ERASME
Jean Monnet Excellence Center
on Sustainability

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Degrowth and Hunger
How Reboot the Economic Matrix ?

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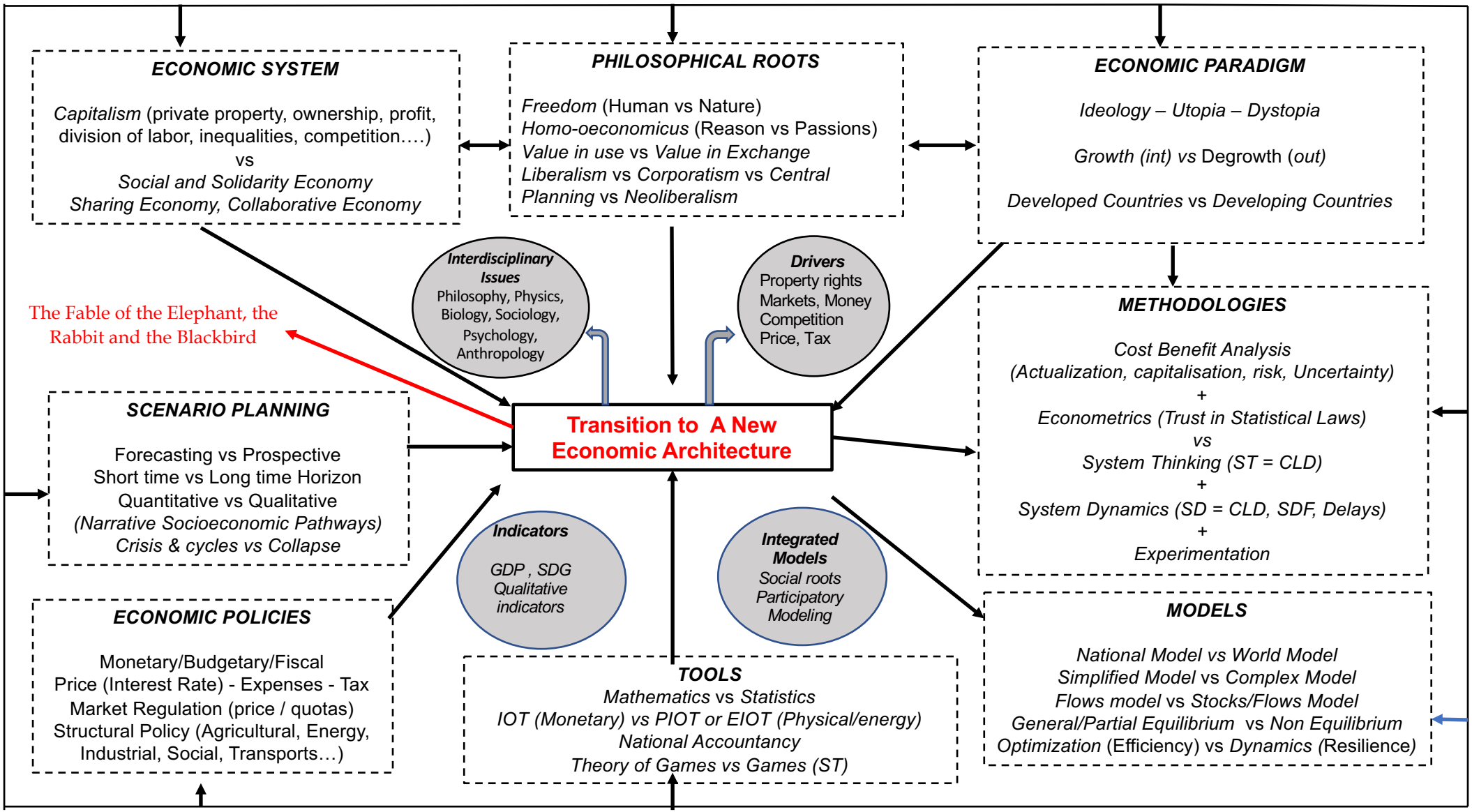
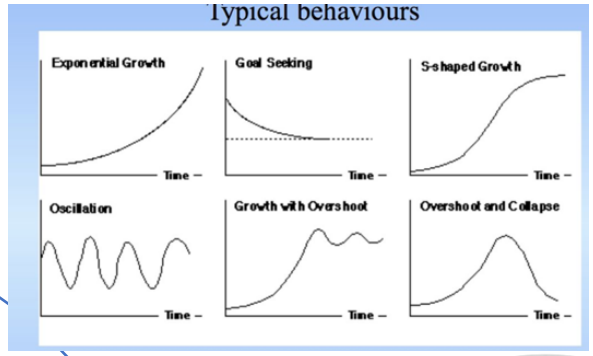
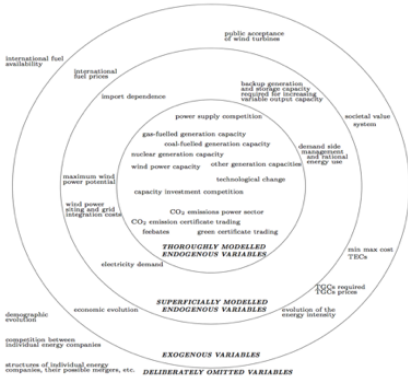
MAPPING THE ECONOMIC SYSTEM


ECONOMIC SYSTEM
Capitalism (private property, ownership, profit, division of labor, inequalities, competition….)
vs
Social and Solidarity Economy
Sharing Economy, Collaborative Economy
PHILOSOPHICAL ROOTS
Freedom (Human vs Nature)
Homo-oeconomicus (Reason vs Passions)
Value in use vs Value in Exchange
Liberalism vs Corporatism vs Central Planning vs Neoliberalism
ECONOMIC PARADIGM
Ideology – Utopia – Dystopia
Growth (int) vs Degrowth (out)
Developed Countries vs Developing Countries
Interdisciplinary Issues
Philosophy, Physics, Biology, Sociology, Psychology, Anthropology
Drivers
Property rights
Markets, Money
Competition
Price, Tax
The Fable of the Elephant, the Rabbit and the Blackbird
METHODOLOGIES
Cost Benefit Analysis
(Actualization, capitalisation, risk, Uncertainty)
+
Econometrics (Trust in Statistical Laws)
vs
System Thinking (ST = CLD)
+
System Dynamics (SD = CLD, SDF, Delays)
+
Experimentation
SCENARIO PLANNING
Forecasting vs Prospective
Short time vs Long time Horizon
Quantitative vs Qualitative
(Narrative Socioeconomic Pathways)
Crisis & cycles vs Collapse
Transition to A New Economic Architecture
Indicators
GDP , SDG
Qualitative indicators
Integrated Models
Social roots
Participatory Modeling
ECONOMIC POLICIES
Monetary/Budgetary/Fiscal
Price (Interest Rate) - Expenses - Tax
Market Regulation (price / quotas)
Structural Policy (Agricultural, Energy, Industrial, Social, Transports…)
TOOLS
Mathematics vs Statistics
IOT (Monetary) vs PIOT or EIOT (Physical/energy)
National Accountancy
Theory of Games vs Games (ST)
MODELS
National Model vs World Model
Simplified Model vs Complex Model
Flows model vs Stocks/Flows Model
General/Partial Equilibrium vs Non Equilibrium
Optimization (Efficiency) vs Dynamics (Resilience)

How to map the dynamics of the Economy system ? Systems thinking and Systems Dynamics

- Behavioral structure
- Limits of the system
- Forest Thinking
- Causalities vs correlation
- Loops CLD, SFD
- Leverage Points

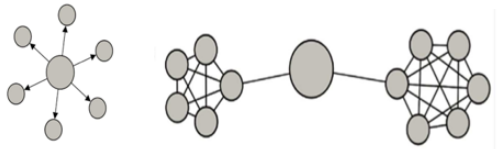


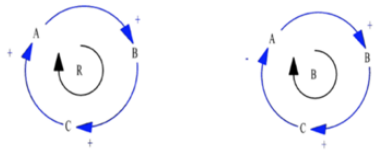


Diemer (2004)

