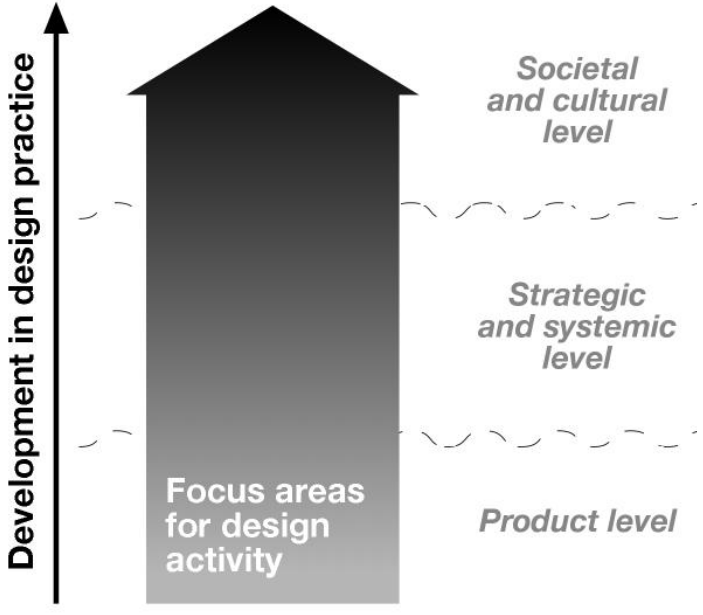
Aalto University
School of Arts, Design
and Architecture

Disruptive innovation: From products to systems and services

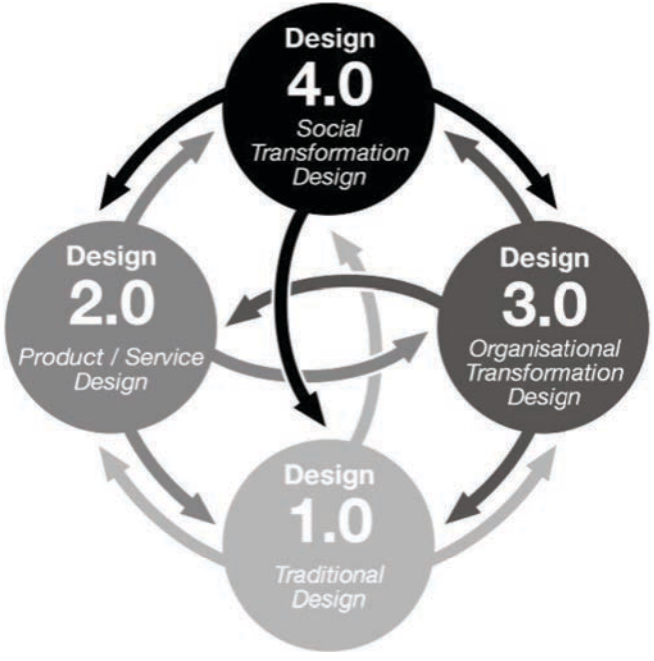
Aaltonaut BA / Product Sustainability
Tatu Marttila
10.11.2020

From incremental to disruptive development

Emerging areas for sustainable design action

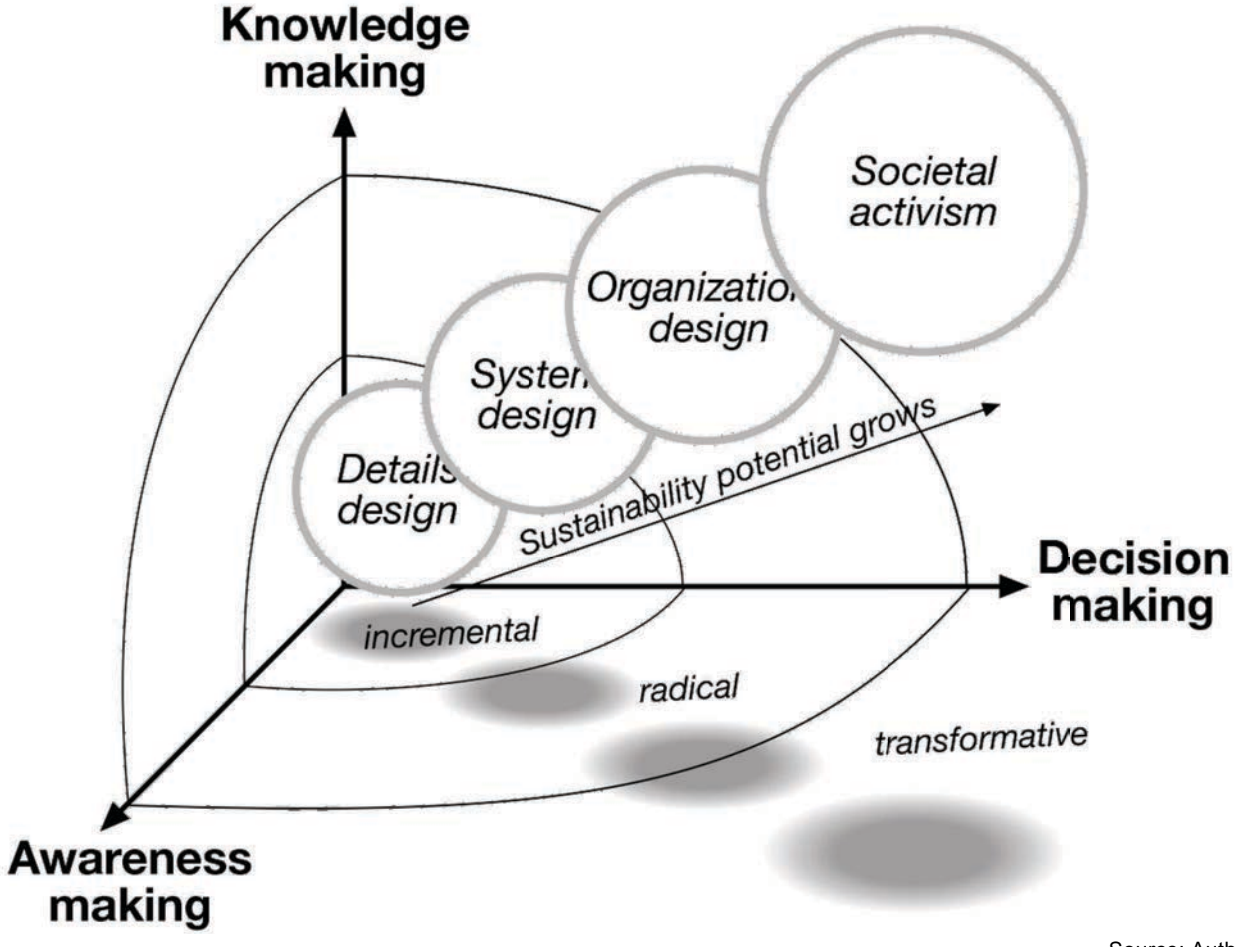


Source: Author



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

Comparing and linking approaches for sustainable design:



Source: Author

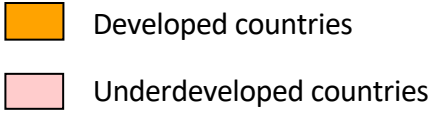
Factor thinking: Increasing efficiency by ‘factor 10’

