How design for sustainability can contribute to a circular economy?

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ICD-CREIDD Interdisciplinary research on transition toward sustainability of sociotechnical systems

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How to manage the challenges of the development of society?

Which models of transition?

Natural resources and ecosystem services

*Inertia*

*Change of the state of the Earth*

**CONTEXT**

Relevant challenges

Rockstrom et al, 2009; Steffen et al. Science 2015;347:1259855
Definition

CIRCULAR ECONOMY AS DRIVER TOWARD SD?

- Circulation of material flows from the source to sink
- Several years of material stock in systems
- Energy is necessary to generate flows
Several definitions (EU, Ellen MacArthur Foundation, Ademe, French Ministry of the ecological transition....)

Economic system that:

- replaces the ‘end-of-life’ concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes.
- It operates at the micro, meso level and macro level,
- creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations.

(Kirchherr et al. 2017)
Facts:

- CE strategies are more focused on the end of life « 5R » (and less focused on the reduction of material flows)
  - Not possible to recycle 100% of material (dispersion, mix and high energy consumption)
  - Recycling efficiency (relative relation between recycling rate and yearly growing consumption of the material (> 1%))

- Rebonds effects (Solutions at the micro level can have propagation of impacts on the other levels of the system)
Challenges:
- Radical **reduction of the material and energy flows**
- **Integrating and measuring** the circularity in a systemic approach *linking the micro, meso and macro levels*

Various Design for Sustainability (DFS) approaches are crucial in the process of implementing CE solutions (Ceschin et al. 2016)
Design, as a primary function for **innovation** in business and increasingly in government and in other social organisational units including local communities (Ceschin et al. 2016)

Engineer as a scientist, dépanneur, mathematician, soldier, economist, and development agent (Wilkelman 2013)

Designers, as **cultural intermediaries**, can and should play a key role on the Sustainable integration (Santamaria et al. 2016)

**Designer** =
- Formulate problems
- develop, create, combine solutions
- Solutions in all scales (from infrastructures to parts)
The role of DFS to contribute CE

Evolution of the DFS

Integration of human aspects

Sustainability challenges requires an integrated set of DfS approaches spanning various innovation levels … (Ceschin et al. 2016)

Perimeter of analysis and action

[Ceschin et al., 2016]
The role of DFS to contribute CE

Evolution of the DFS

(Ceschin et al., 2016)

(Gaziulusoy, A. et al., 2015)
Understand the multi-scale and temporal evolutions linked to the integration of Sustainability in the product development process.

(Brezet 97; Millet et al. 2003, Frones et al. 2015, Ceschin et al.)
- Value is defined as the evolution in the organization of mobilized capital (Dernis 2019)

- Understand the relation between value creation and capitals towards DFS strategies

- Hypothesis:
  - the territorial resources (tangibles and intangibles) are carrying sustainable values
  - Capital allow to measure the maturity level of sustainable integration (and value creation)
DFS FRAMEWORK
Sustainable navigator

**Capital:**
Client, human, organisational, information system, knowledge, partnership, Societal, Natural, Image, Shareholders.

(Allais 2015, Allais et al.)
T. Moysset, CEO, : The objective of the company is the **human development**, in respecting the environment, by using the **economy as a means**...
DFS FRAMEWORK

Sustainable Navigator - OUTCOMES

- Creates additional values both for the company and its territory
- Modify the PDP and its life cycle
- Requires internal collaboration (and must be supported by the strategy)
- Requires collaboration with local stakeholders

(Zhang et al. 2013)
Organisational: Participative and responsible management
Shared values

Customer: Global clientele (numerous, socio-professional categories)

Brand: Reputation, notoriety, Trust, Influence, value

Societal: local dynamism: employment, tourism, economy

Knowledge: Innovation, IP R&D projects

Partnership: Fidelity
Long term Relationship

Natural: Choice of material/products fow (label, certified, local)
Ecodesign
Cleaner production
Waste management

• Company can compensate between capital ?
• What challenges will arise ?
• What effects on the territory and in the society ?

Discussion

DFS FRAMEWORK

Human: Leadership and

Territorial reservoir

Innovation from primitive knives

Heritage know-how
CONCLUSION

Design another way: Deal with technology evolution and social evolution

=> More ability to define their need and design their technology

Tangible and intangible assets

Find wastes as resources, avoid nonrenewable energy...

Transmit knowledge on new ways to design: develop design ability
Merci pour votre attention
Thank you for your attention

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