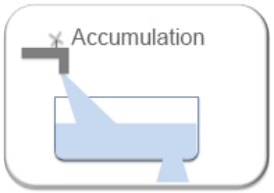
	Drivers	Barriers
Economic	– Increased revenue (Giurco et al. 2011) – Lower input costs (Van Beers et al. 2007)	– Operational costs and revenues (Giurco et al. 2011) – Lack of funding (Bacudio et al. 2016; Fang et al. 2011; Li et al. 2015) – Insufficient financial support from banks (Su et al. 2013) – Investments in extended production systems (Van Beers et al. 2007)
Regulations	– New pollutant targeted regulations (Giurco et al. 2011) – Strong government engagement (Mathews & Tan 2011; Zhu & Ruth 2014) – Government-initiated policies (Behera et al. 2012)	– Environmental regulations (Giurco et al. 2011) – Inadequate public tax incentives (Su et al. 2013)
Cooperation	– Between stakeholders (Geissdoerfer et al. 2017) – Social ties (Zhu & Ruth 2014)	– Lack of willingness to collaborate (Bacudio et al. 2016) – Lack of cooperation and information sharing (Gibbs & Deutz 2007; Golev et al. 2015) – Lack of trust among locators (Gibbs & Deutz 2007)
Knowledge and technology	– Specific knowledge that actors acquire through experience and learning of IS in their system (Boons et al. 2011) – Technical knowledge (Zhu and Ruth 2014)	– Technological challenges (Li et al. 2015) – Lack of technology infrastructure readiness (Costa & Ferrão 2010; Li et al. 2015)
Management	– Corporate sustainable focus in the firm (Giurco et al. 2011) – Proactive management (Geissdoerfer et al. 2017)	– Cultural changes within firms (Giurco et al. 2011) – Lack of awareness of IS (Bacudio et al. 2016; Chiu & Yong 2004) – Lack of top management support (Bacudio et al. 2016; Chiu & Yong 2004)
Resources	– Availability of resources (Zhu & Ruth 2014) – Staff mobility between different industries (Van Beers et al. 2007)	– Resource scarcity (Giurco et al. 2011)
Location	– A facilitator in the system (Behera et al. 2012)	– Distances between companies (Giurco et al. 2011)

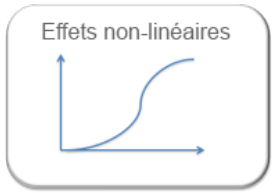
High level of exits **Mediation**



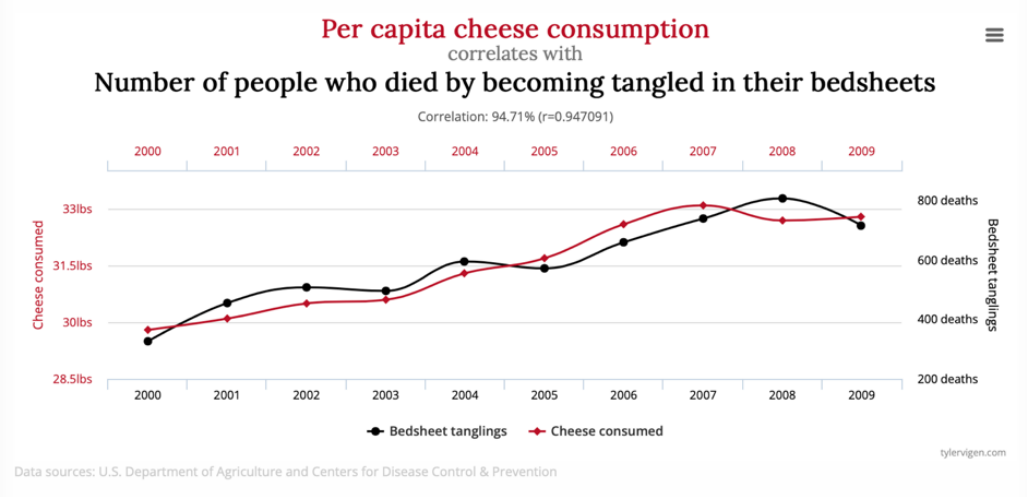


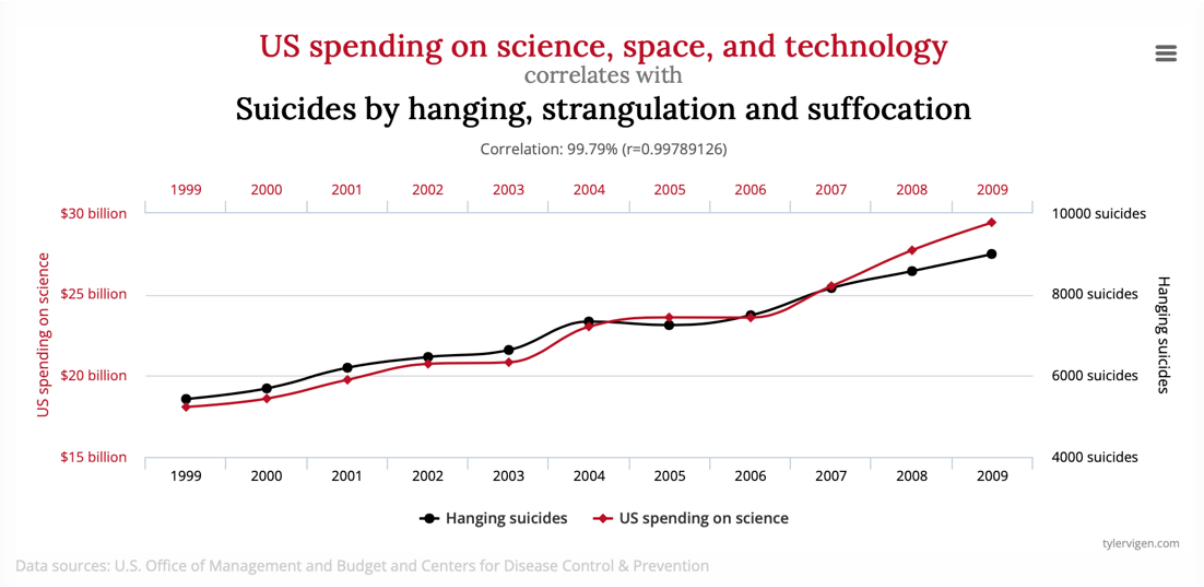
Source : Sterman (2000), Diemer (2004)



