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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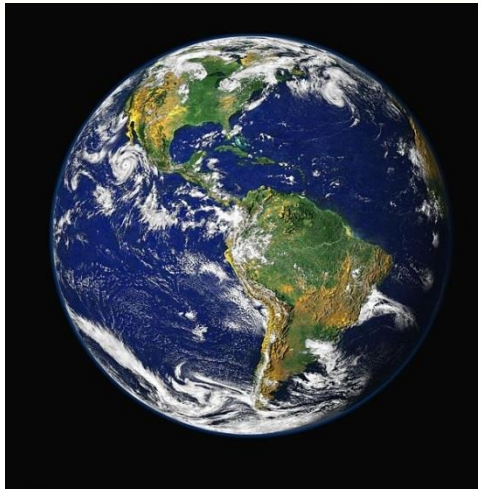
CONTEXT

Relevant challenges



Natural resources and ecosystem services

Inertia
Change of the state of the Earth

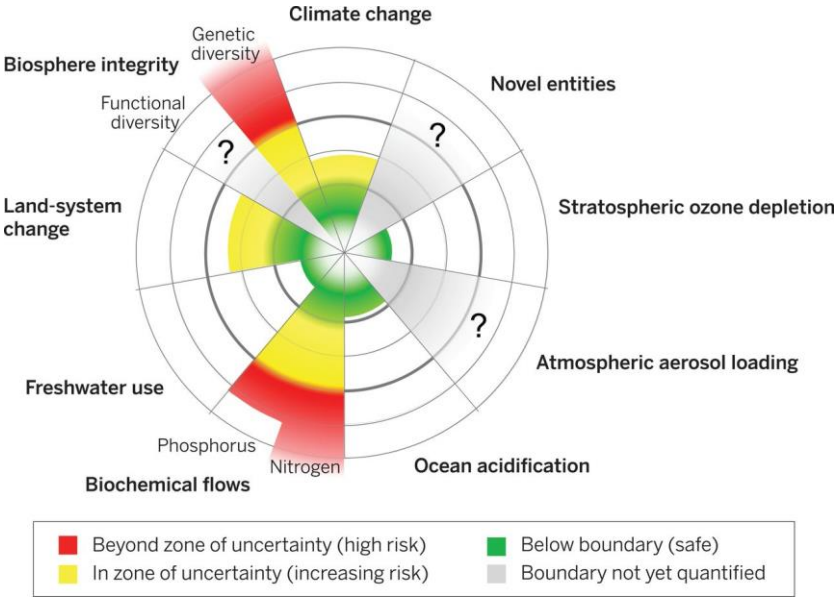
How to manage the challenges of the development of society?

Which models of transition ?