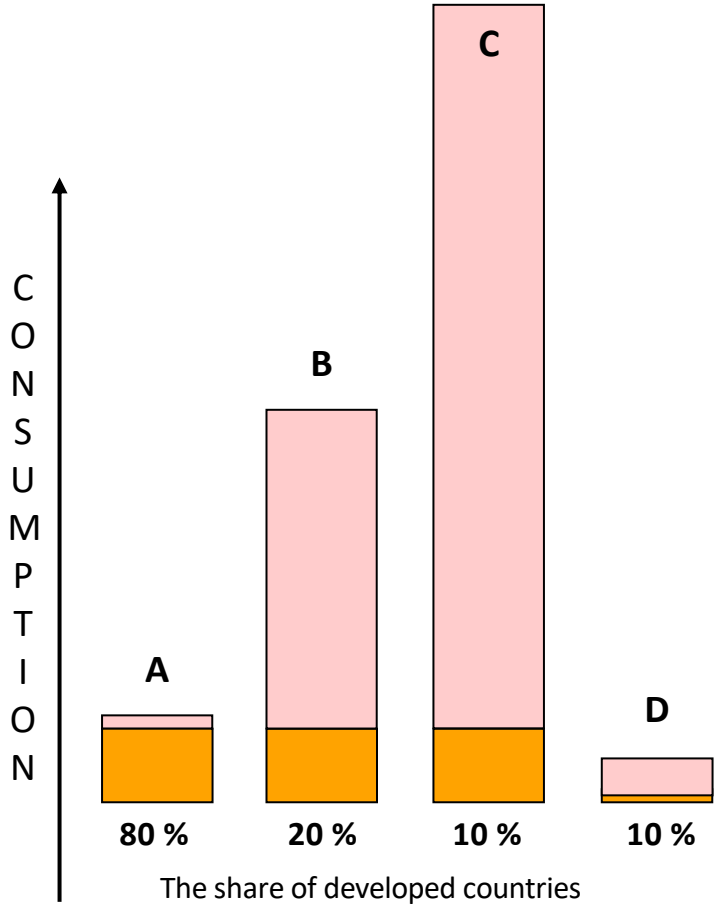
A = current level of consumption

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

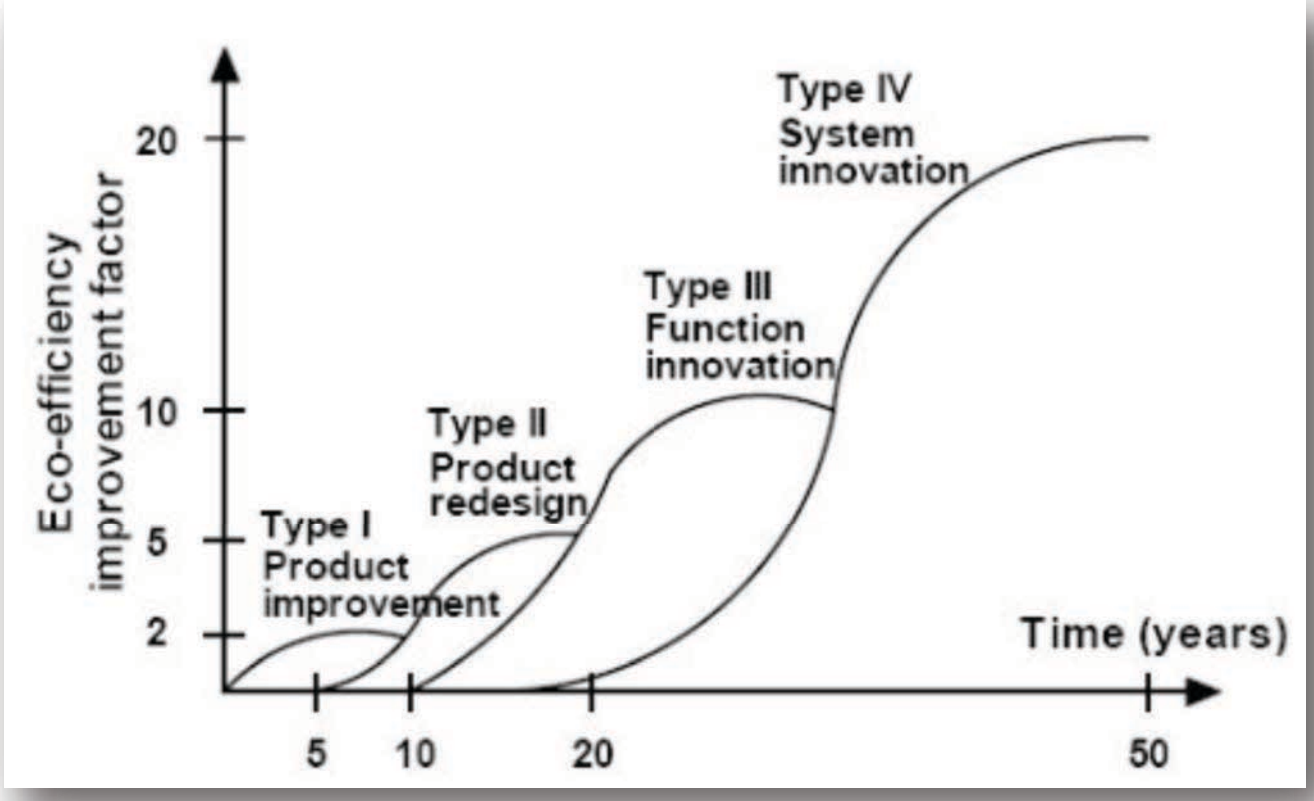
D = sustainable consumption ~half of the present -> consumption in developed countries must be cut into 1/10 (**factor 10**), if targetting to globally equal setting





Source: Wuppertal-institute

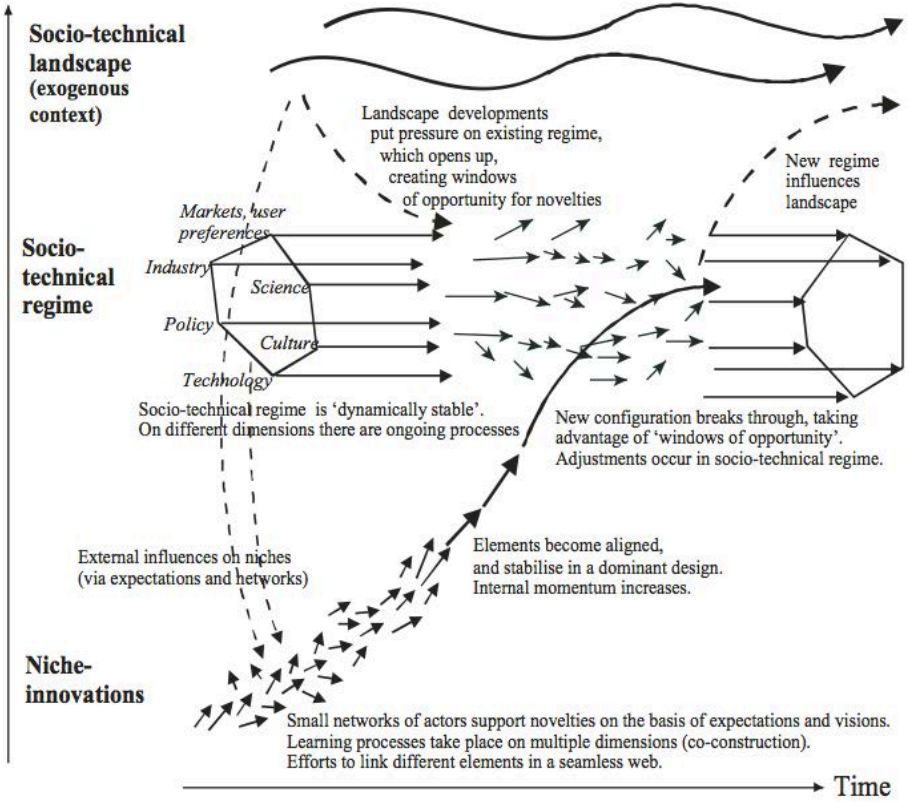
From improvement to redesign, and to functional and system innovation:



Source: Rathenau Institute, 1996

Towards sustainable transitions

Multi-level perspective on sustainability transitions within the socio-technical context: (Geels 2011)



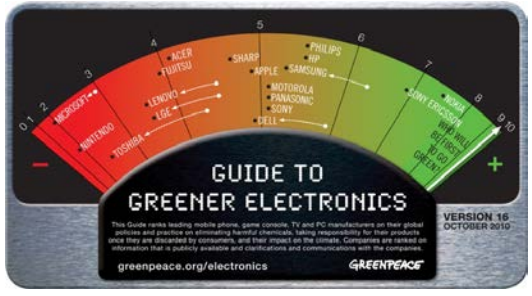
Source: Geels, F. (2011) Multi-level perspective on sustainability transitions

