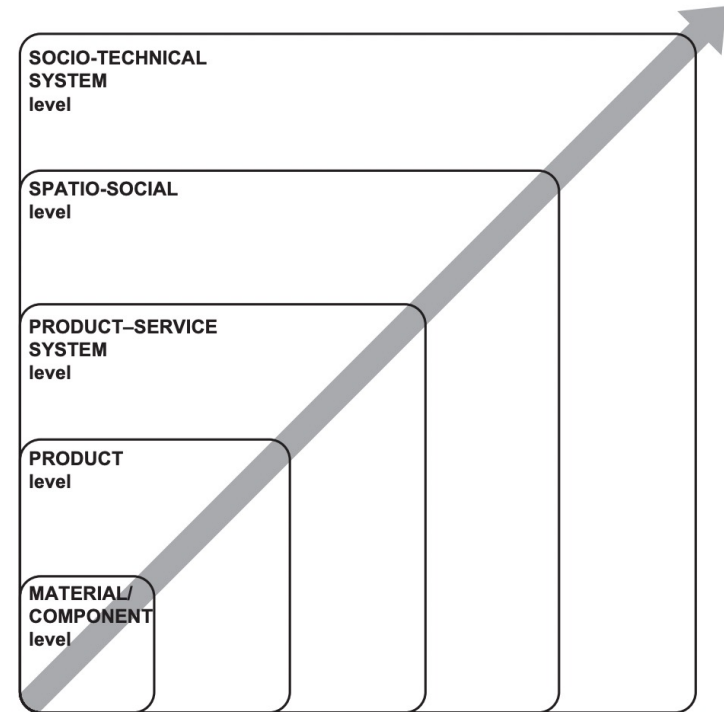


Figure 12.1 The DfS innovation framework

## Five levels of innovation:

- The material/component innovation level
- The product innovation level
- The product–service system innovation level
- The spatio-social innovation level
- The socio-technical system innovation level