Society and technology

Habitability on Earth

Challenges

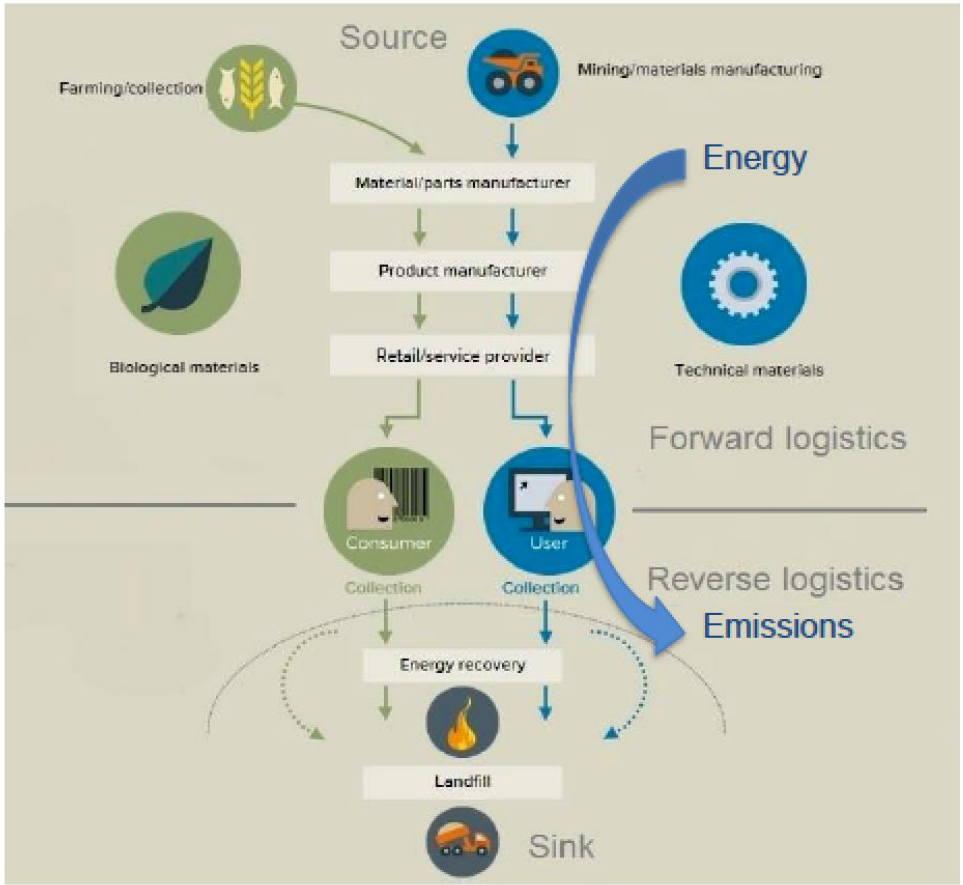


Rockstrom et al, 2009; Steffen et al. Science 2015;347:1259855

CIRCULAR ECONOMY AS DRIVER TOWARD SD ?

Definition

Biosphere | Technosphere



Source: Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment; Drawing from Braungart & McDonough, Cradle to Cradle (C2C).

- **Circulation of material flows from the source to sink**

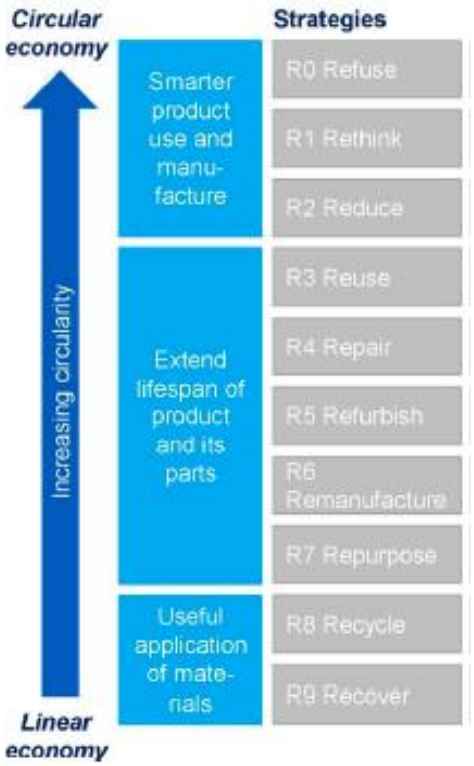
- **Several years of material stock in systems**

- **Energy is necessary to generate flows**

CIRCULAR ECONOMY AS DRIVER TOWARD SD ?

Definition

- **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 leve**l,
- **creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations**.

(Kirchherr et al. 2017)

CIRCULAR ECONOMY AS DRIVER TOWARD SD ?

Relevant challenges

- 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)

CIRCULAR ECONOMY AS DRIVER TOWARD SD ?

Relevant challenges

- Challenges :
  - Radical **reduction of the material and energy flows**
  - **Integrating and measuring** the circularity in a systemic apporach ***linking the micro, meso and macro levels***

Various Design fos Sustainability (DFS) approaches are crucial in the process of implementing CE solutions (Ceschin et al. 2016)

What role does the design play in CE ?