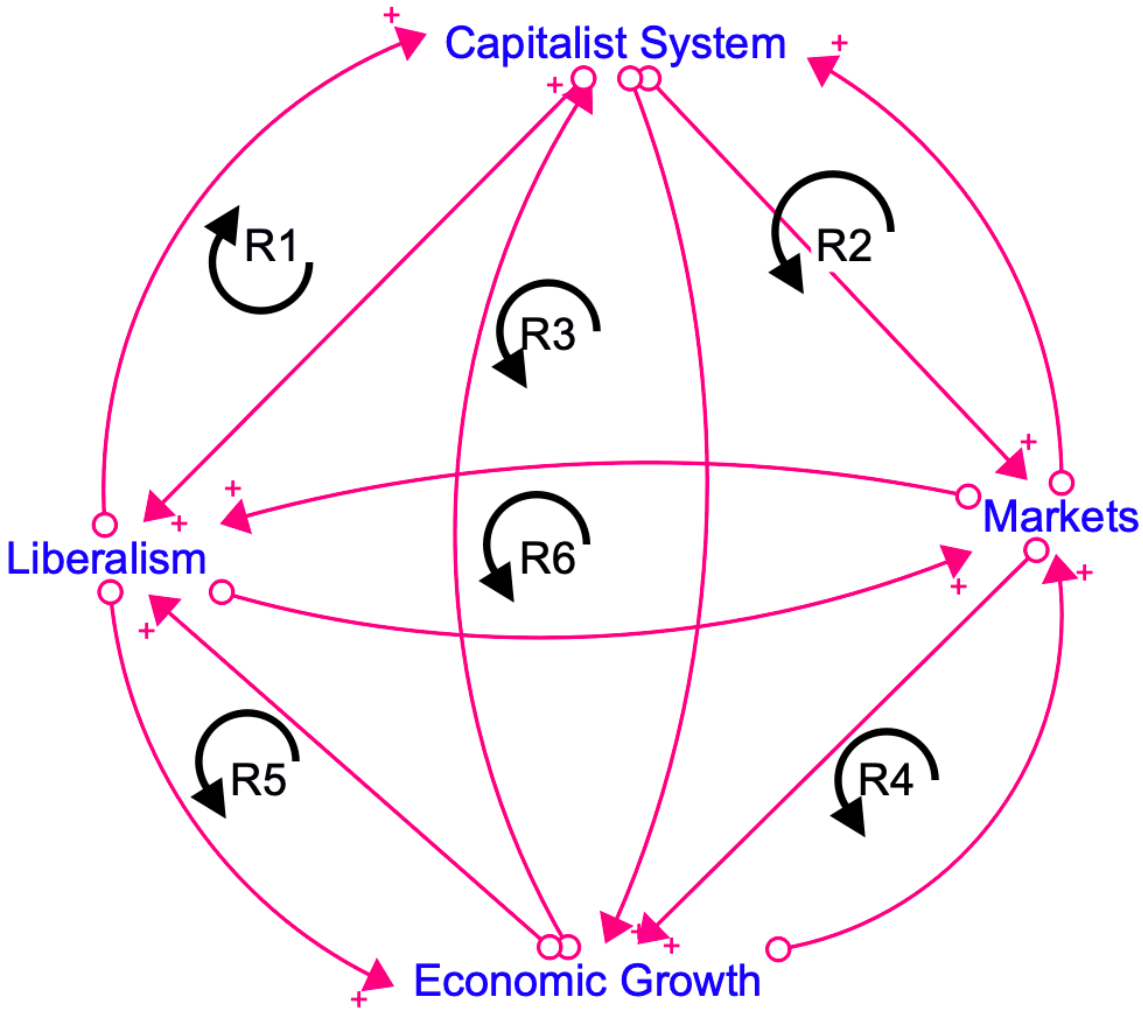


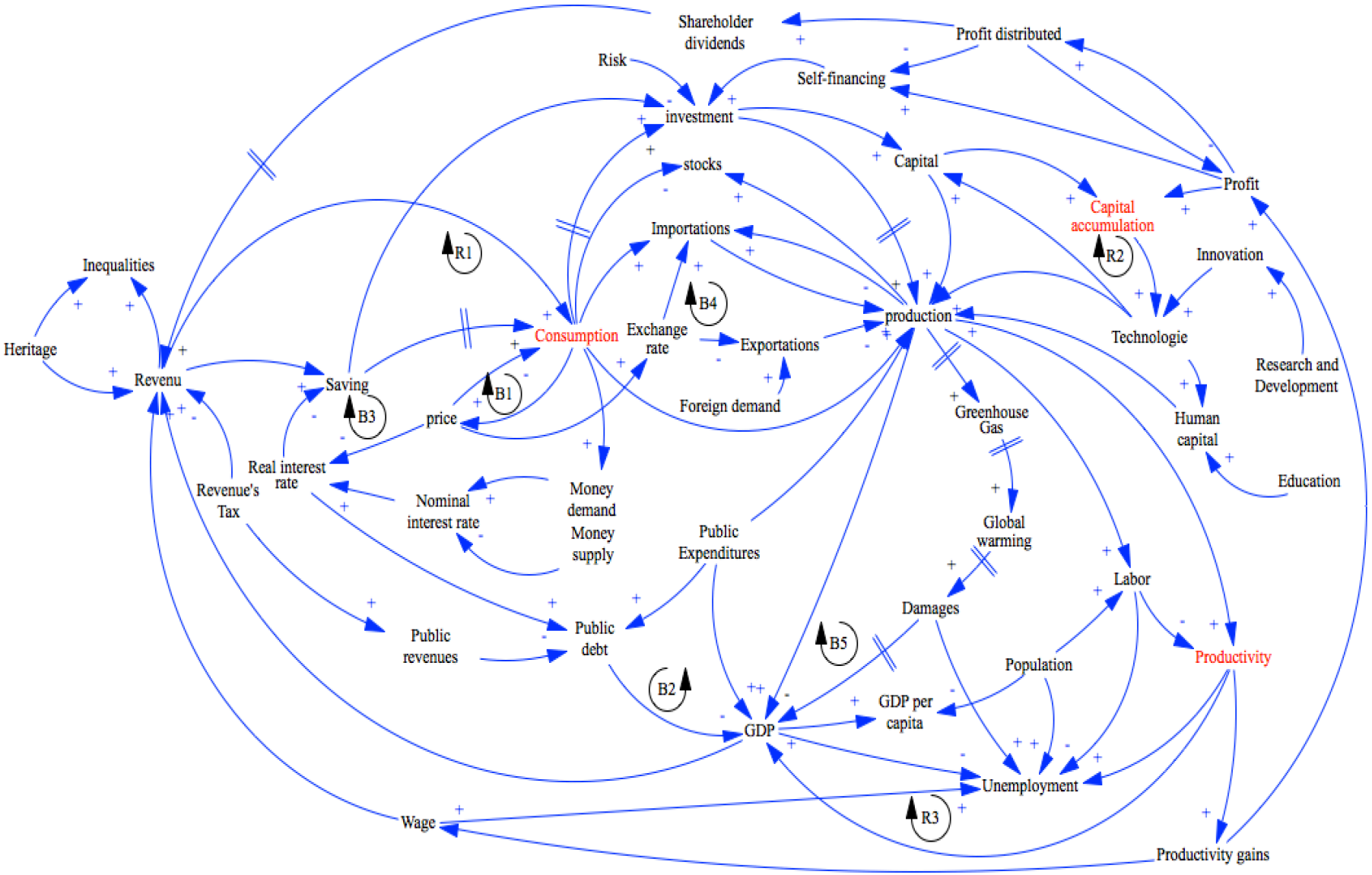
Correlation does not mean causality, it's very hard to prove a link of causality





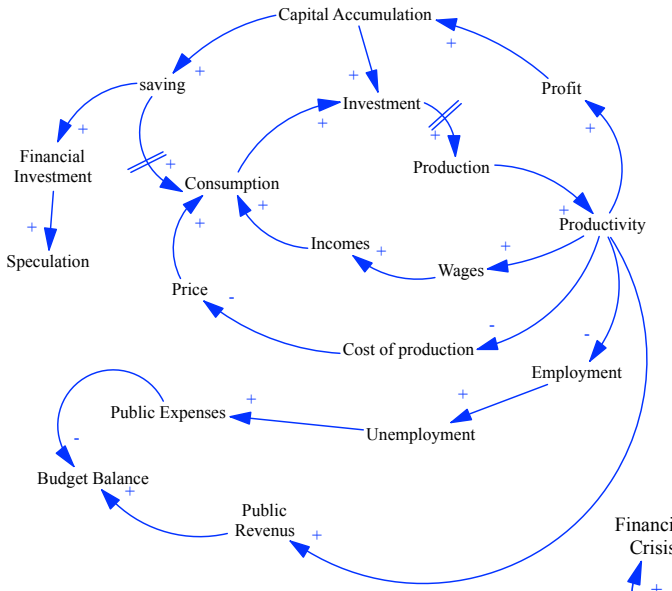
The economic system is so resilient because too much reinforcing loops (no regulation loops)





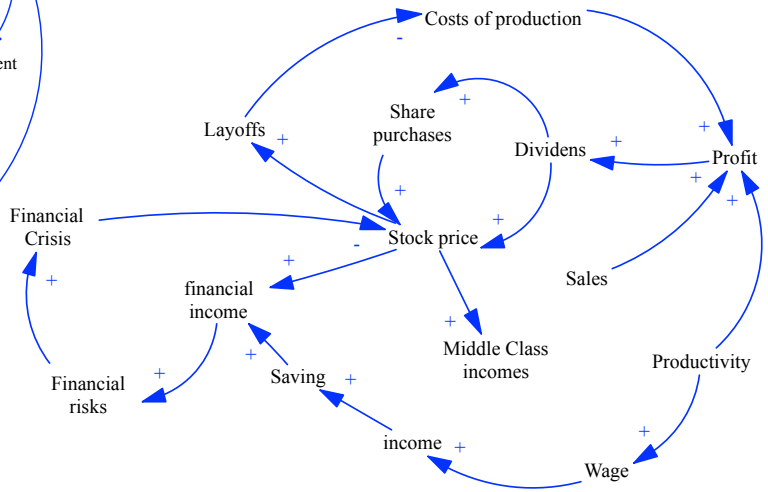
The dynamics of the economic system

Three Loops of the Economic Dynamic



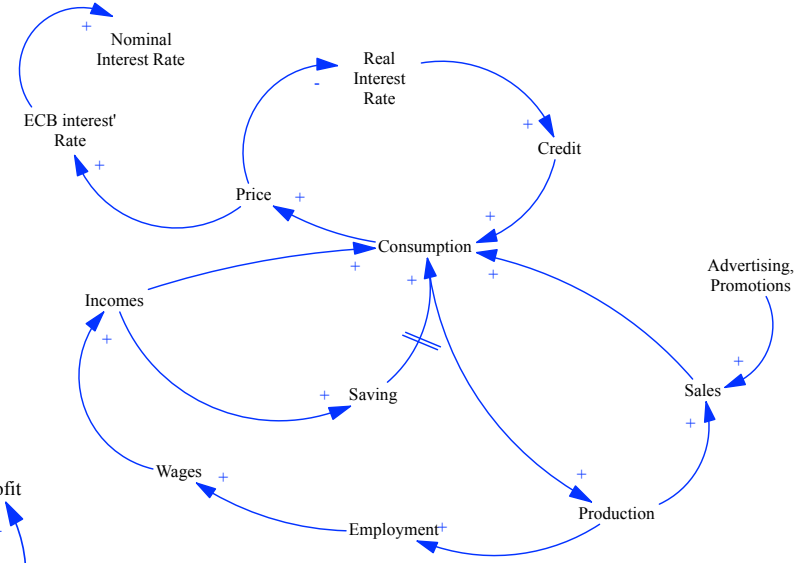
Productivity Loop

To reduce working time, at the same salary, you have to be more productive. 40 hours per week 35 hours per week + Hourly productivity



Capital Accumulation Loop

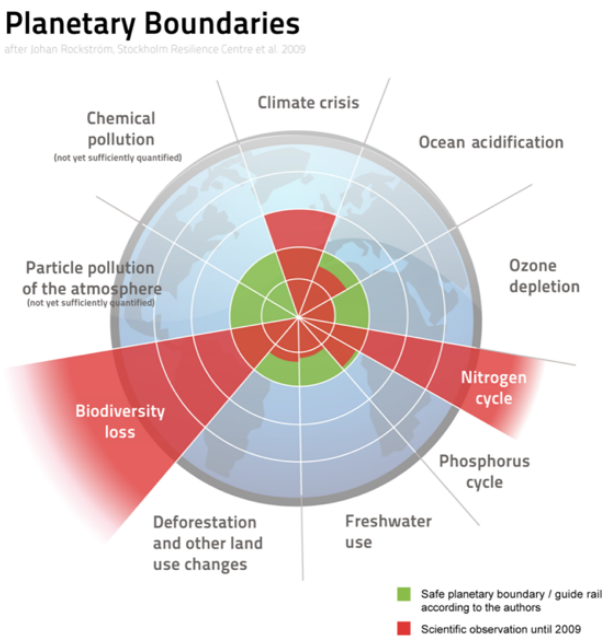
The French have savings equal to 5,000 billion euros = 2 times France's GDP