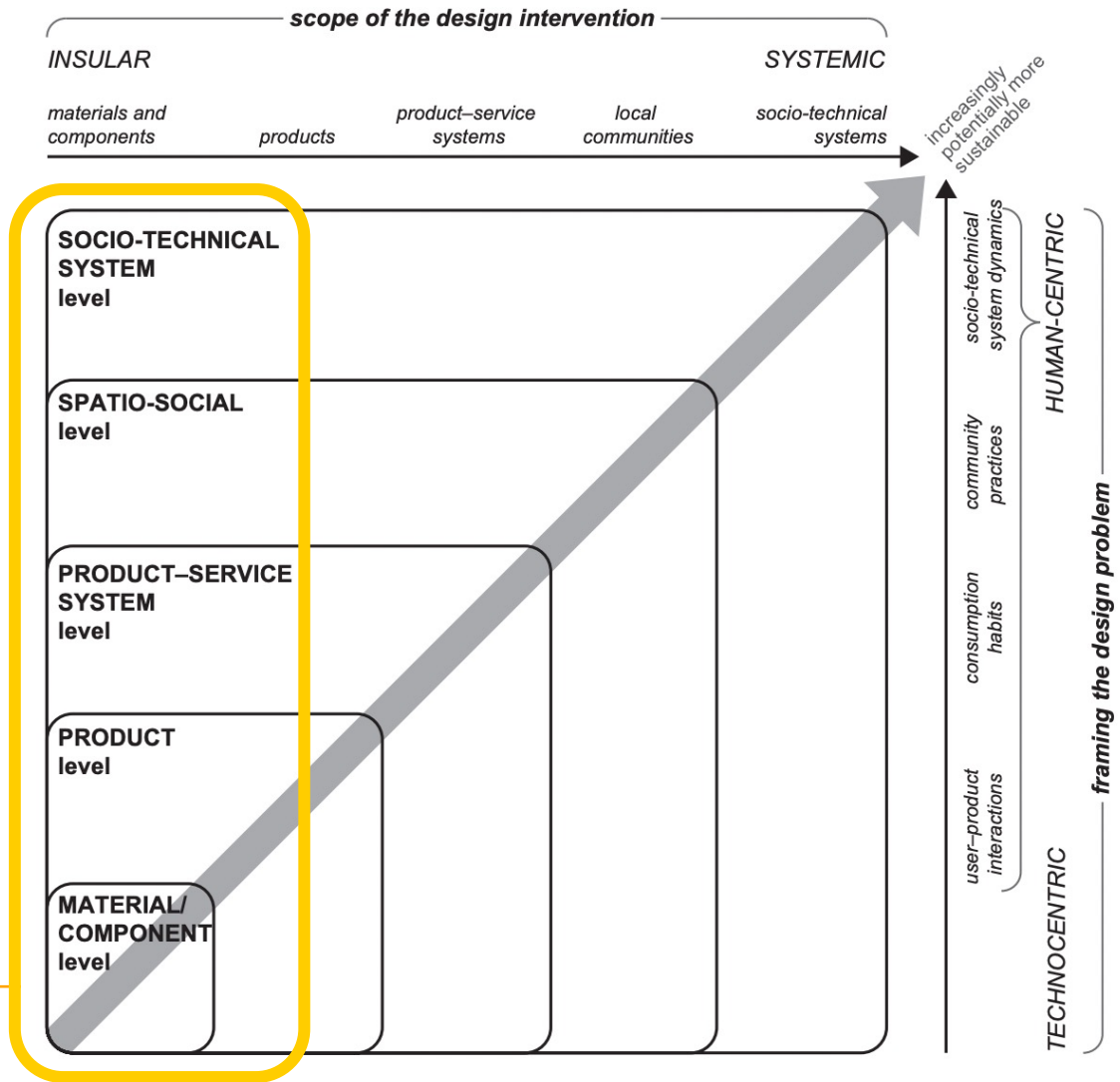


Figure 12.1 The DfS innovation framework

# The 'scope of the design intervention' axis:

The horizontal axis ranges from insular to systemic interventions and, similarly to the five innovation levels, visualises how the design scope can range from materials to socio-technical systems.

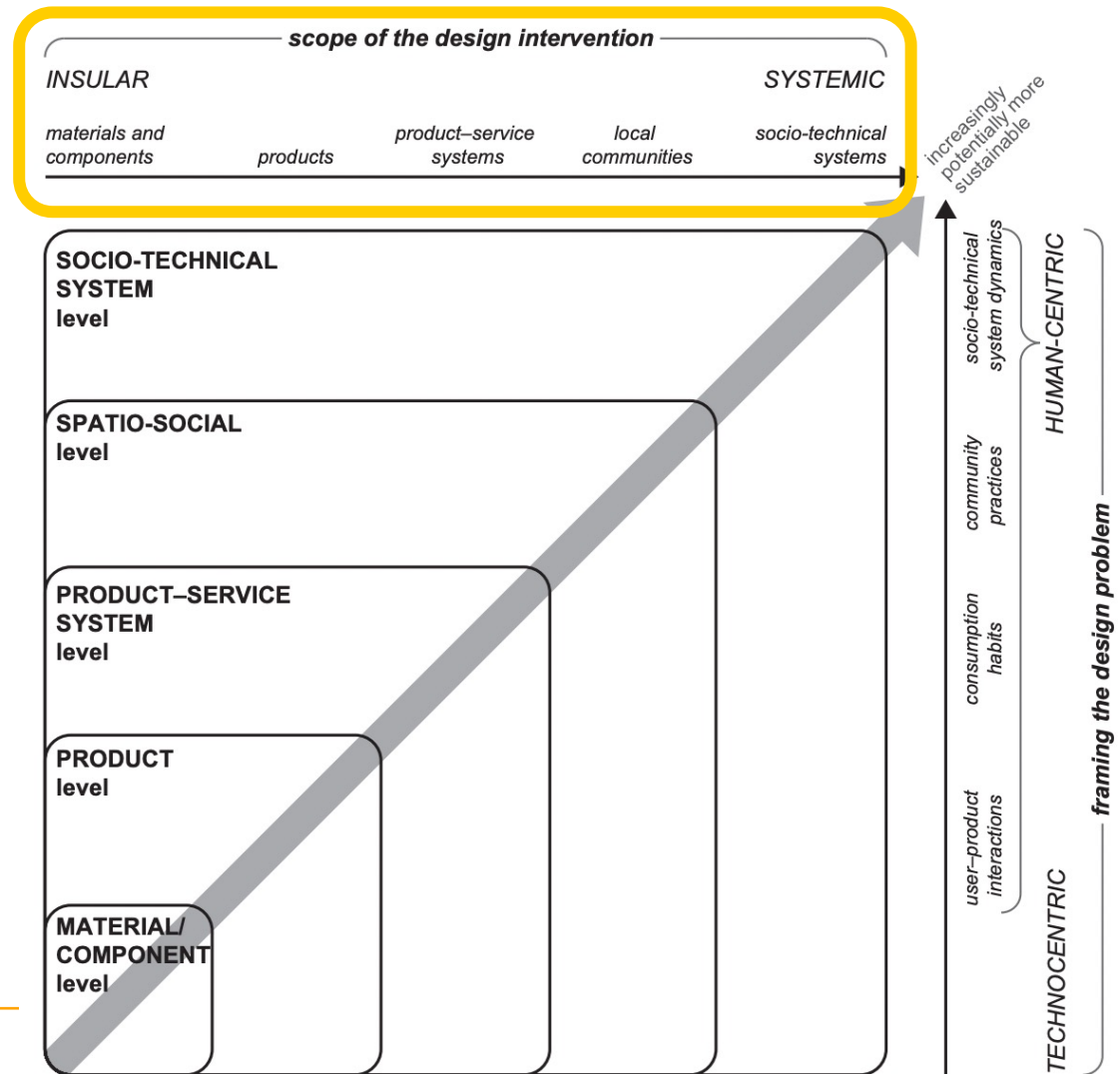


Figure 12.1 The DfS innovation framework



# The 'framing the design problem' axis:

The vertical axis represents how a certain DfS problem is addressed, ranging from technocentric to human-centric framing.

