

# Beyond the production paradigm

## Feeding the world is a matter of sustainability and equity

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## Some quotes of the Welcome session

« The objective is to produce without impairing environment »

« A triple objective : Sustainability, productivity, profitability »

« The more with less »

**Is it relevant ?**

**Is it possible ?**

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## Objectives

- Discuss five myths on agriculture & food systems
- Emphasize the distinction between sustainable intensification and agroecology
- Propose a framework for a transition of the world food systems

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# Myths

- Myth 1 : The only function of agriculture is to feed the world
- Myth 2 : There is a single pathway for agriculture
- Myth 3 : Agroecology, sustainable intensification, it is just a question of words
- Myth 4 : Science is neutral



5 | **Myth 1 : The only function of agriculture is to feed the world**



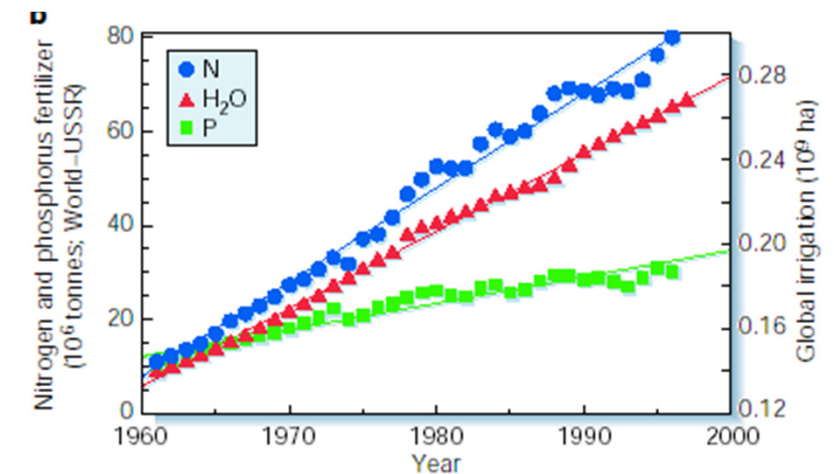
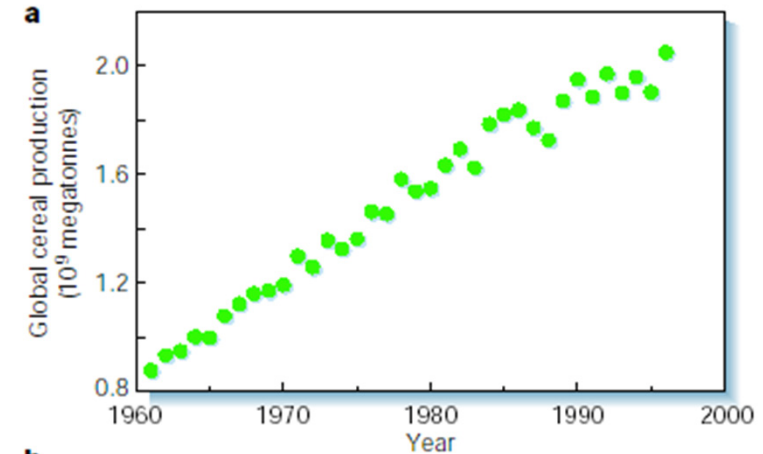
## 6 | **Myth 1 : The only function of agriculture is to feed the world**

- 1. New challenges of the XXIst century
- 2. Agriculture is a business
- 3. The main issue of hunger is not the lack of production

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## 1.1. New challenges of the XX1st century (1)

- XXth century was marked by a dramatic increase in total production
- With little attention to the renewability of resources and social and environmental impacts