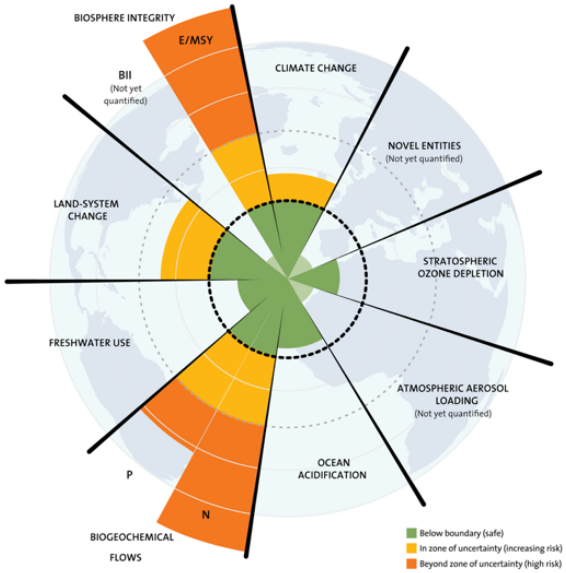


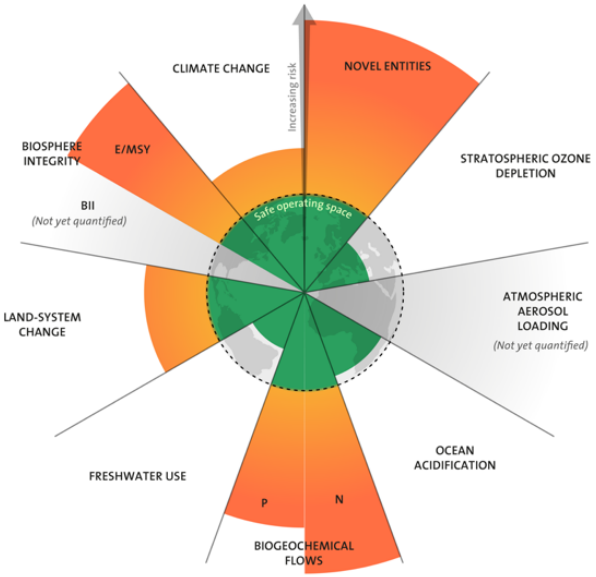
Consumption Loop

A Frenchman consumes 84% of his income, an American consumes 98% of his income

There is an upper limit (Environmental) beyond which one cannot go







Source : Rockström & al. (2009)

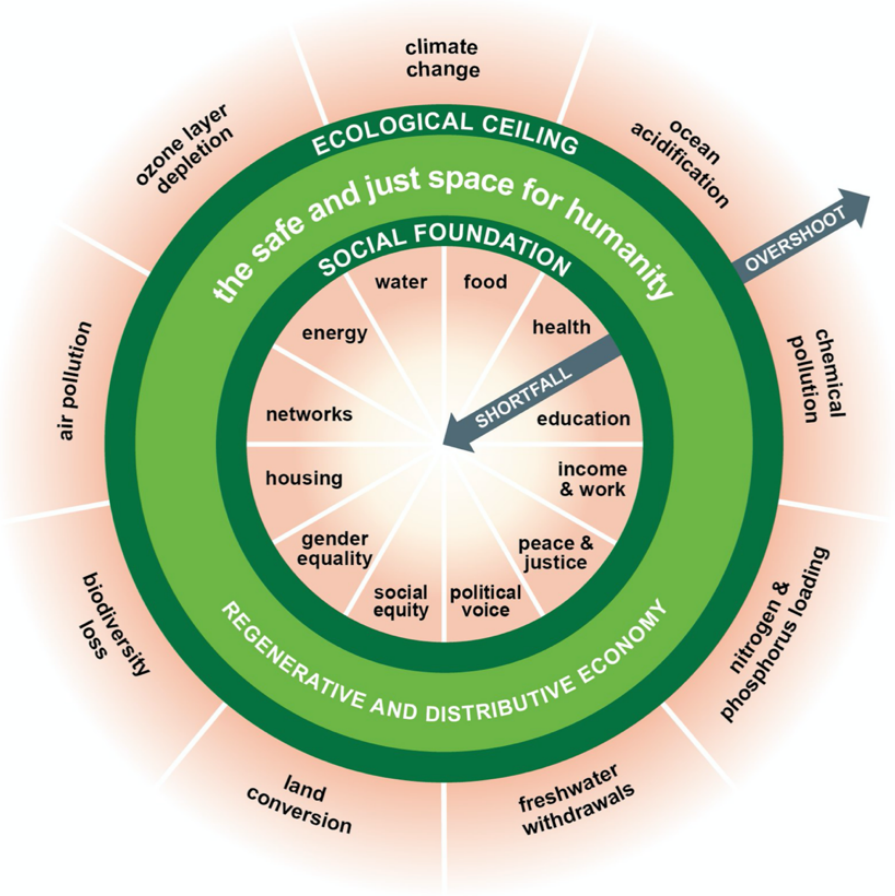
Source : Steffens & al. (2015)

Source : Persson & al. (2022)

Introducing environmental limits for economic growth (planet Bpundaries)

There is a floor limit (social) below which one does not want to go

Doughnut Economics

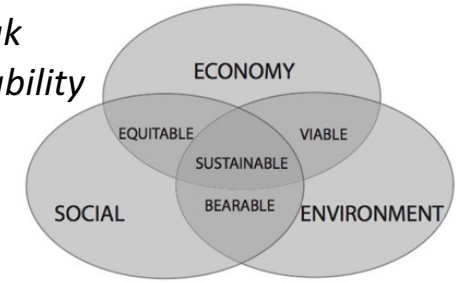


Raworth (2012, 2017)

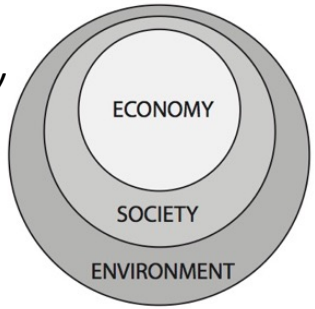
The economic system has to be redesigned into the light of Strong Sustainability

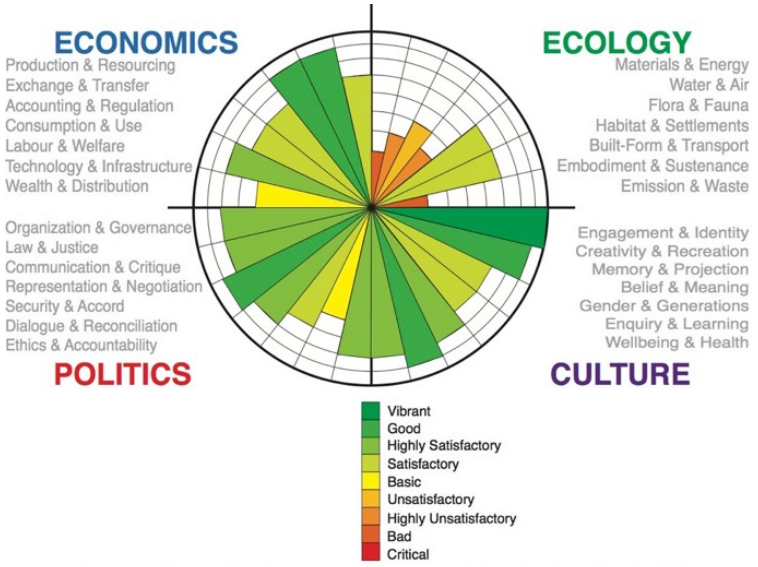
Strong Sustainability → Circles of Sustainability → Adapted for Circular Economy

Weak Sustainability

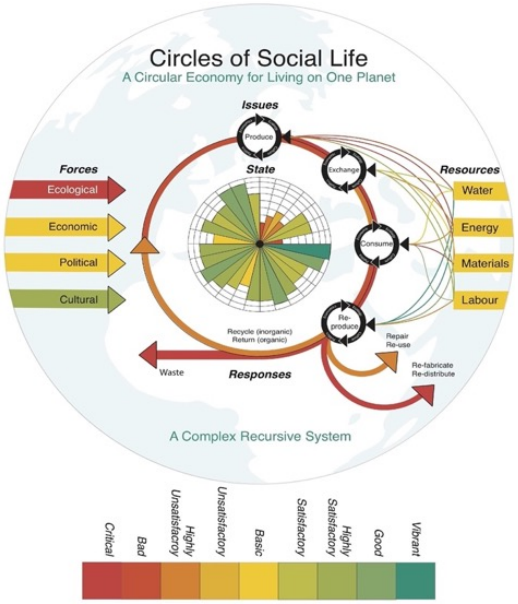


Strong Sustainability





CIRCLES OF SUSTAINABILITY



The Fable of the Elephant, the Rabbit and the Black Bird (Diemer, 2019)