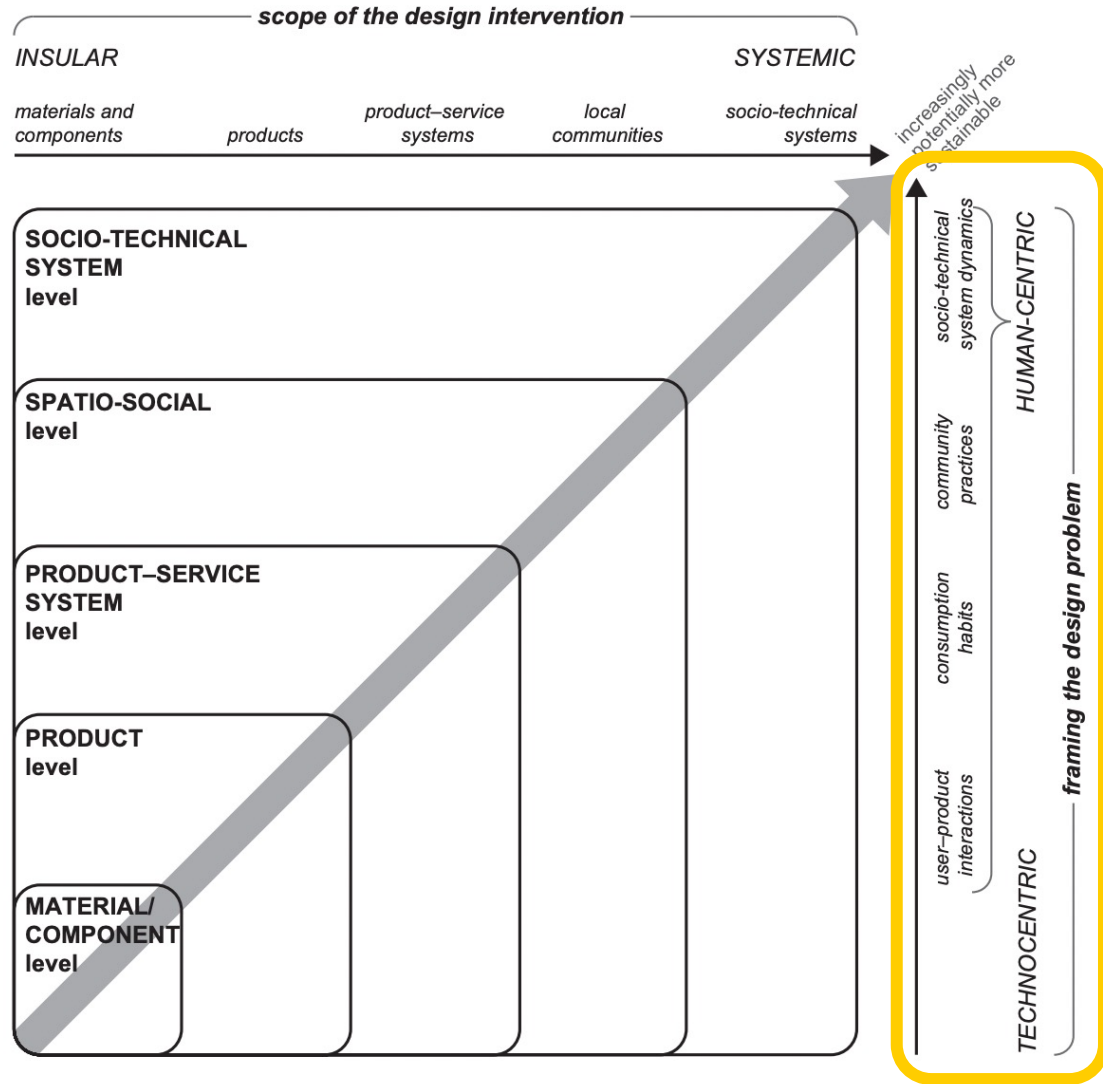


Figure 12.1 The DfS innovation framework

# Project work on the course

# Project work – thinking about the different DfS approaches

The project work will be launched on week 2, but you can begin to think of different DfS approaches and emphases to tackle your project case...