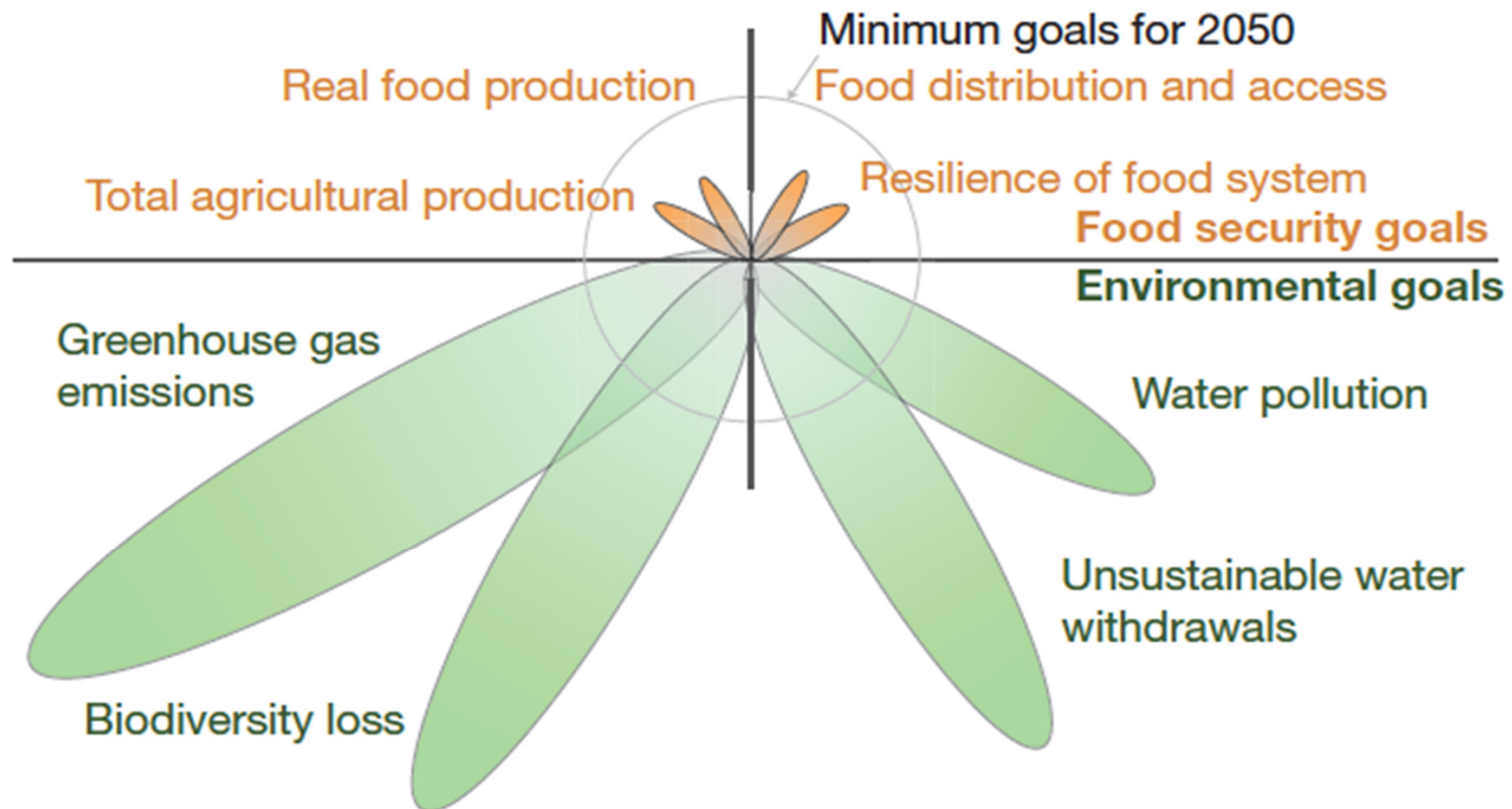


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## 1.1. New challenges of the XXIst century (2)