Design and designer

- 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)

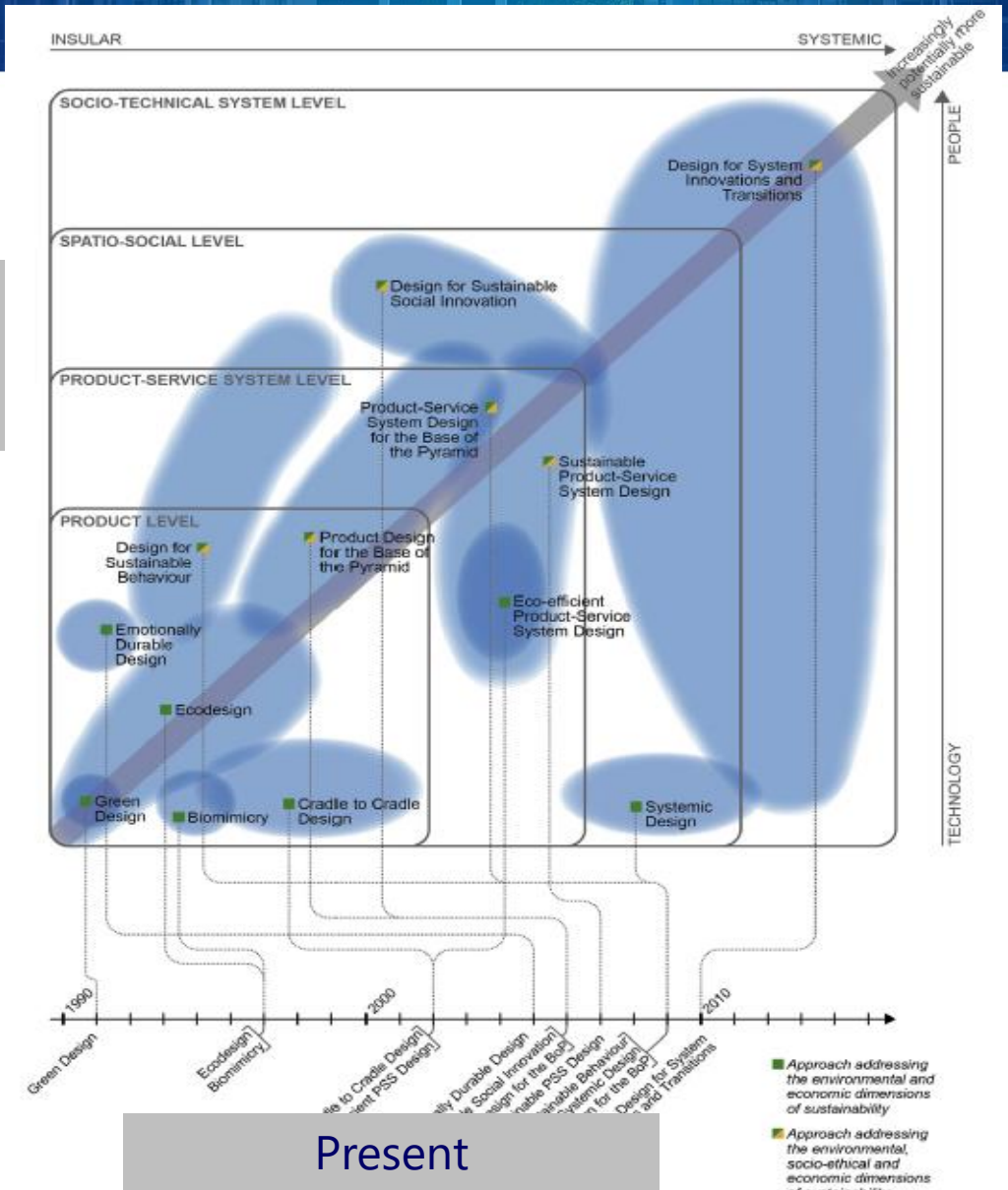
Designer =

- **Formulate problems**
- **develop, create, combine solutions**
- **Solutions in all scales (from infraestructures to parts)**

The role of DFS to contribute CE

Evolution of the DFS

[Ceschin et al., 2016]