## *Focus DfS approaches for the project work:*

**A**  
Ecodesign &  
PSS design

**B**  
Behavioral  
communication  
and information  
design

**C**  
Participatory  
and collaborative  
design

**D**  
Strategic and  
transition design

**E**  
Speculative,  
critical, radical  
design

# A. Ecodesign & PSS design

## Focus and scope:

- Material, product, product-service system level innovation

## Framing of challenge:

- User-product interactions and consumption habits

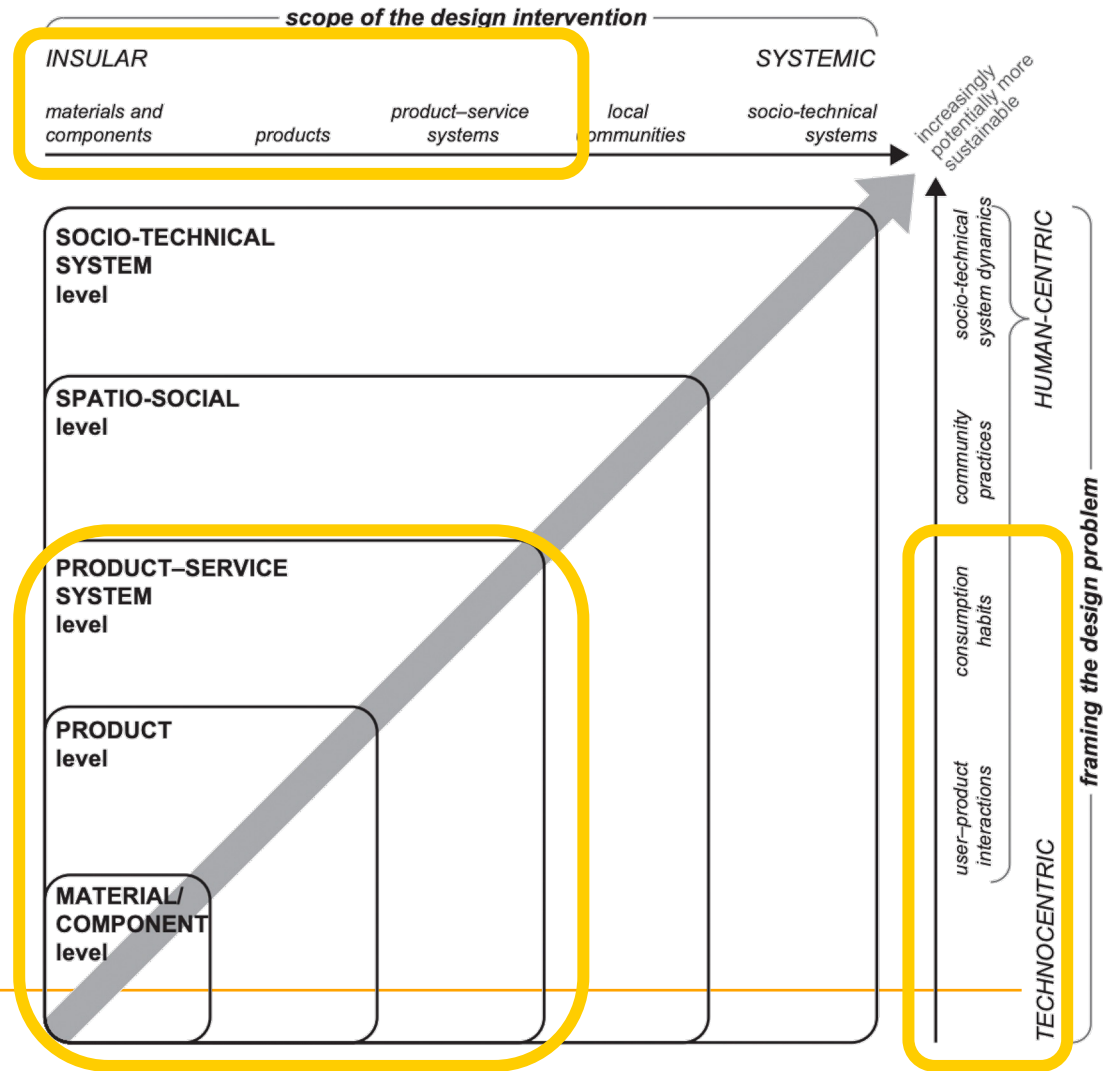


Figure 12.1 The DfS innovation framework