Examples of sustainability transitions in mobile ICT:

New ideas

FAIRPHONE

Change in organi-zations

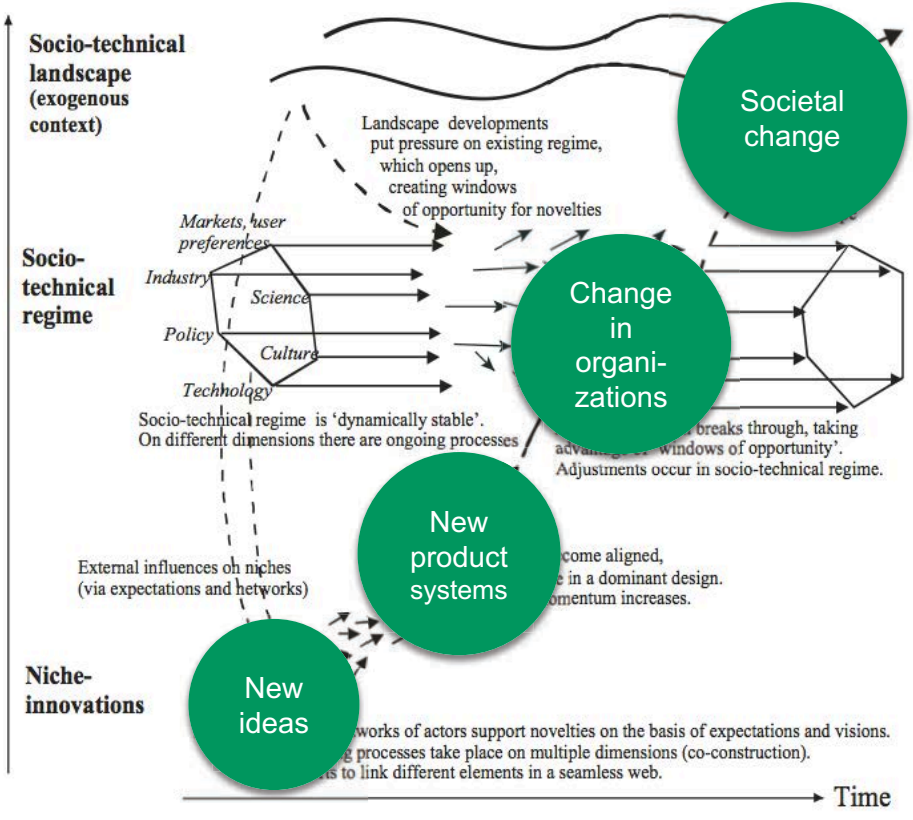


New product systems

Societal change

Towards sustainable transitions

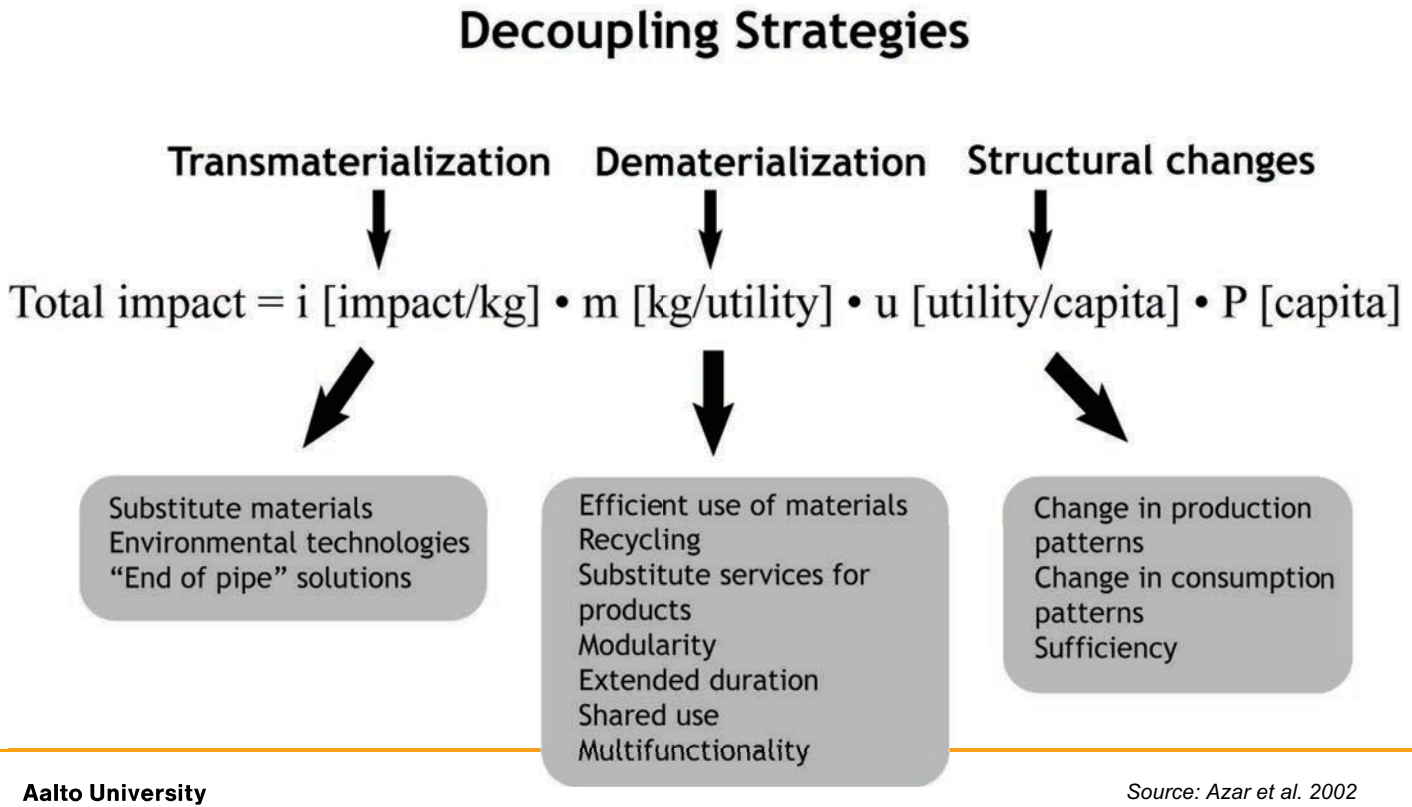
Multi-level perspective on sustainability transitions within the socio-technical context: (Geels 2011)