Present

Perimeter of analysis and action

Integration of human aspects

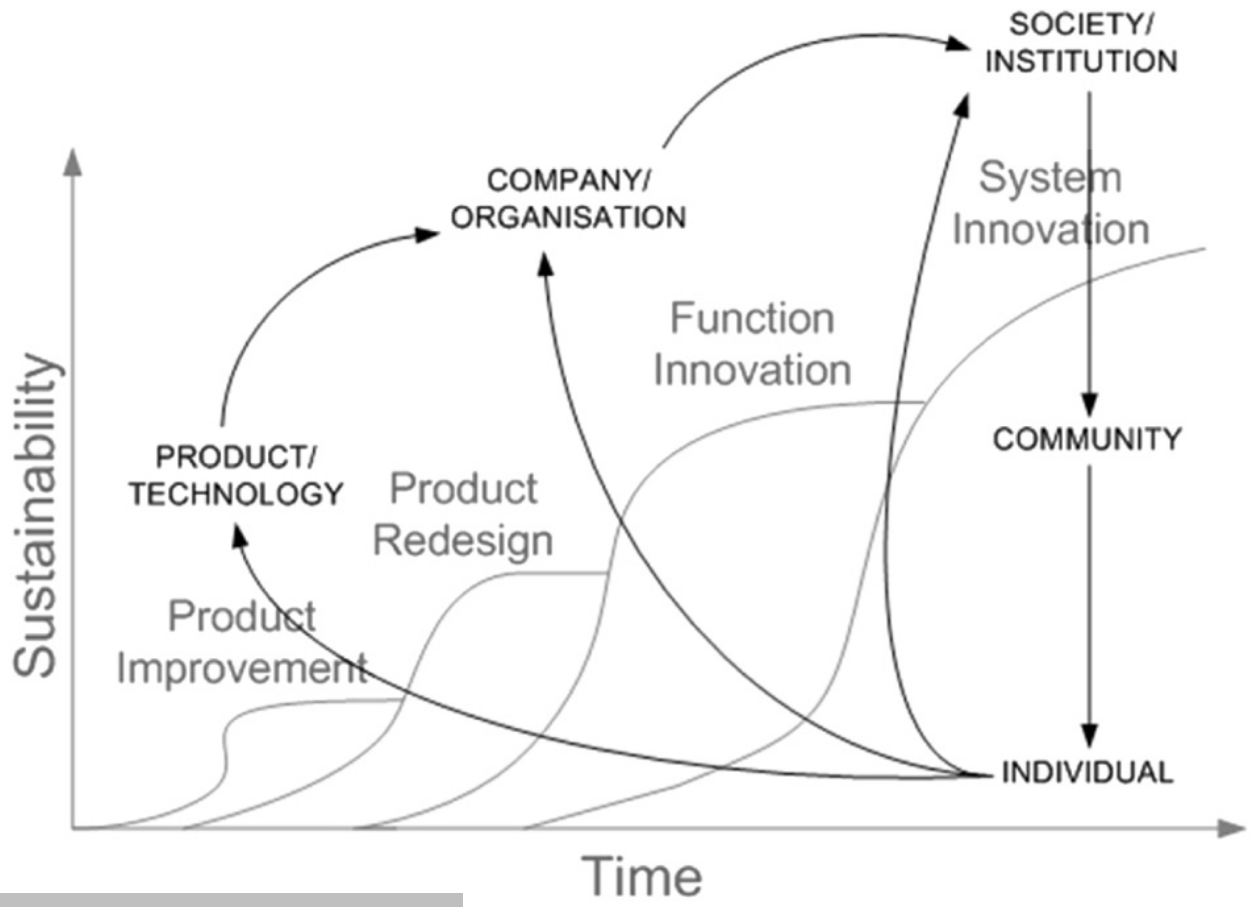
Sustainability challenges requires an integrated set of DfS approaches spanning various innovation levels …
(Ceschin et al. 2016)

The role of DFS to contribute CE

Evolution of the DFS

[Ceschin et al., 2016]