# B. Behavioral communication and information design

## Focus and scope:

- Material, product, product-service system, and community level innovation

## Framing of challenge:

- User-product interactions, consumption habits, community practices

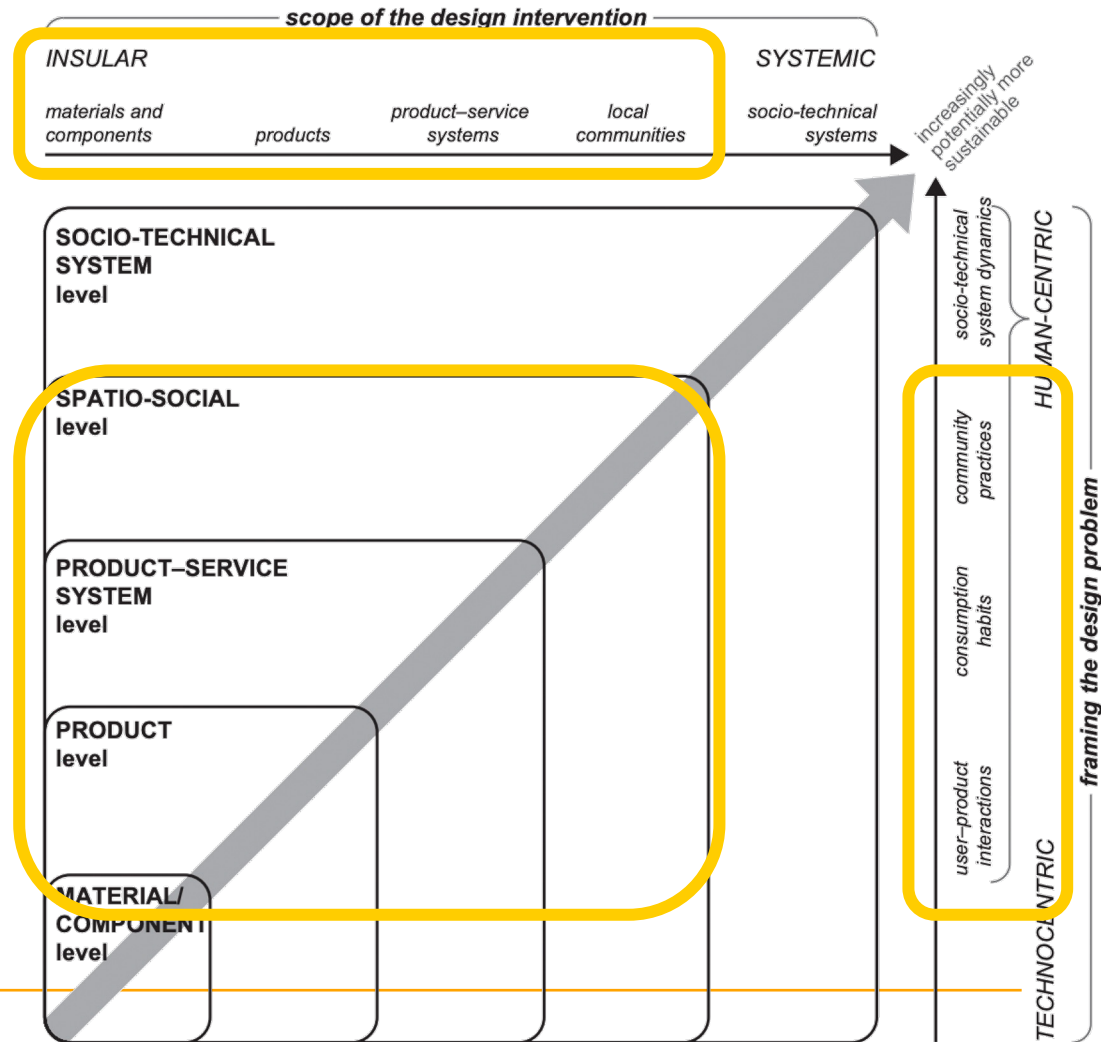


Figure 12.1 The DfS innovation framework

# C. Participatory & collaborative design

## Focus and scope:

- Product, product–service system, and community level innovation

## Framing of challenge:

- Consumption habits, community practices
- Participatory strategies

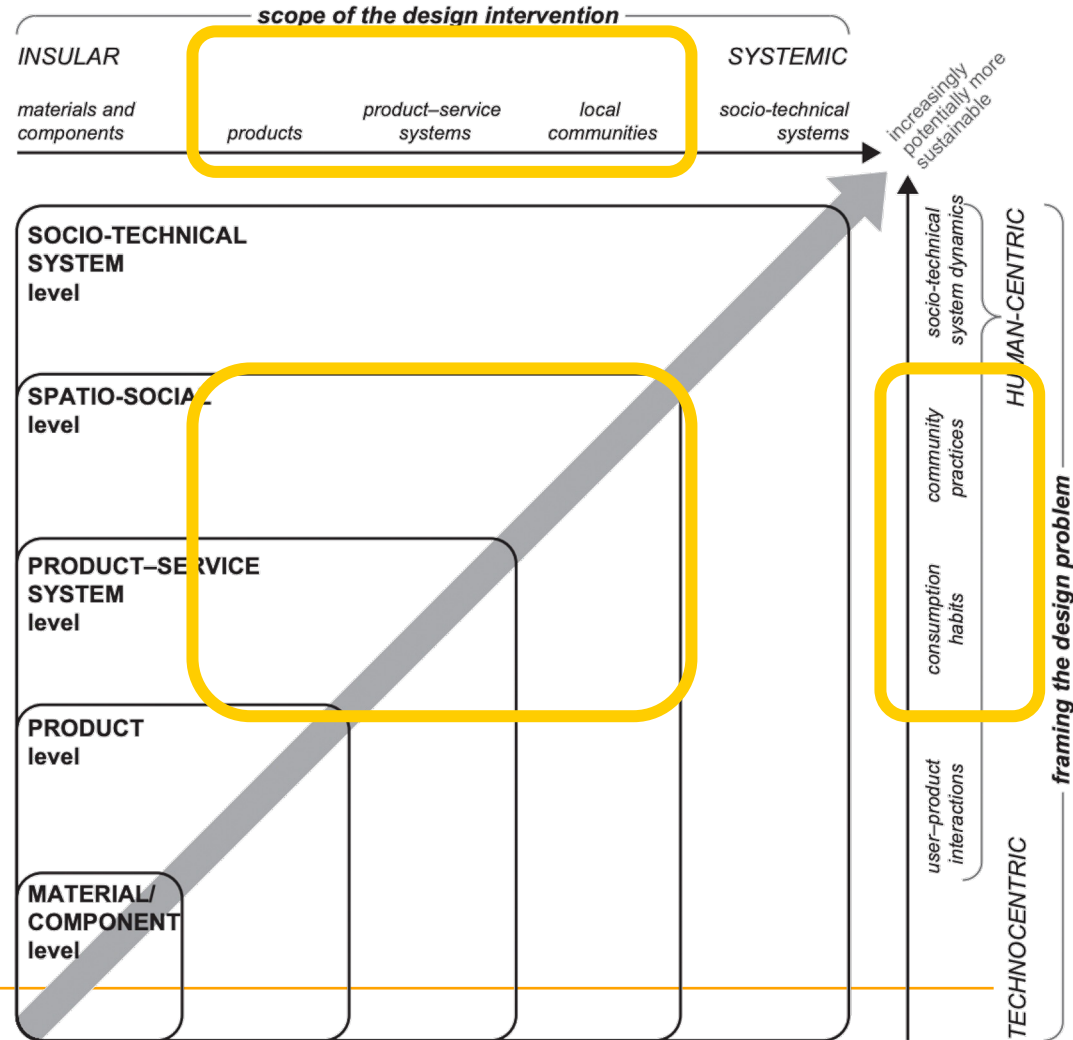


Figure 12.1 The DfS innovation framework