(The Elephant : Economy)

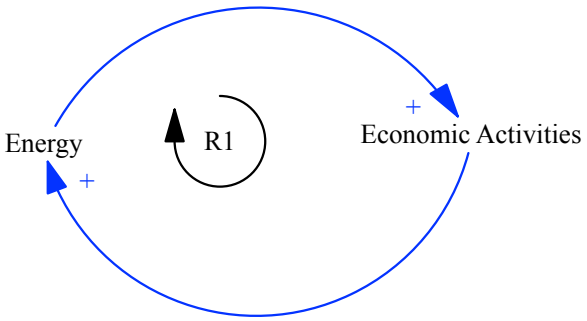
(The Rabbit : Energy)

(The Black Bird : Climate)

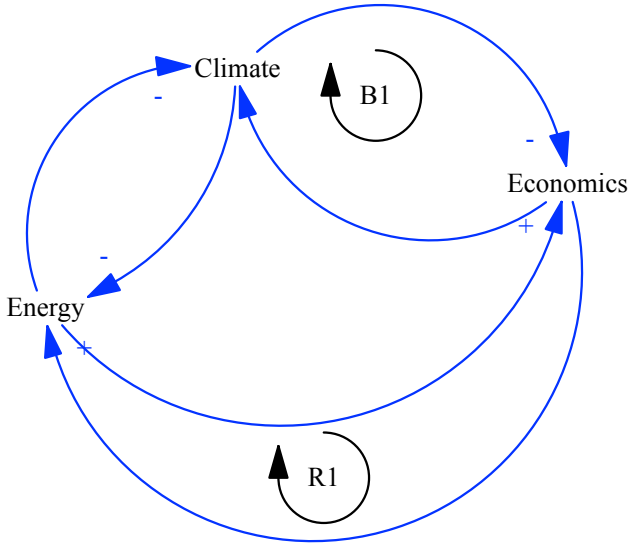
In 1977, Charles Hitch edited a book untitled " Modeling Energy – Economy Interactions : Five Approachs
One of the five articles has been written by W. Hogan and Manne S., "The Fable of Elephant and the Rabbit"

The statement : "*In most energy policy studies, the energy sector is viewed in isolation from the remainder of the economy, and the analysis is performed without consideration of the broader impacts. Typically, the GDP and other macro-economic indices are taken as given – as though they were unaffected by the energy sector*" (1977, p. 247).

In 1977, the conclusion was clear : the two way linkages between energy and GDP are significant - we can not threat the energy sector in isolation, but we must consider the full interdependence effects

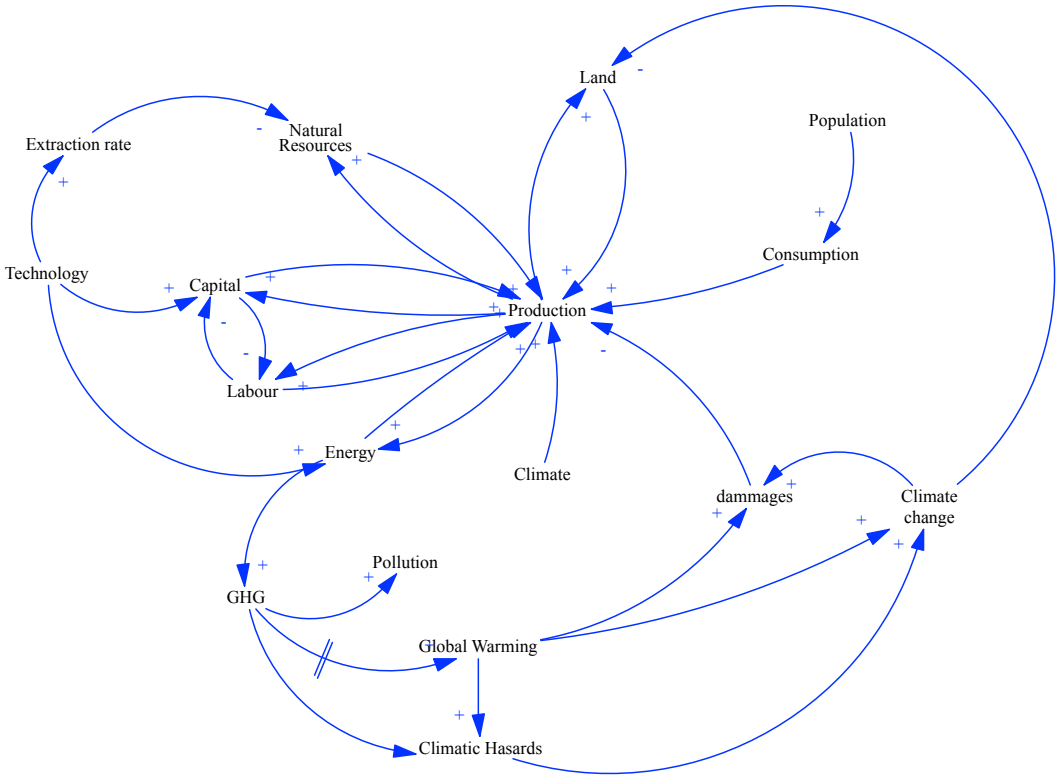


Today, Energy is an input for the economic activities (more GDP = more energy) but generates damages to economic activities (GHG) and jeopardizes life on earth. Climate as an input, may produce more economic activities but also creates some damages.



Conclusion : we can not study Economy – Energy and Climate in isolation –> causalities and interlinkages (Diemer, 2009)

Climate as Energy are inputs for production….



The Long Term Growth Model of the World Bank ????

Long Term Growth Model (LTGM v4.1) - Model Description

Steven Pennings (spennings@worldbank.org)

27 June 2018

- **NEW** in LTGM v4: effect of growth on poverty (via log-normal income distribution, Section 5)
- The neoclassical growth model is based on Solow (1956), Swan (1956) and Hevia and Loayza (2012)
  - There are only two key parts: the production function and capital accumulation.
- Model 1: assume a path for the investment share of GDP $(I/Y) \rightarrow$ implied per-capita GDP growth.
- Model 2: assume a path of growth in GDP per capita $\rightarrow$ required investment share of GDP (I/Y).
- Model 3: assume a path for the savings share of GDP $(S/Y) \rightarrow$ implied per-capita GDP growth.
- A Current Account Balance or External Debt constraint converts savings (S/Y) into (I/Y) in Model 3. The constraint also allows savings to be calculated as residual in Model 1 and 2 (see Section 3 for details).
- Section 4 summarizes the drivers of per-capita GDP growth in one equation (and compares to the ICOR).

1 Model 1: Growth given investment

1.1 The production function

I assume a standard production function where Y_t is GDP, A_t is the total factor productivity, K_t is the capital stock, and $h_t L_t$ is *effective* labor used in production, which can be further decomposed as h_t human capital *per worker*, and L_t is the number of workers. β is the labor share.