Multi-scale

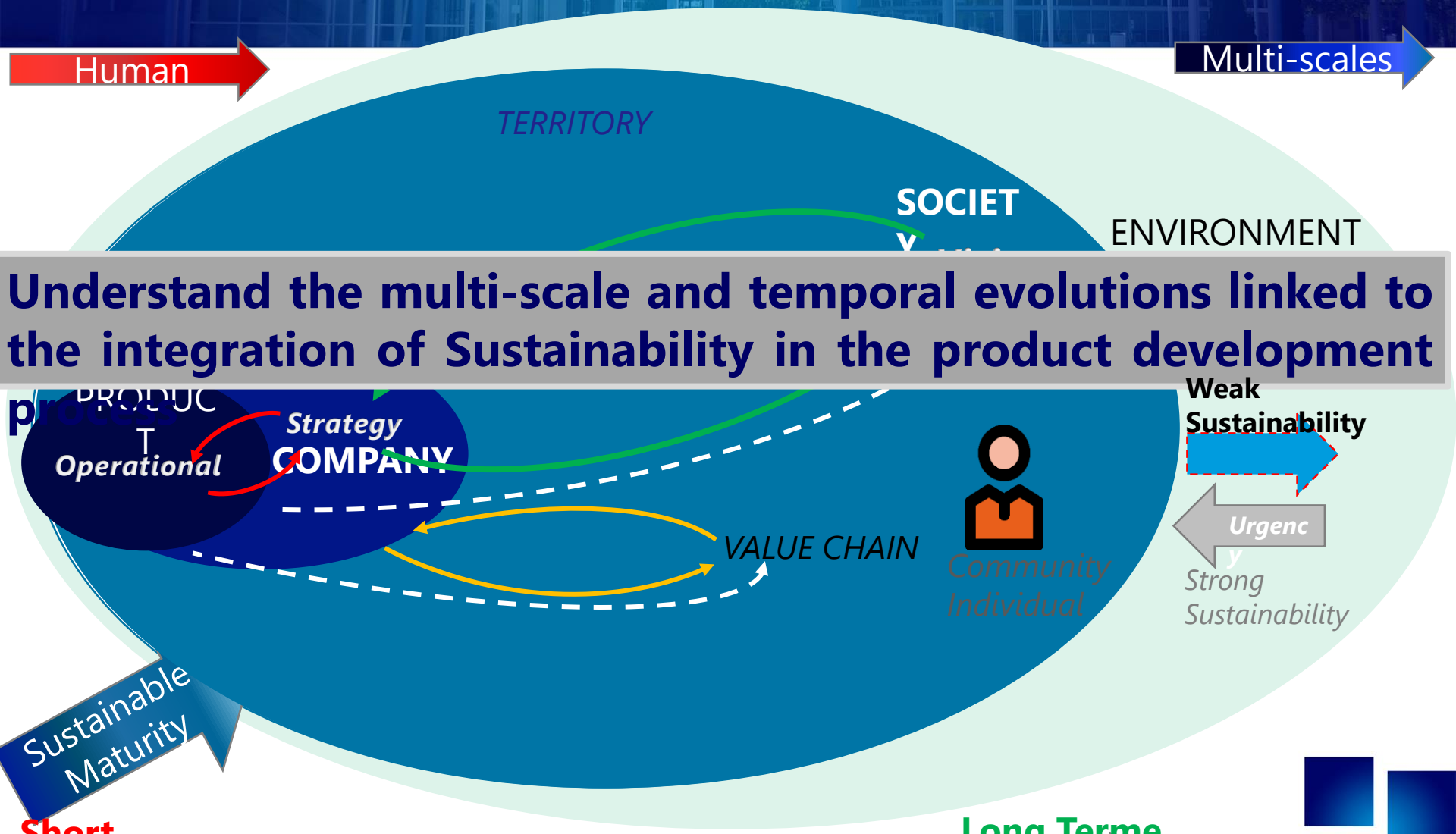


Time

(Gaziulusoy,A. et al., 2015)

FRAMEWORK FOR THE DFS INTEGRATION

OUR VISION



(Brezet 97; Millet et al. 2003,Frones et al. 2015, Ceschin et al.