# D. Strategic and transition design

## Focus and scope:

- Product–service system, community and socio-technical system level innovation

## Framing of challenge:

- Consumption habits, community practices, socio-technical system dynamics
- Transition management dynamics

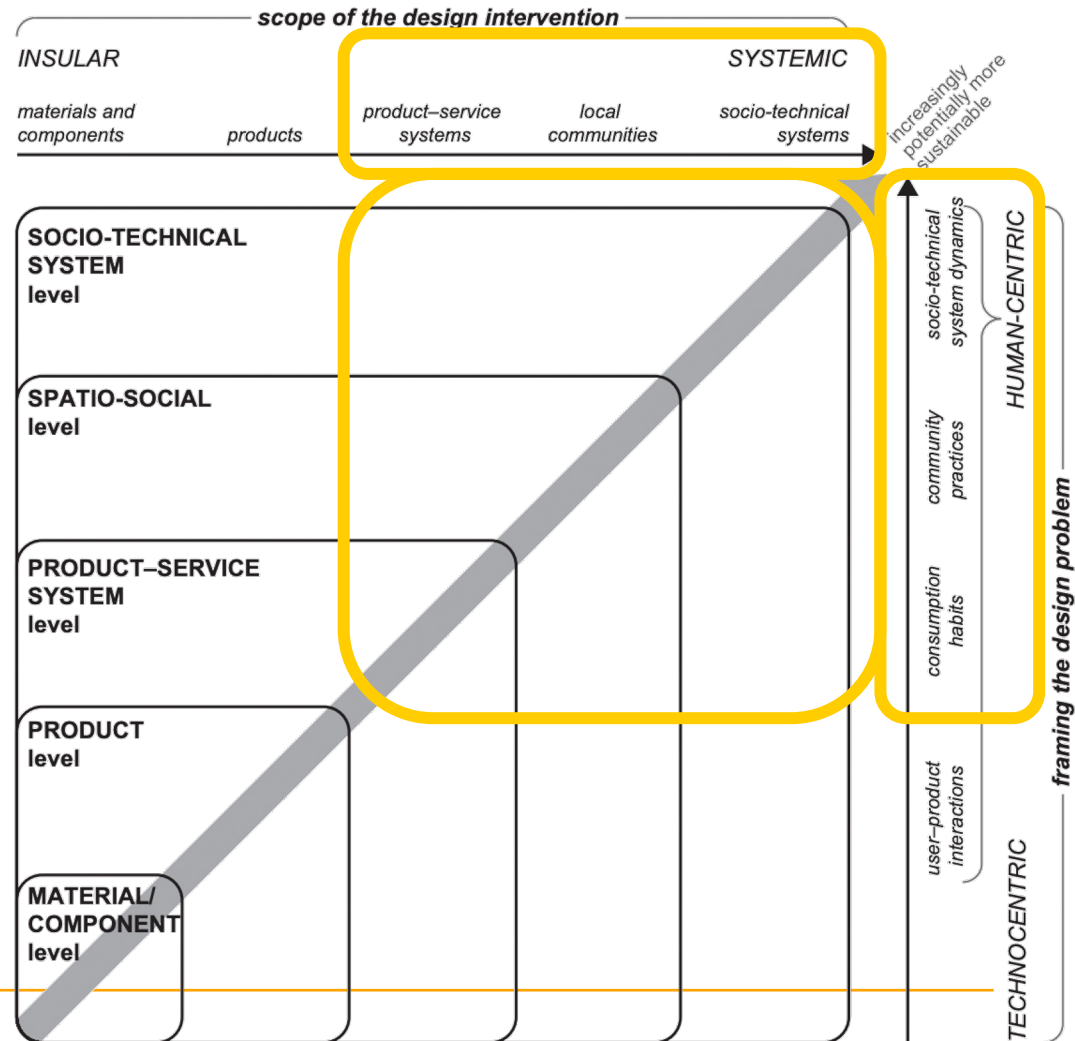


Figure 12.1 The DfS innovation framework

# E. Speculative, critical, radical design

## Focus and scope:

- From products and PSS to socio-technical system level innovation

## Framing of challenge:

- From user-product interactions to socio-technical system dynamics
- Speculative futures/realities
- Critical and radical dynamics