Source: Geels, F. (2011) Multi-level perspective on sustainability transitions

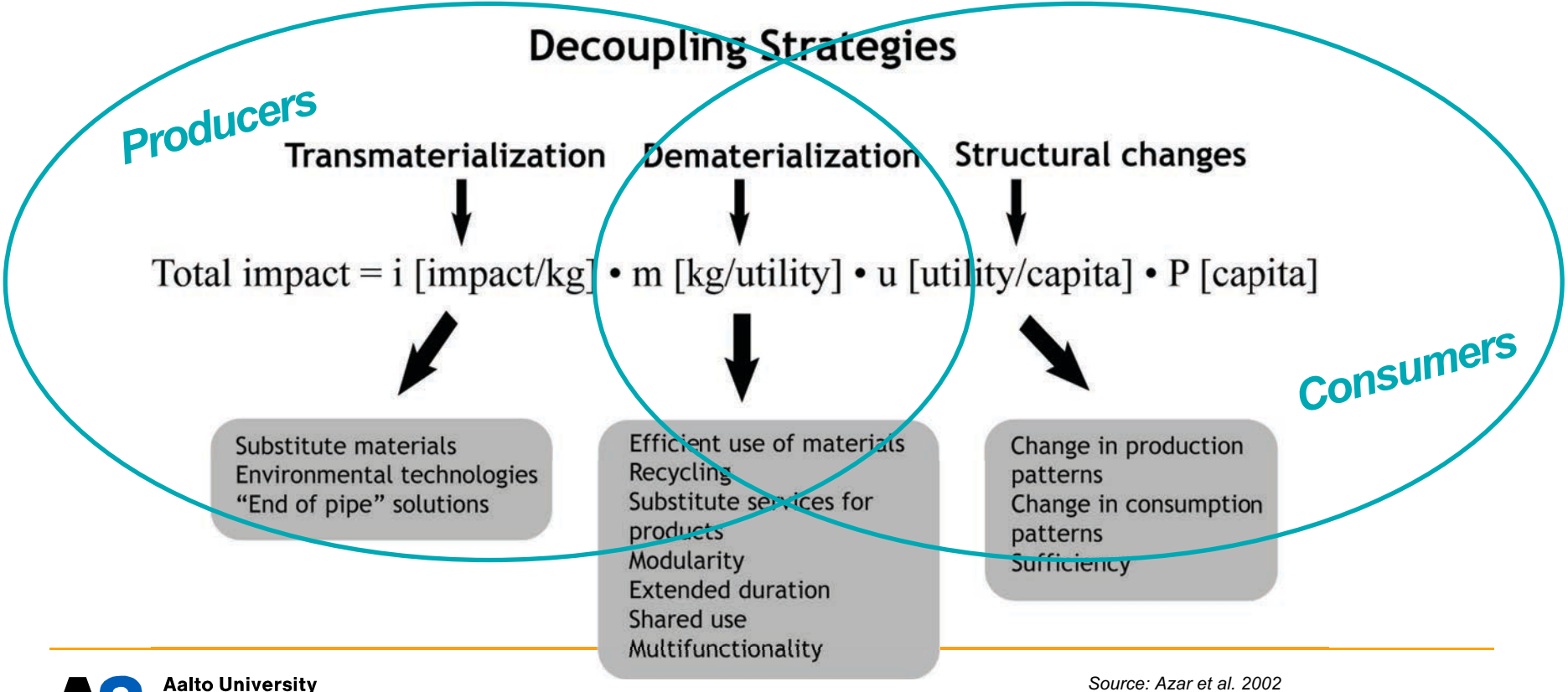
From products to systems and services

Strategies for Sustainable Consumption and Production



Source: Azar et al. 2002

Strategies for Sustainable Consumption and Production



Source: Azar et al. 2002

Product-Service systems (PSS) design

Products as artifacts offer interfaces to functions and services they provide. 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 ‘system’ sustainability

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

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

Sustainable Product-Service systems

However: There are several types of PSS – not all PSS are by default sustainable!
(Tukker, A. 2004; Mont, O. 2001)

Three key elements in creating new, innovative, and sustainable PSS concepts:
1) Innovative stakeholders network;
2) A shift from selling products to selling results;
3) A change in product and resources ownership.
(Vezzoli, C. and Ceschin, F. 2008)

Switching from product sales to selling a functional result has most sustainability potential. Here, the provider agrees with the client the delivery of a result.
(Tukker, A. 2004)

Example: Selling office lighting in lux per meter (Philips) or clean air per cubic meter

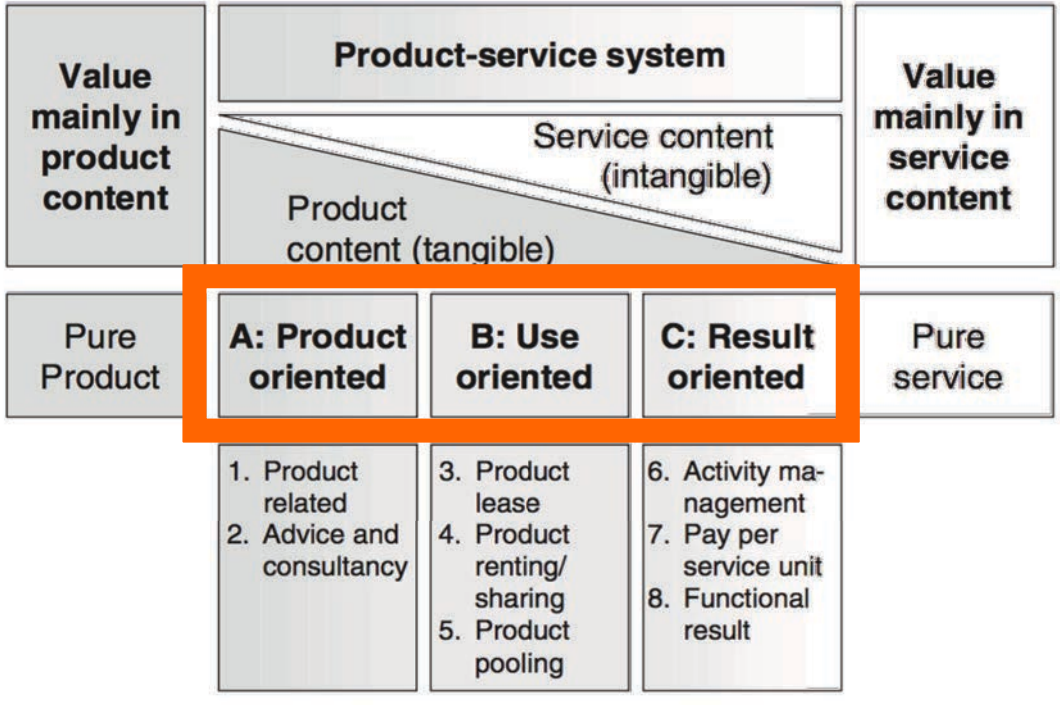


Figure 1. Main and subcategories of PSS

See: Tukker, A. 2004

Sustainable PSS: Examples

Product oriented:

Use oriented:

Result oriented:

Sustainable PSS: Examples

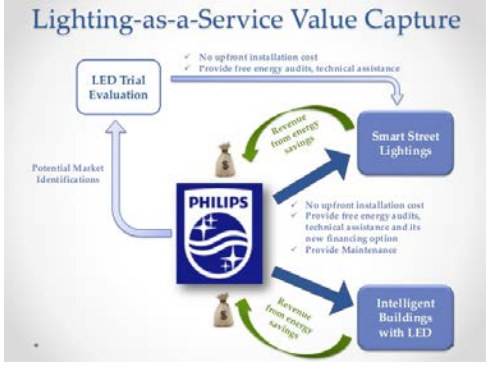
Product oriented:

Use oriented:

CITYCARCLUB

Ruoka Osuuskunta
KAUPUNKILAISTEN OMA PELTO

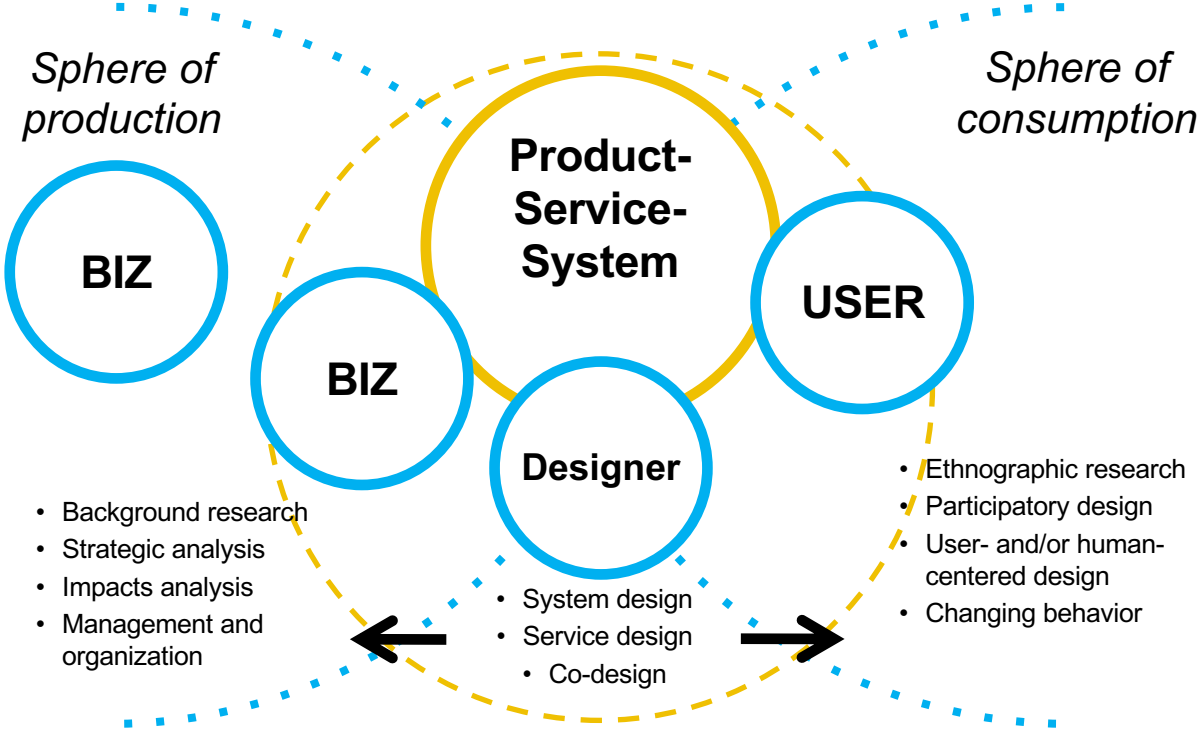
Result oriented:



whim

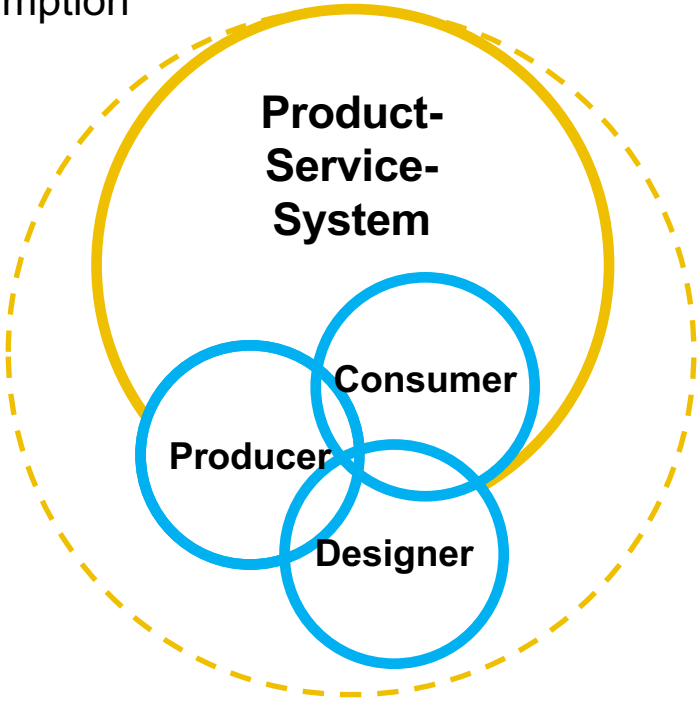
couchsurfing

Sphere of sustainable PSS design focus



Sphere of sustainable PSS design action

Sustainable consumption and production at the interplay of stakeholders:



Sustainable PSS:

- ✓ Functional results as a goal
- ✓ Expanded stakeholder network
- ✓ Sharing vision
- ✓ New roles for stakeholders
- ✓ Ownership into system processes and components

Sustainable PSS design – what & why?

WHAT & WHY:

- What is the demand? What is being offered & why?
- Strategic analysis & Exploring opportunities
- Existing research, checklists, “facts”
- Understanding the surrounding system; System mapping
- Identifying the potential (remember “low hanging fruits”)
- Environmental, socio-ethical and economic potential & needs
- What are the driving motivations, and how are they communicated?
- How to prioritize trade-offs?

Sustainable PSS design – how & who?

HOW & WHO:

- What is the improvement? What new stakeholder interactions can be created? What is the added value?
- Exploring opportunities; System ideation, development and design
- What is the offering to stakeholders (or system functions)?
- Who are the main actors? Who are the other stakeholders?
- What are the interactions? System & stakeholder mapping…
- What are the system boundaries (primary & secondary)
- How is the design process set up?
- How is communication set up?

Sustainable PSS design – test & iterate!

TEST & ITERATE:

- Take PSS concept in real life setting & testing
- System implementation and iteration
- Socio-technical experimenting
- Environmental, socio-ethical and economic assessment
- Communication between societal domains & actors
- Develop & iterate collaboratively with stakeholders!
- Scale up from experiment...

Sustainable PSS design process

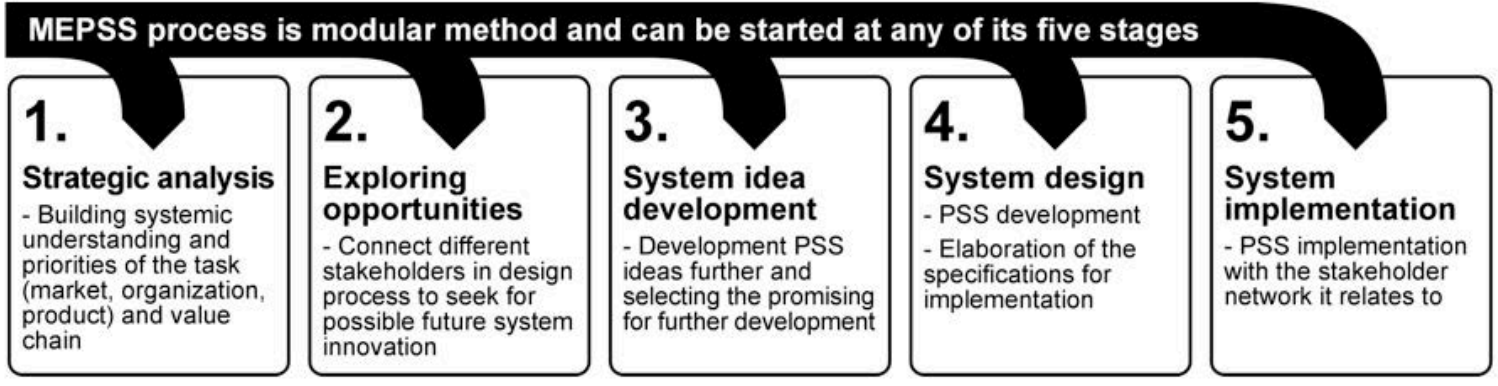


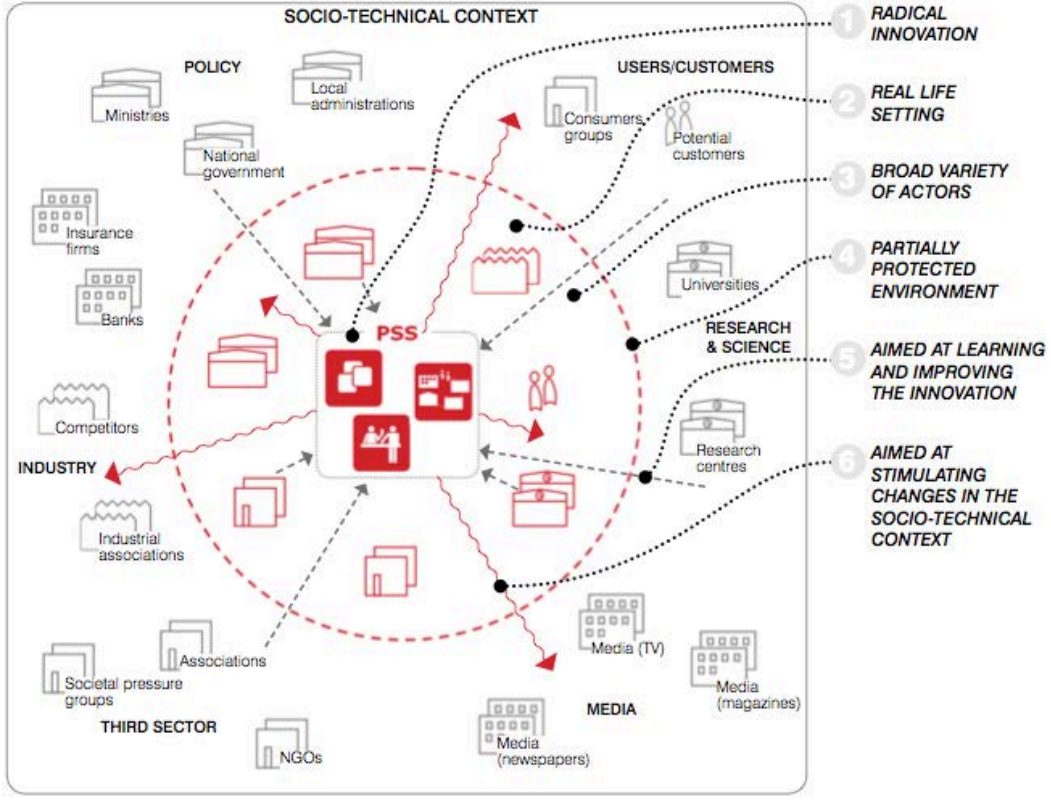
Figure 1. MEPSS design process and its five stages (based on Van Halen, C. et al. 2005; Vezzoli, C. 2007).