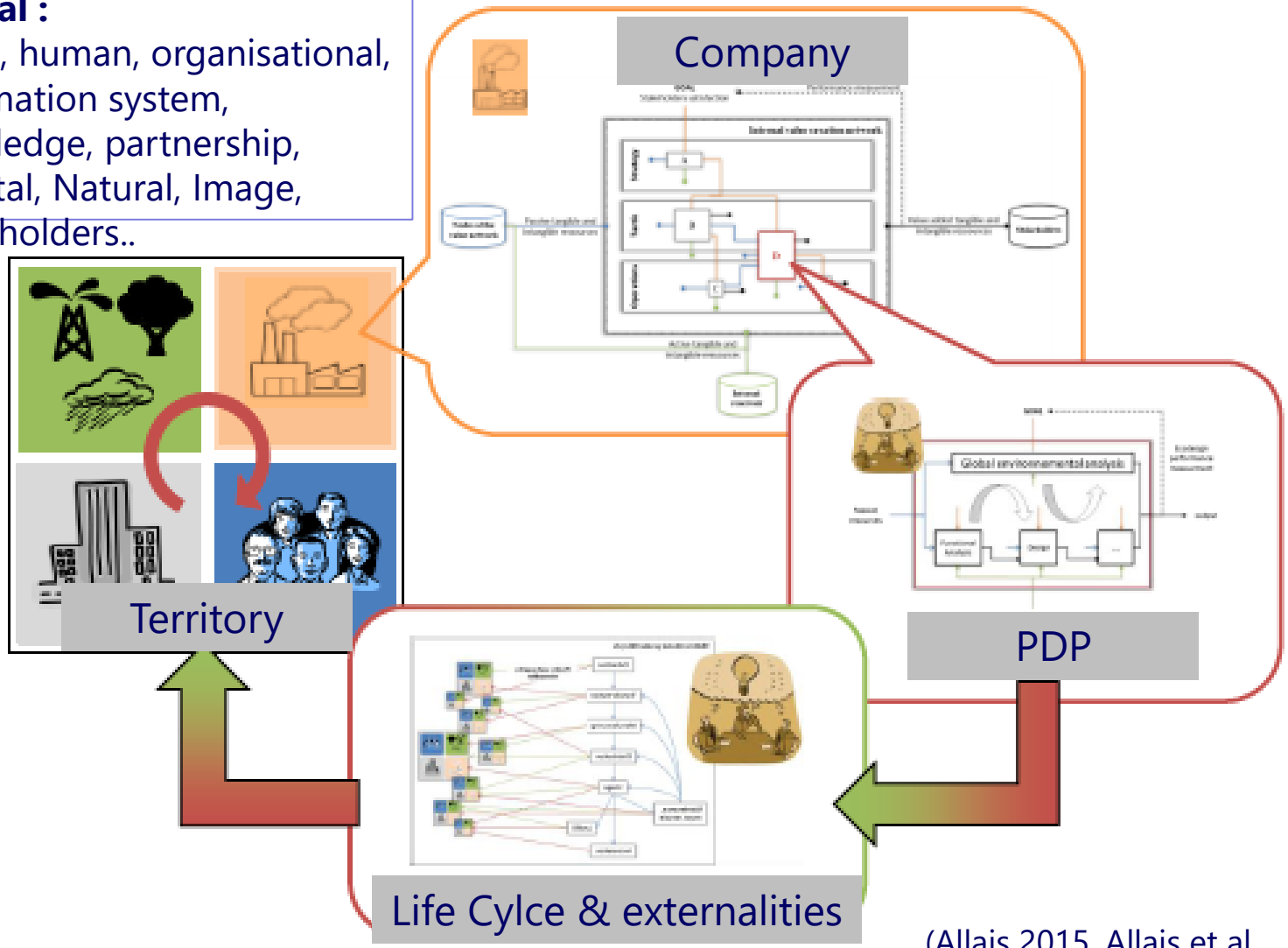
Aim of the research

- Value is define as the evolution in the organization of mobilized capital (Dernis 2019)
- Understand the relation between value creation and capitals towards DFS stratégies
- 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.