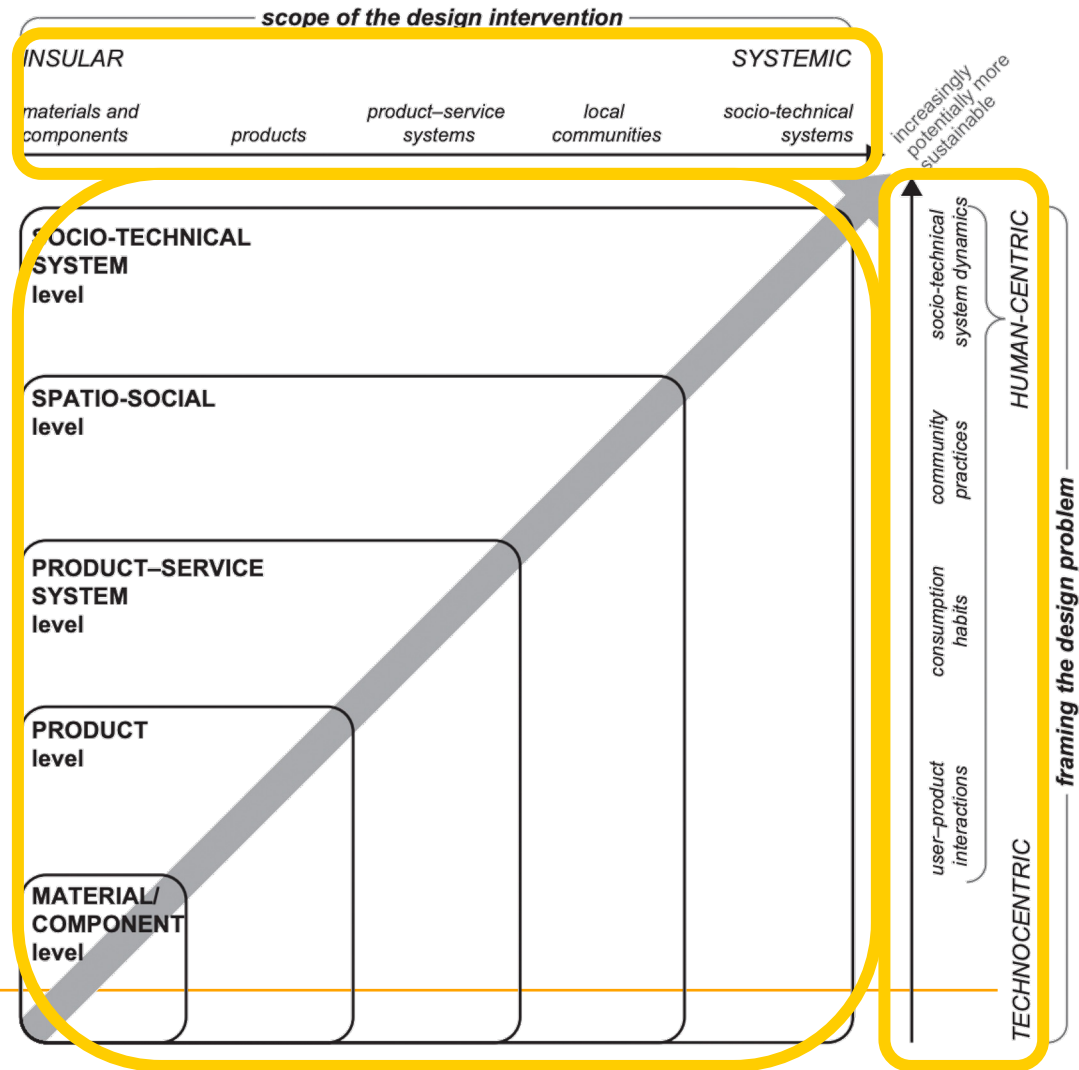


Figure 12.1 The DfS innovation framework



# Next session & tasks



Aalto University  
School of Arts, Design  
and Architecture

# Course and project work schedule

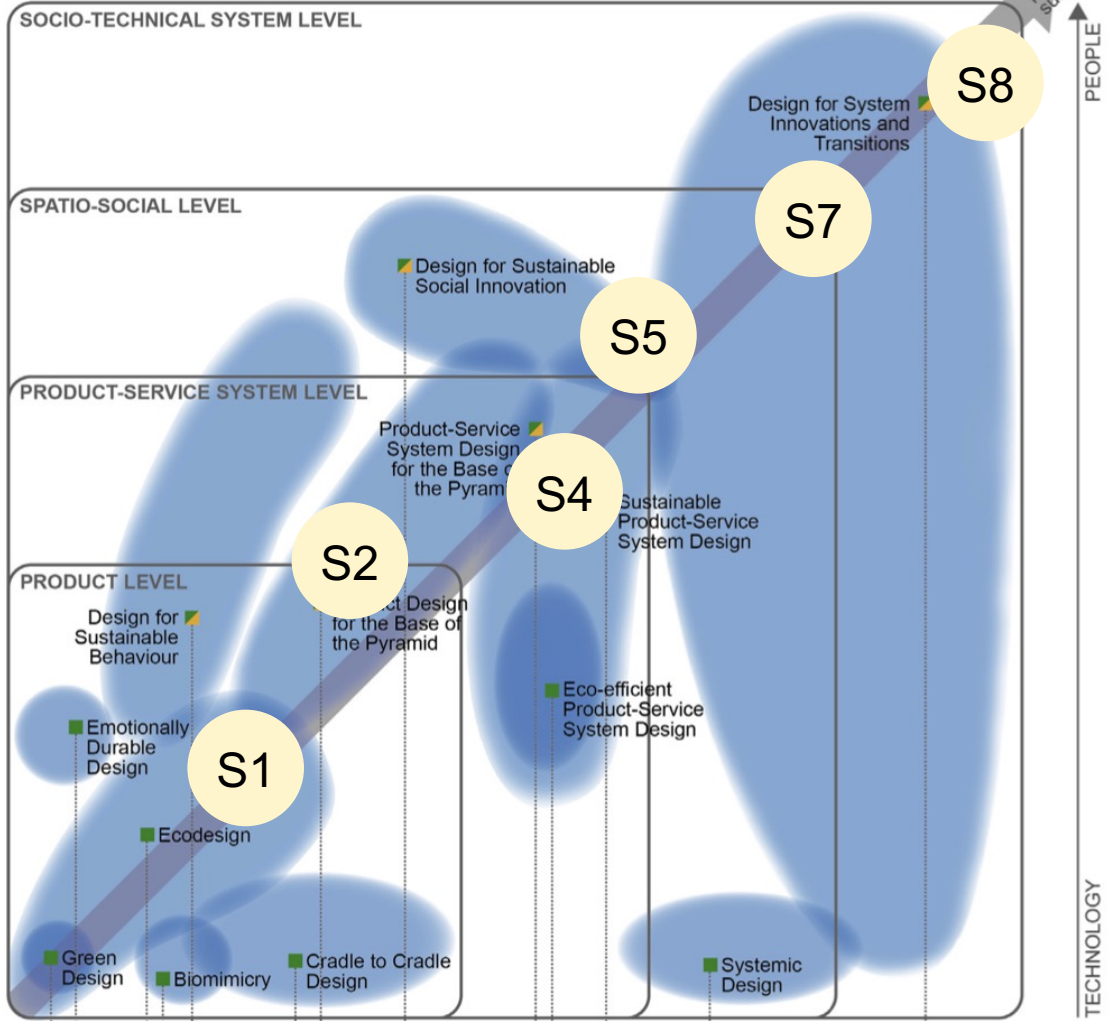
Working days	Tuesdays (13:15–17:00)	Thursdays (9:15–12:00)
Week 1 (9.1 & 11.1.)	Introduction to course; DfS introduction (F101)	Designing for sufficiency (visitor: Mikko Jalas) (Q201)
Week 2 (16.1. & 18.1.)	<b>Project work: Kick-off</b> (Q201)	Sustainable PSS design & systems design (Q201)
Week 3 (23.1. & 25.1.)	Socio-technical experimentation & social innovation (F101)	<b>Presenting case work ideas</b> (F101)
Week 4 (30.1. & 1.2.)	Design for sustainability transitions (Q201)	Communicating sustainability (Q201)
Week 5 (6.2. & 8.2.)	Promoting and scaling-up sustainability (location TBA)	<b>Project work tutoring &amp; finalisation</b> (Q101)
Week 6 (13.2. & 15.2.)	<b>Project work: Final presentations</b> (F101)	Feedback session (Q101)

INSULAR

SYSTEMIC

Increasingly  
potentially more  
sustainable

S9



## Lectures and sessions:

- S1. Introduction to course & DfS
- S2. Design for sufficiency
- S3. Project work intro**
- S4. PSS & system design
- S5. Sociotech. experimentation
- S6. Idea presentations**
- S7. Design for transitions
- S8. Communicating sustainability
- S9. Scaling-up sustainability
- S10. Shared tutoring**
- S11. Final presentations**
- S12. Feedback session

# For next session...

**Perform SITRA's lifestyle impacts test before next session:**

<https://www.sitra.fi/en/projects/lifestyle-test-2/>

**Reflect readings and session topics, and interaction in your learning diary...**

**Thursday (11.1.) agenda (room Q201):**

9:15–10:00 Designing for Sufficiency (Mikko Jalas)

10:00–11:00 Exercise considering areas of consumption

11:00–12:00 Presenting project work for week 2

# Thanks!