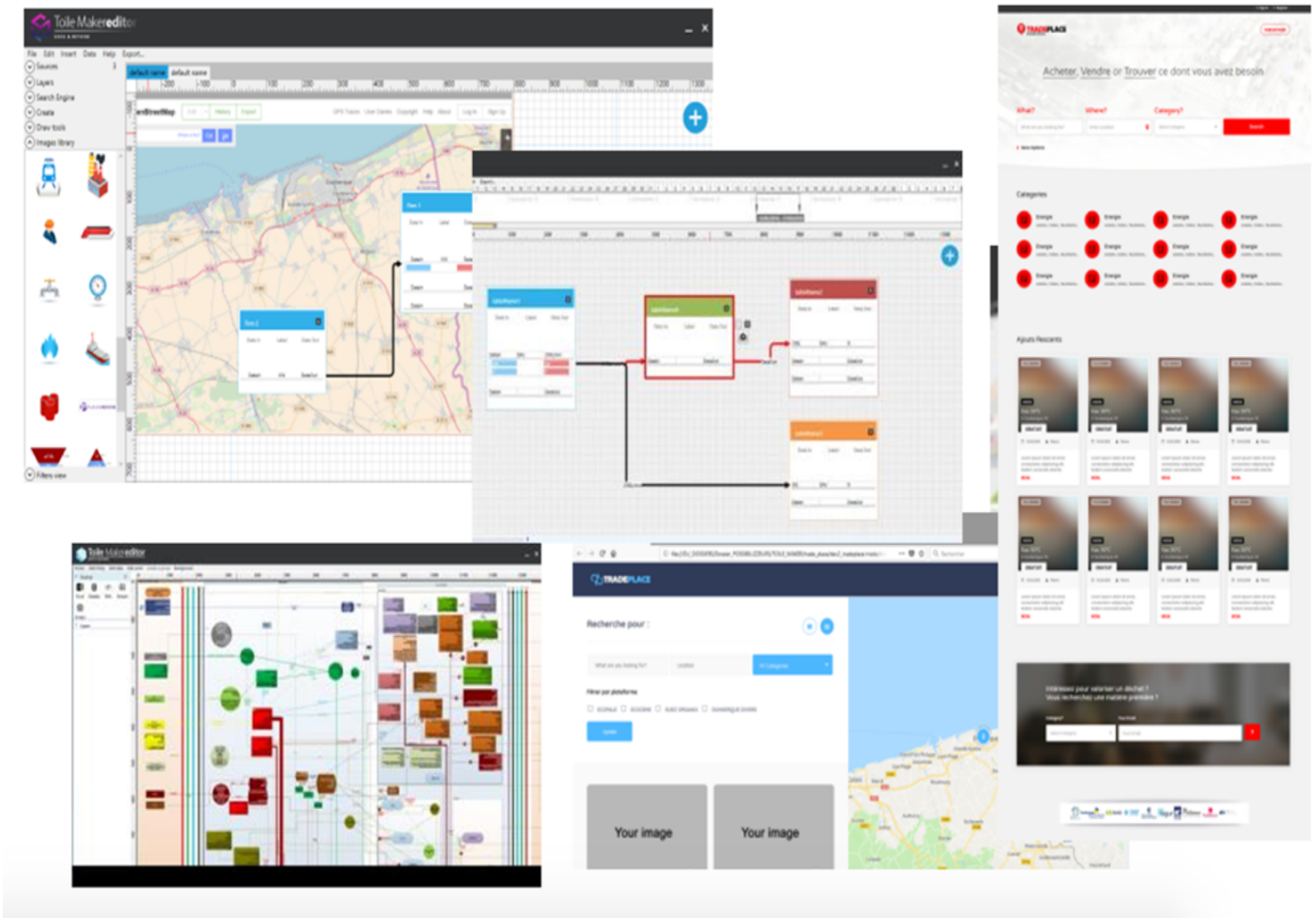
$$Y_t = A_t K_t^{1-\beta} (h_t L_t)^{\beta} \tag{1}$$

METHODS, TEACHING AND TRAINING

1. Describe how the system works ?

TOILE MAKER

Using Clickchart software



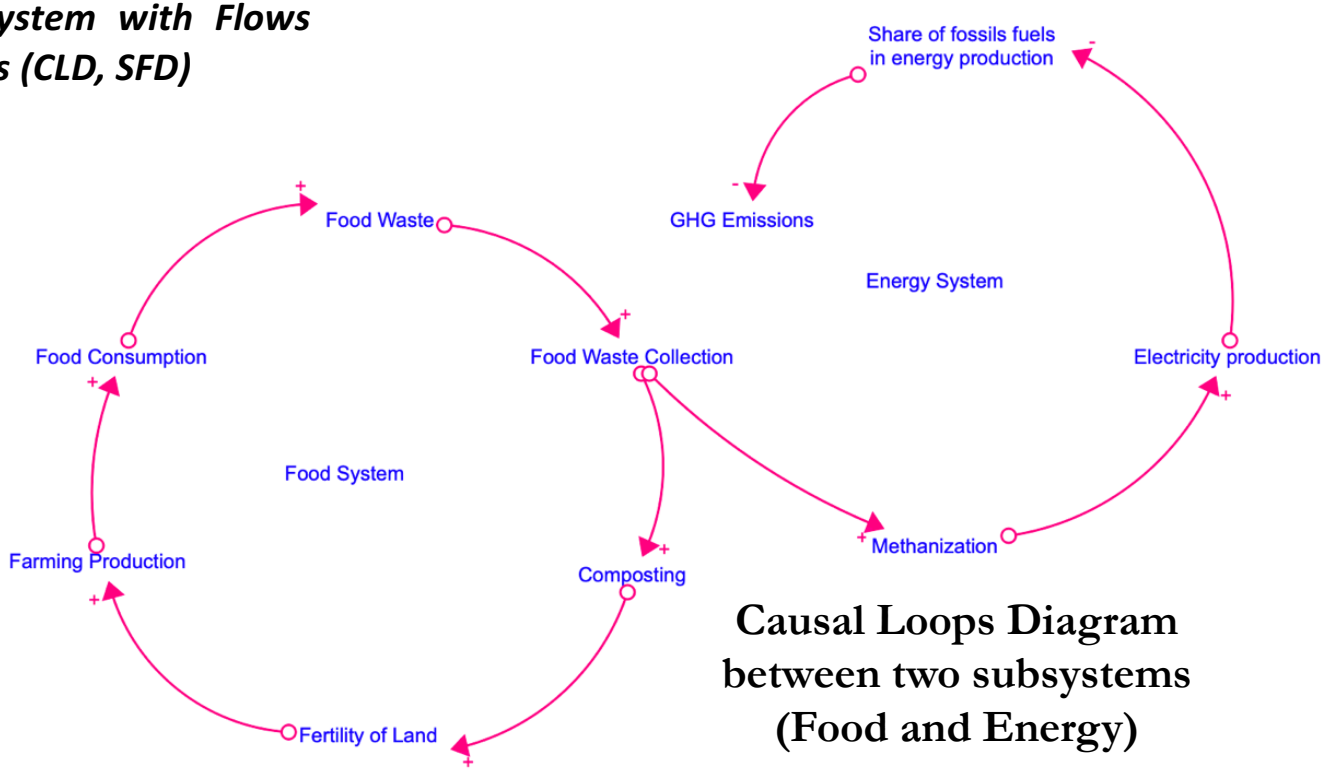
Mapping the actors and the flows

Collecting Data

Food Toile

2. Modelling the system with Flows and Stocks Diagrams (CLD, SFD)

Qualitative structure of the model



Causal Loops Diagram between two subsystems (Food and Energy)

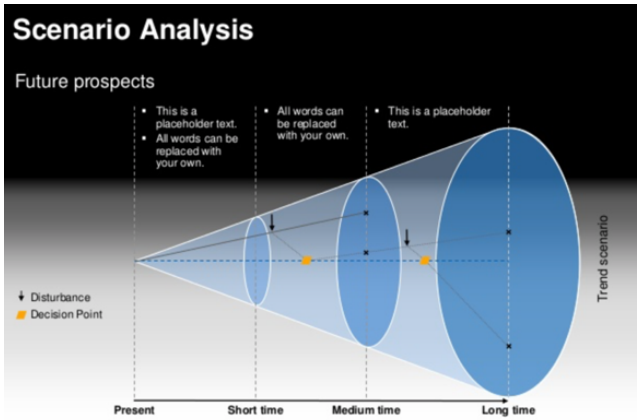
Quantitative structure of the model

3. Challenging Scenarios

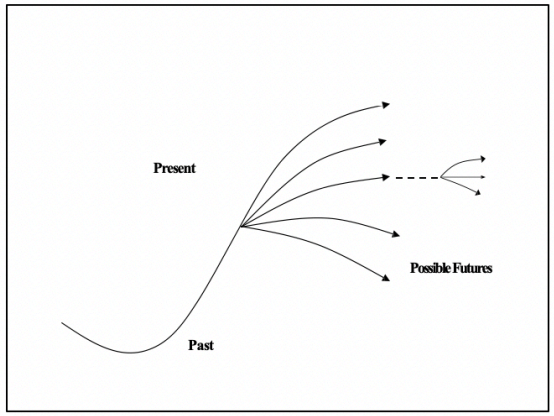
Design how the system should be ?

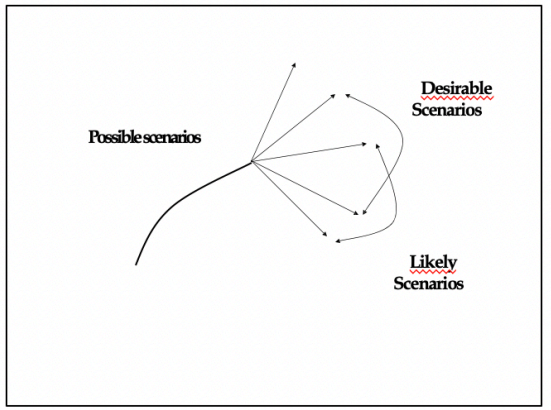
Narratives

Method



model + Prospective



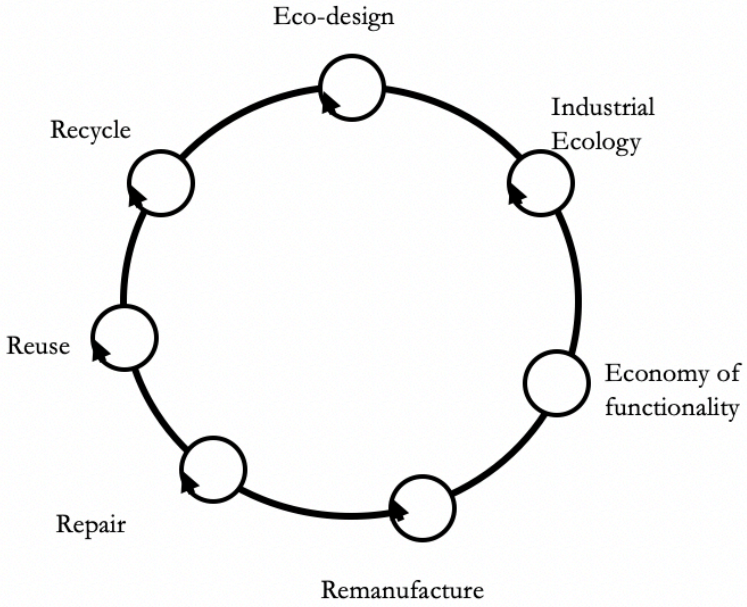


Diemer (2017)