DFS FRAMEWORK

Case Study : Knife Manufacture

Knowledge:
Innovation, IP
R&D projects

Organisational:
Participative and responsable management
Shared values

Brand:
Reputation, notoriety, Trust, Influence, value
- *Trademark protection*

Societal:
local dynamism: employment, tourism, economy

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

Partnership:
Fidelity
Long term
Relationship

Human:
Ledership and Strategy
Collaborators

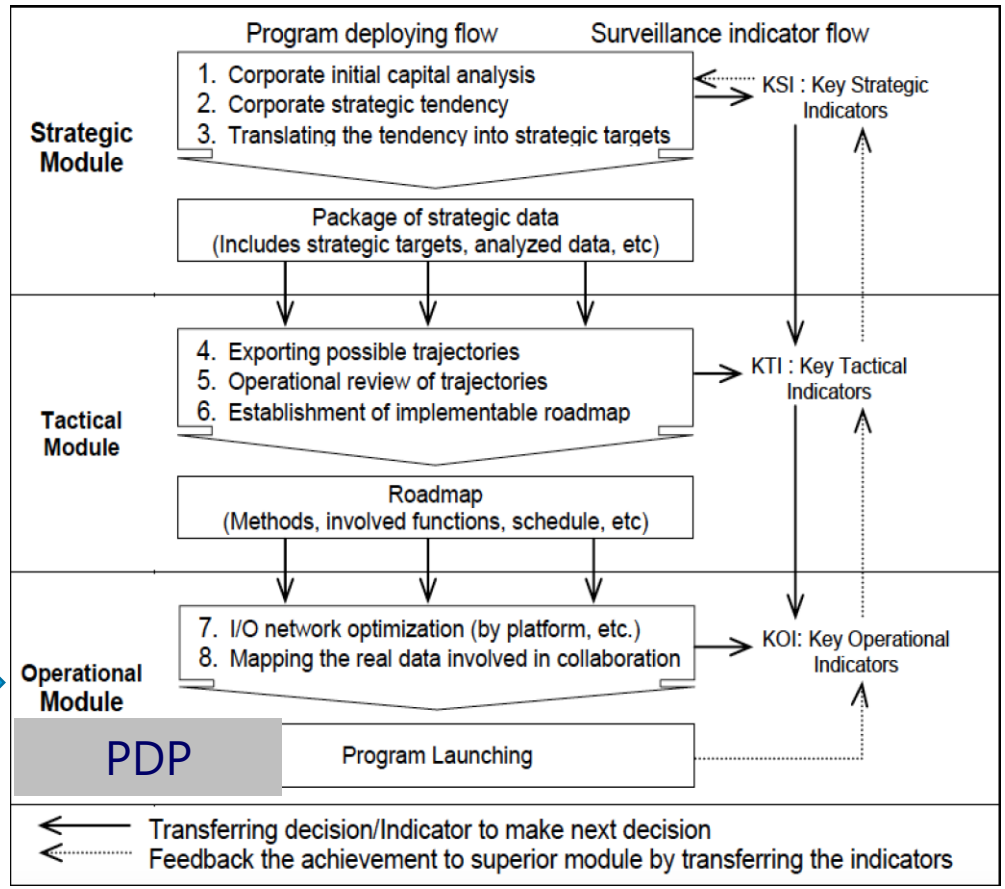
Natural:
Choice of material/products fow (label, certified, local)
Ecodesign
Cleaner production
Waste management

T.Moysset, CEO, :The objective of the company is the **human development,** in respecting the environment, by using the **economy as a means ..**

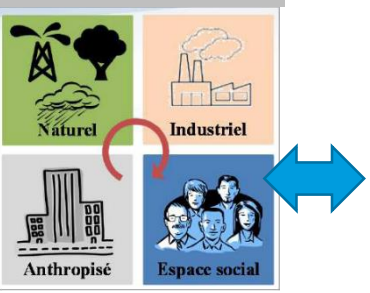
DFS FRAMEWORK

Sustainable Navigator - OUTCOMES

Company



Territory



(Zhang et al. 2013)

- 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

DFS FRAMEWORK

Discussion

Knowledge:
Innovation, IP
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Ecodesign
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Waste management

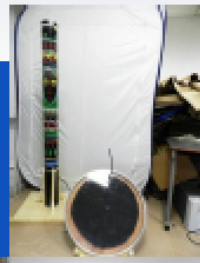
- Company can compansate between capital ?
- What challenges will arise ?
- What effects on the territory and in the society ?

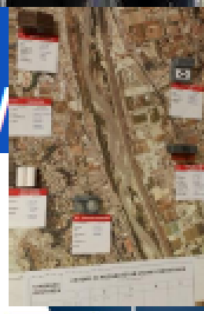
CONCLUSION

Tangible and intangible assets

Find wastes as resources, avoid non renewable energy…

Design another way : Deal with technology evolution and social evolution
=> More ability to define their need and design their technology





Transmit knowledge on new ways to design: develop design ability

Merci pour votre attention
hank you for your attention

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