Communicating results

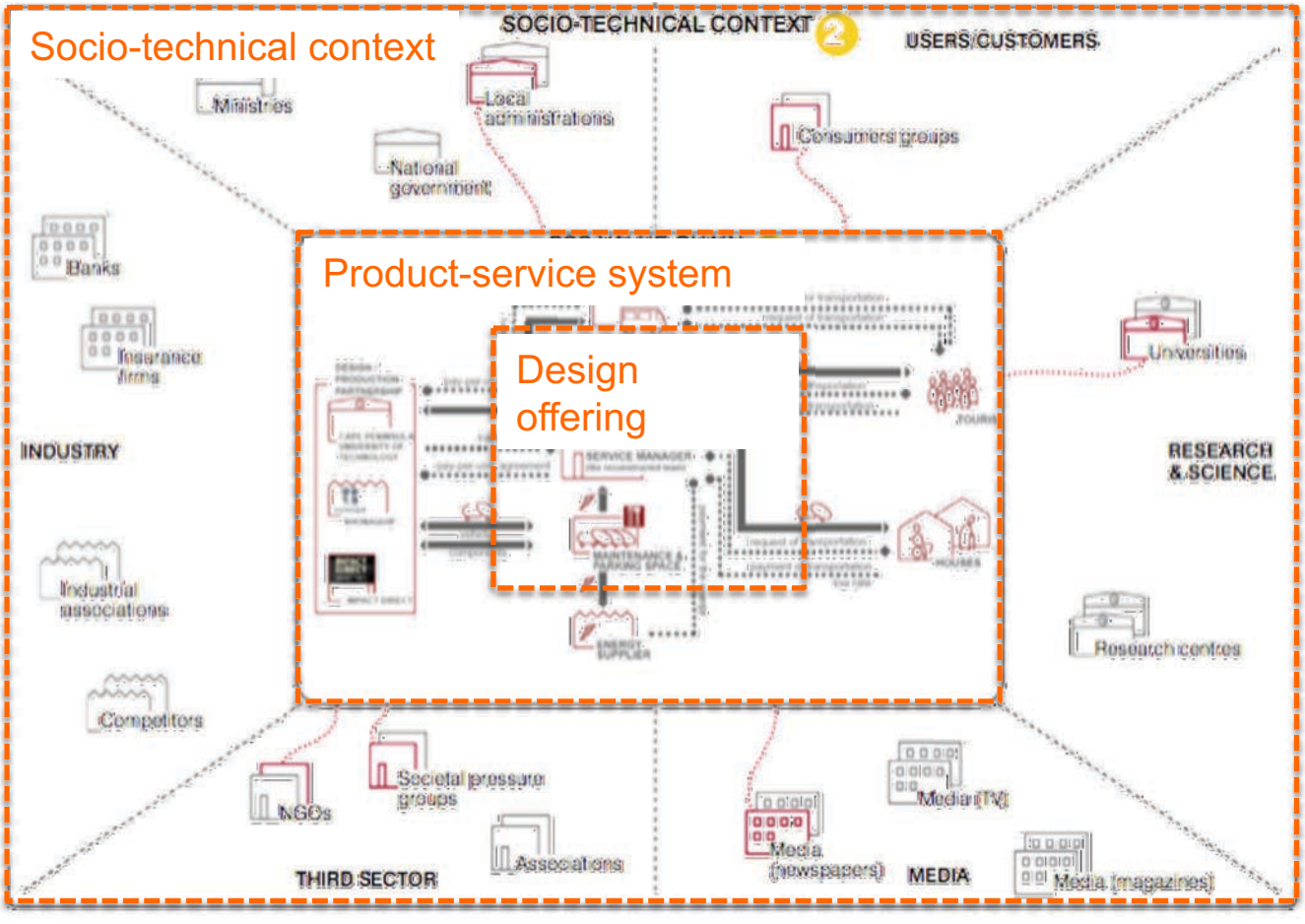
Designer as the match-maker

Design action can focus to:

- Redesigning system interactions and connections
- Connecting new stakeholders within the problem context
- Communicating system interaction and value propositions



Identifying connections within the socio-technical context:



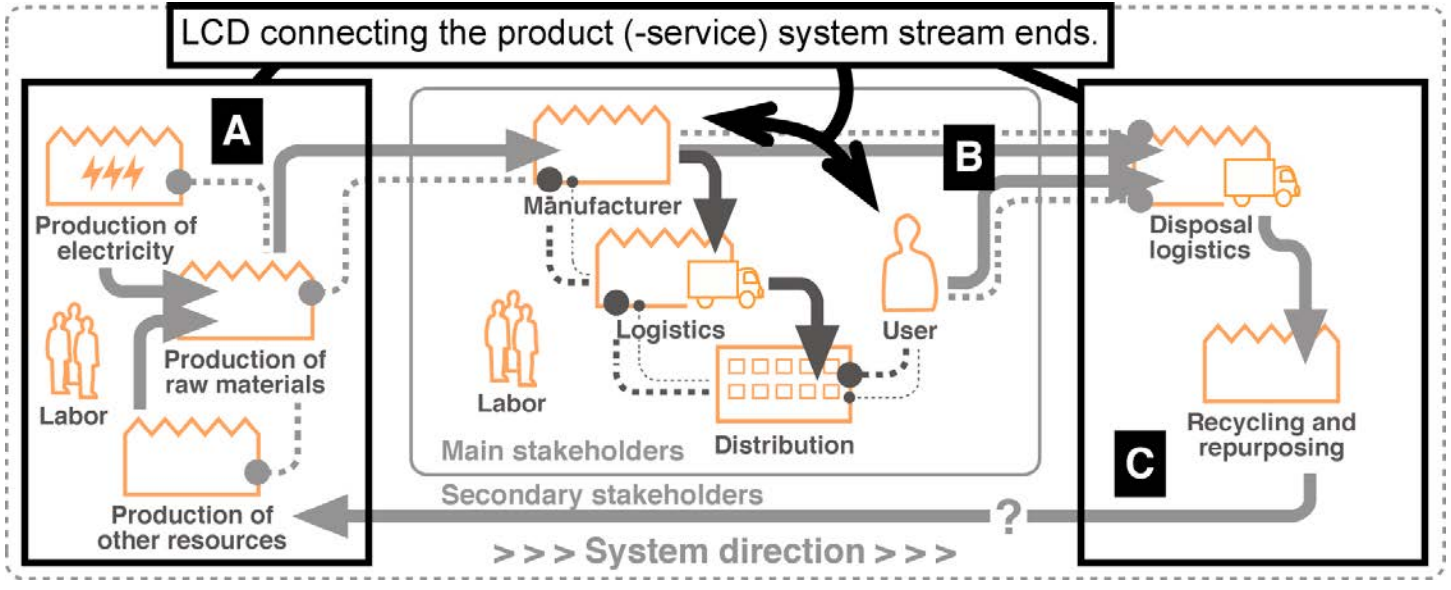
Source: Ceschin, 2013

Communicating the offering from user perspective:

Part of the detailed Offering Diagram that visualises the whole offering

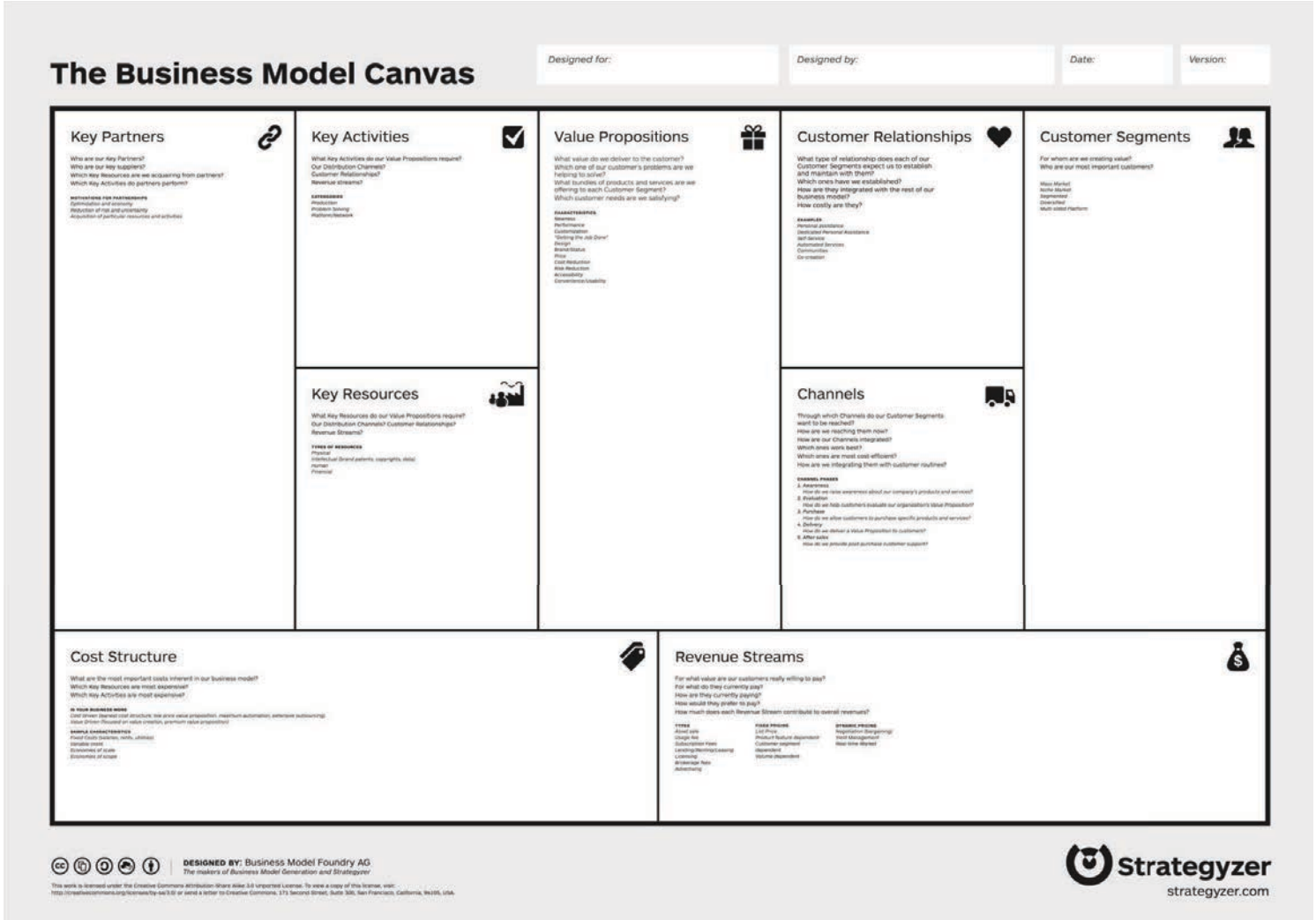
Offering Diagram showing the basic and added-value functions of the design idea

Communicating production system and system of use, and novel stakeholder & system interactions:

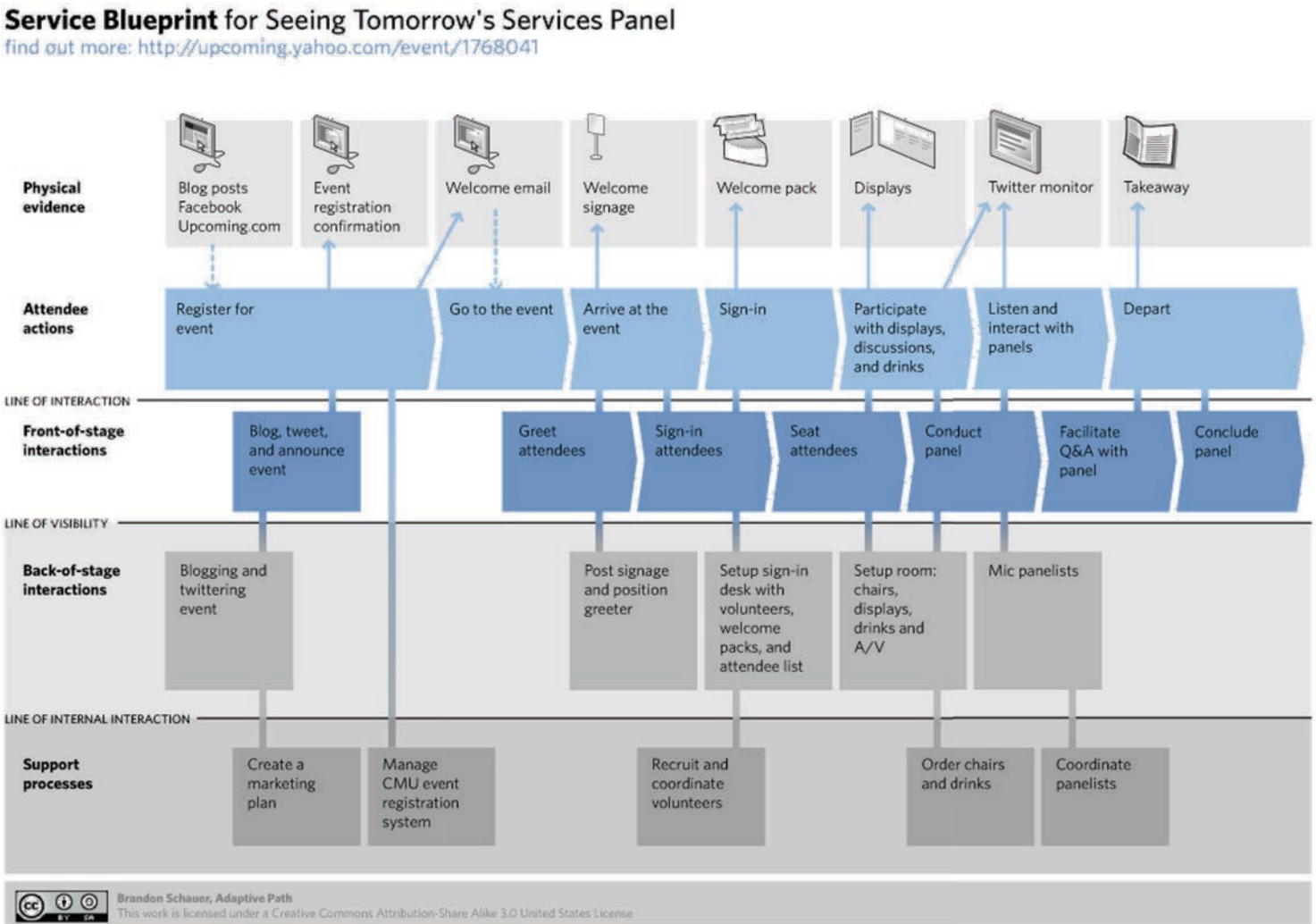


Source: Author, 2014

Communicating business value:



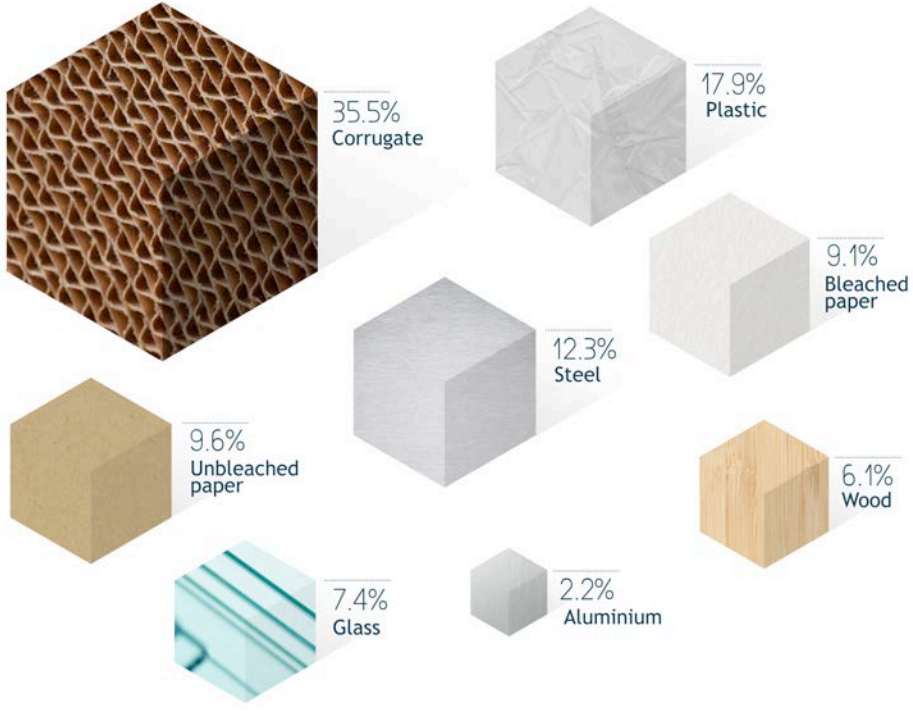
Communicating ‘service blueprint’:



Communicating system interactions with storyboards:

SOLUTION	> database to register information	> menu formulation software > communication system	> menu formulation software > communication system	> order management system > appliances
USER ROLE		>users decide which ingredients the University kitchens has to order	>users order the weekly menu	
LINE OF INTERACTION	**Service action 1**	**Service action 2**	**Service action 3**	**Service action 4**
				
		Representative of students chooses the weekly menus, basing on local producers disponibility	Students, using internet, communicate their weekly menu and the place where they will eat. The system return them a code/ticket	
SYSTEM ROLE	>local producers cooperative gives information to university on products disponibility			>central kitchen receive orders and prepare the requested meals
				

Not forgetting new material innovations!



Exercises

In-class exercise in groups:

Random groups in breakout rooms, 15 mins group discussion:

- Based on your topic (below), find out a real-world example, or ideate a new one…
- What is the focus service offering in your example case?
- Who are the main stakeholders in the system? How are interactions designed?
- Explain your choice briefly after discussion

Case topics for each group:

1. ICT services
2. Mobility services
3. Tools and appliances
4. Tourism services
5. Food-related services
6. Spaces for shared use
7. Open-source data
8. Housing services

Source: Azar et al. 2002

Home exercise in product case groups:

Continue in your product case groups, and prepare for next week tutor discussions:

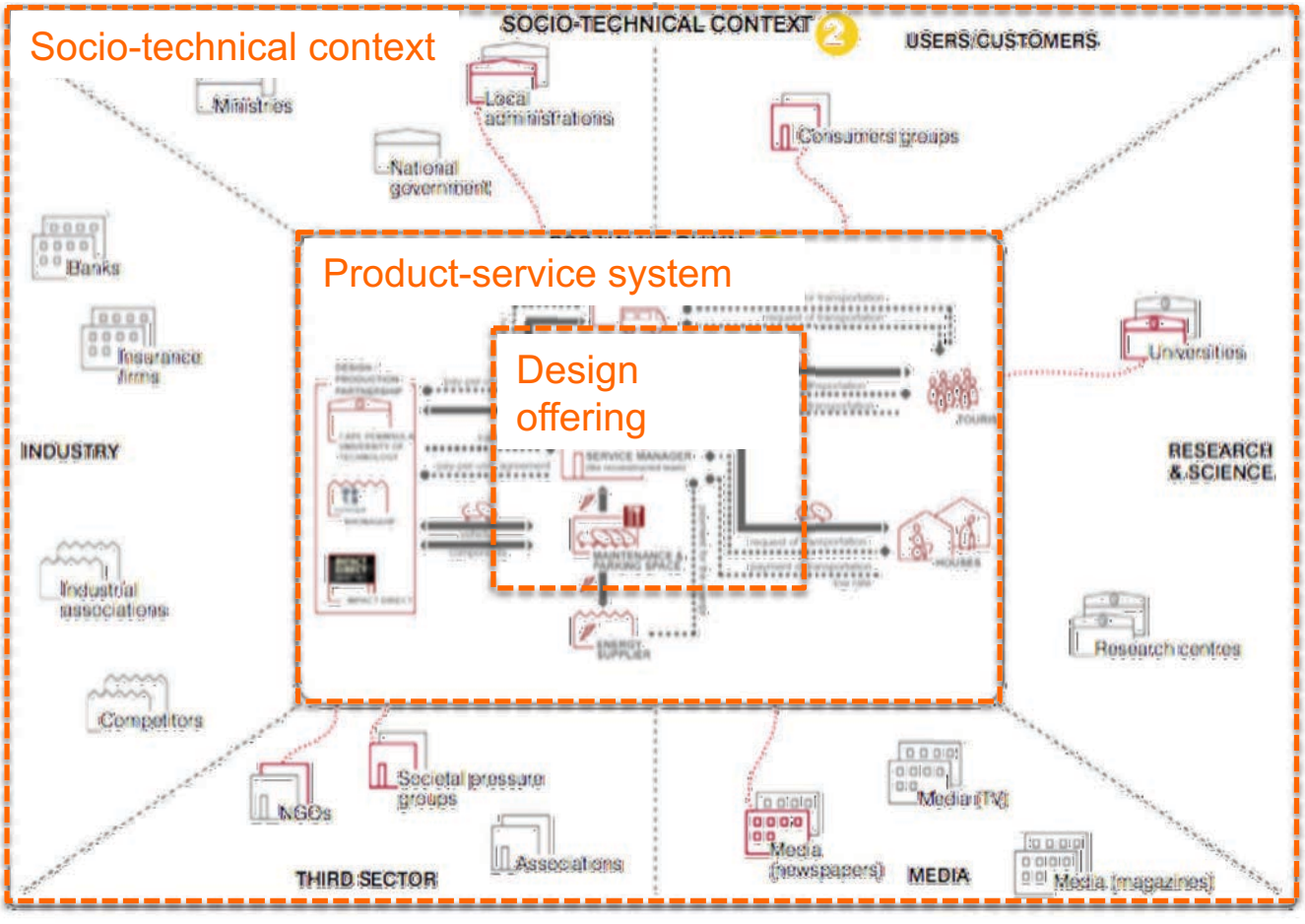
- What is the focus service offering in your case? What is the 'sustainability offering' in your case? Can you expand the offering or redesign it?
- Who are the main stakeholders in your product-service system? Can you introduce new actors and interactions?
- How are interactions designed? Can they be redesigned?
- Can you introduce changes to your product system to improve it: increase sustainability through improved system or with a novel component with additional value?

➢ Consider core offering(s), map your PSS, create innovative redesign!

➢ Explain your idea(s) in next week tutoring meeting

Source: Azar et al. 2002

Identifying connections (and promoting sustainability) within the context of action:



Source: Ceschin, 2013

Thank you!