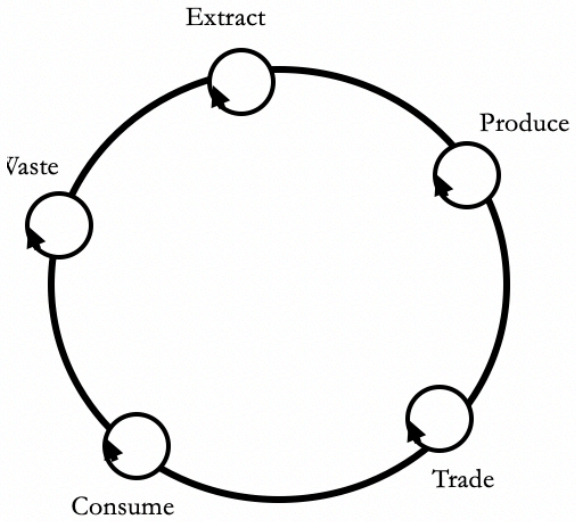
DEGROWTH, A SHIFT OF PARADIGM

Degrowth – Definition

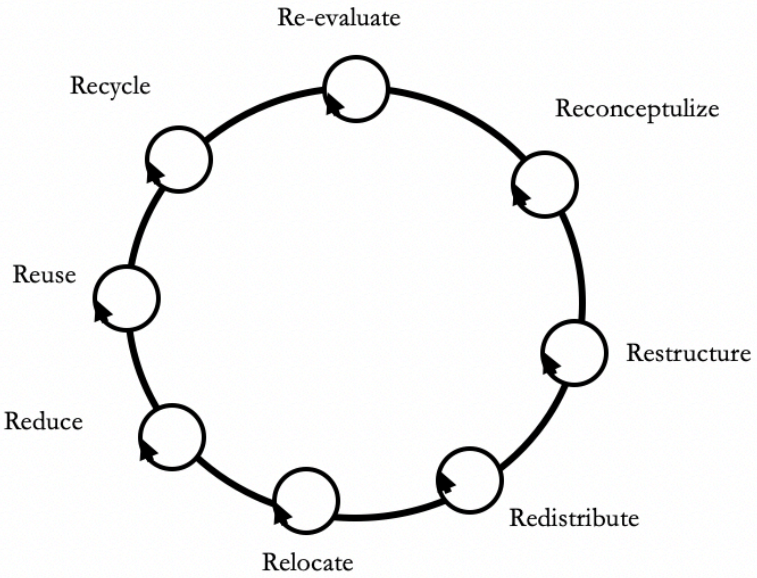
A reduction of production and consumption planified to reduce our footprint and improve our well-being from a democratic way



Micro Level

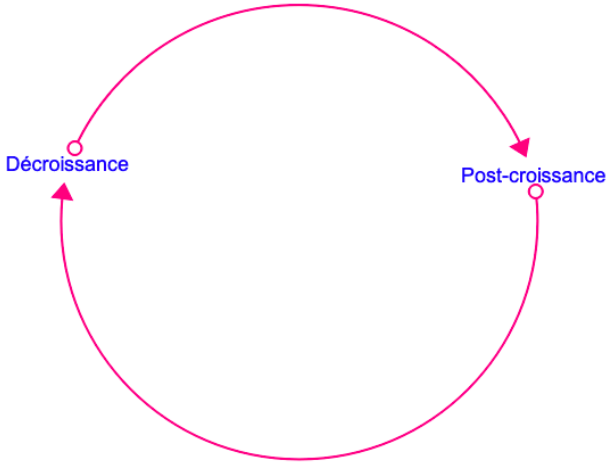


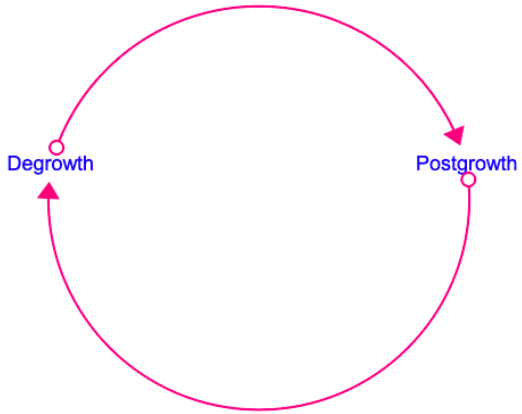
Macro Level

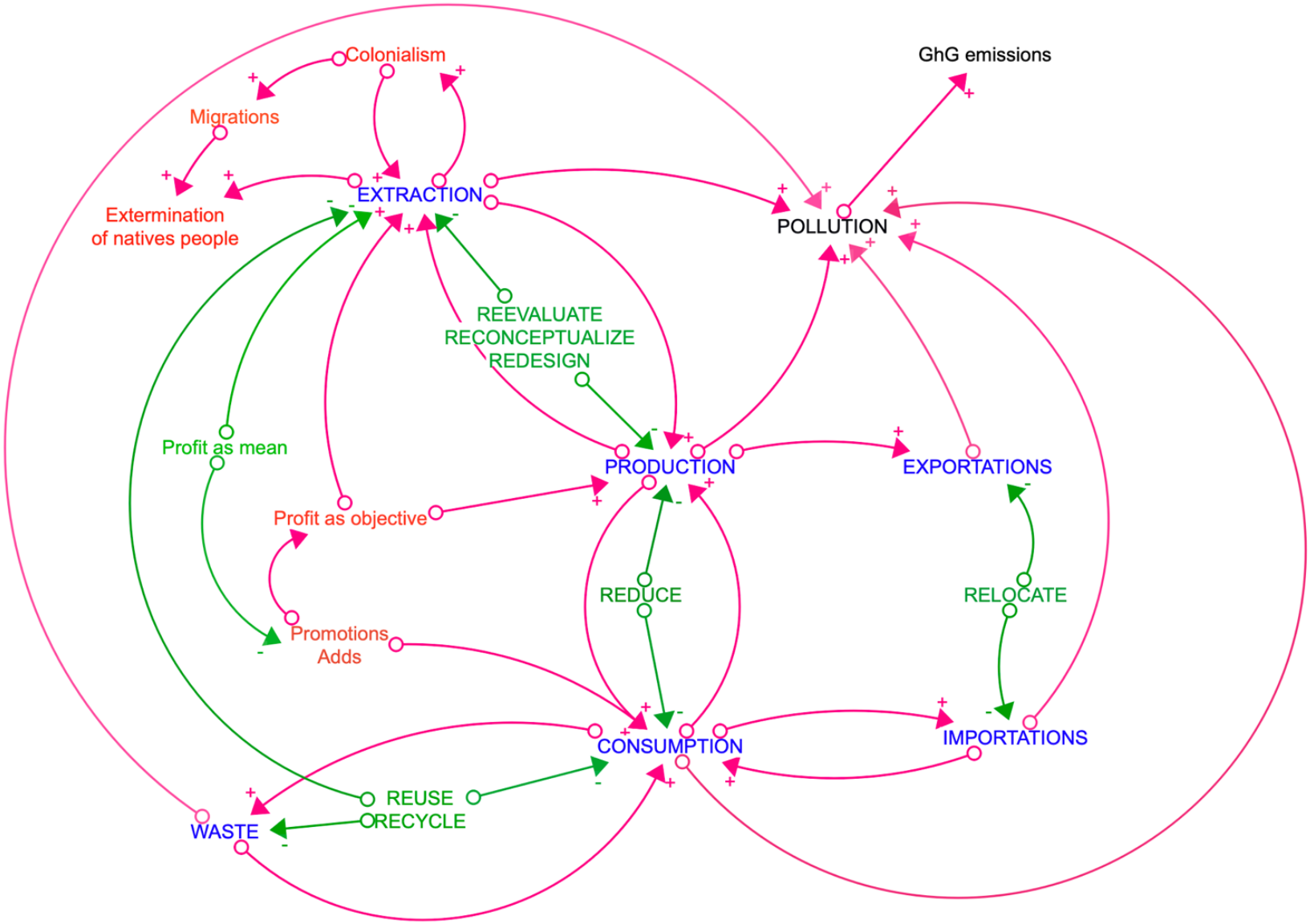


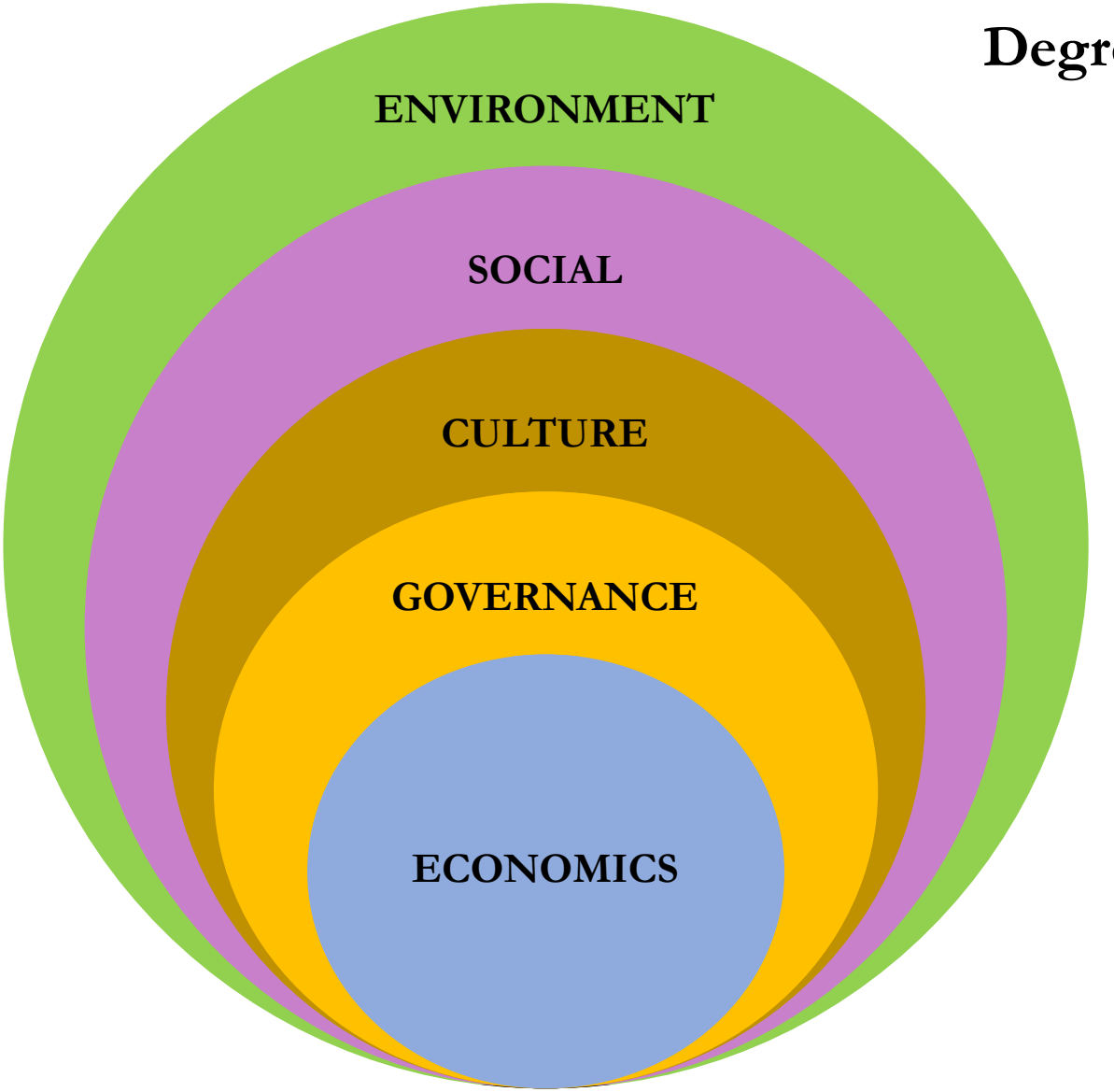
Degrowth Level

Degrowth, a transition to Postgrowth Economy

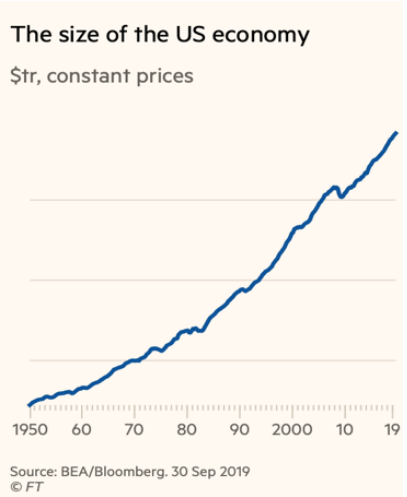





Colonialism
Migrations
Extermination
of natives people
EXTRACTION
GhG emissions
POLLUTION
REEVALUATE
RECONCEPTUALIZE
REDESIGN
Profit as mean
PRODUCTION
EXPORTATIONS
Profit as objective
REDUCE
RELOCATE
Promotions
Adds
CONSUMPTION
IMPORTATIONS
REUSE
RECYCLE
WASTE



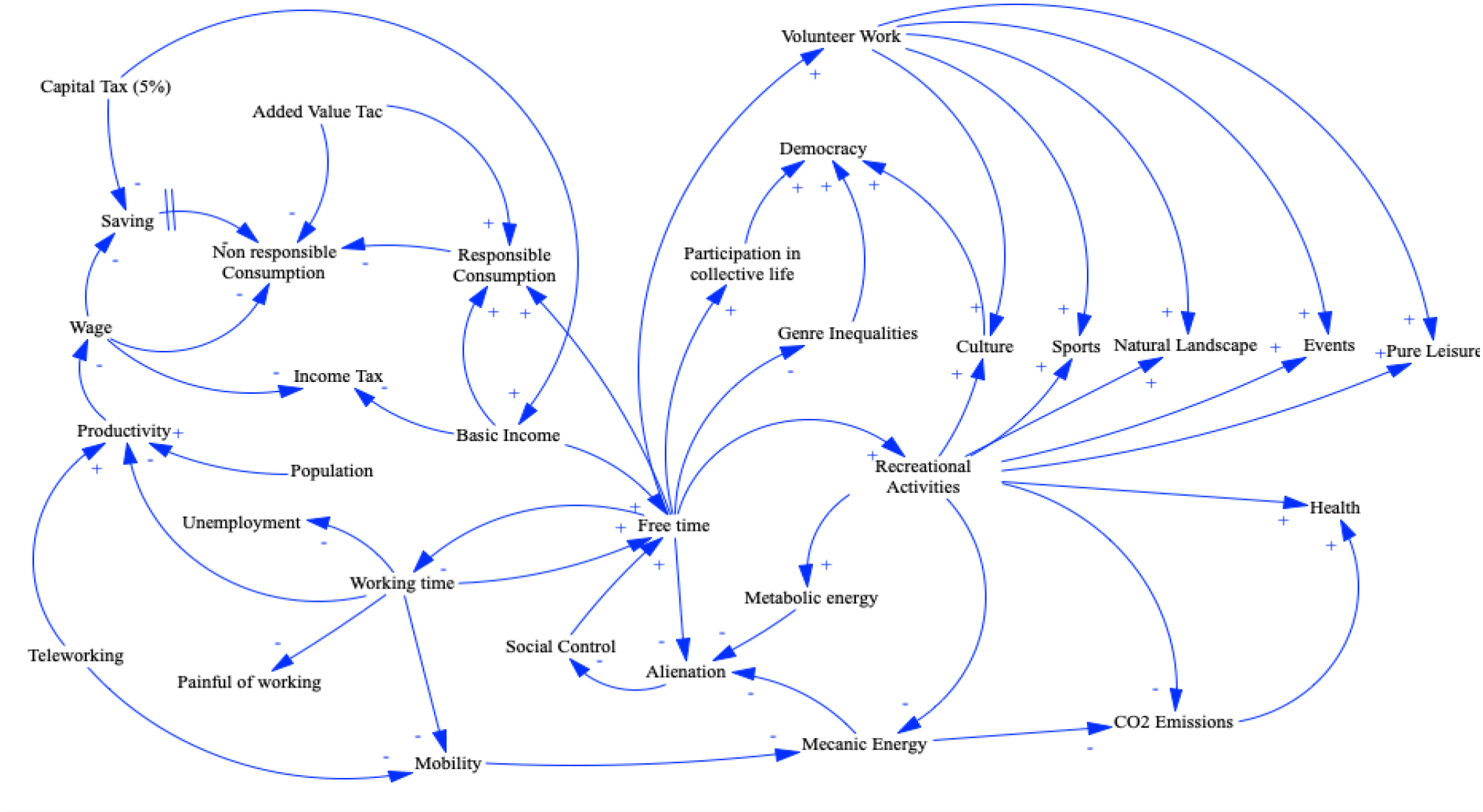
Degrowth = Reducing the size of the economy



Economic Growth (GDP)

Commodification + Trading

Reducing working time : A Degrowth Scenario



Degrowth : Drivers and leverage points

Reducing Working time	Universal revenue	Basic revenue
Local Food	Organic Food	CSA
Local currency	Micro-credit	Carbon Account
Renewal Energy	Bio-sourced Materials	Fair trading
……..	……	……..

Design your own system including problems to solve (systems thinking), targets you want to reach (objectives) and transitions pathways (degrowth to postgrowth).