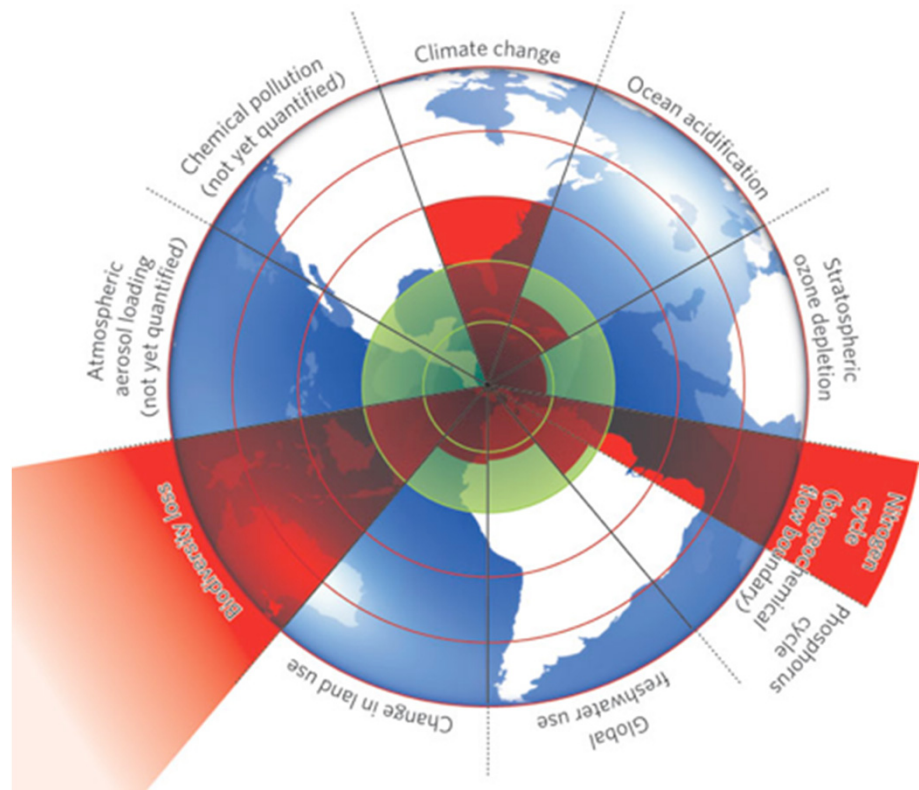


## 1.1. New challenges of the XXIst century (2)



## 1.1. New challenges of the XX1st century (3)

- New issues **scientifically** emerged at the end of the XXth century :
  - Biodiversity loss (Rio, 1992)
  - Climate change (Kyoto, ...)
  - Energy crises
  - Water consumption
  - Nitrogen cycle



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## Myth 1 : The only function of agriculture is to feed the world

1. New challenges of the XXIst century
2. Agriculture is a business
3. The main issue of hunger is not the lack of production

## 1.2. Agriculture is a business

- Agricultural production (food & non food) is determined by the market
- Most of agricultural productions are considered as commodities
- The main driver of food chains is profit and not feeding the world
- Farm is a small scale business

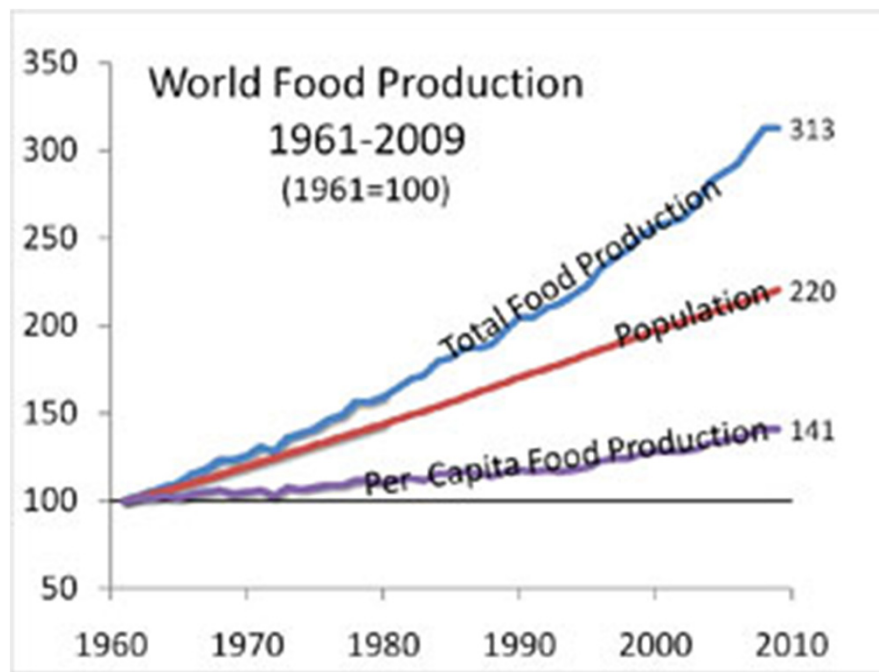
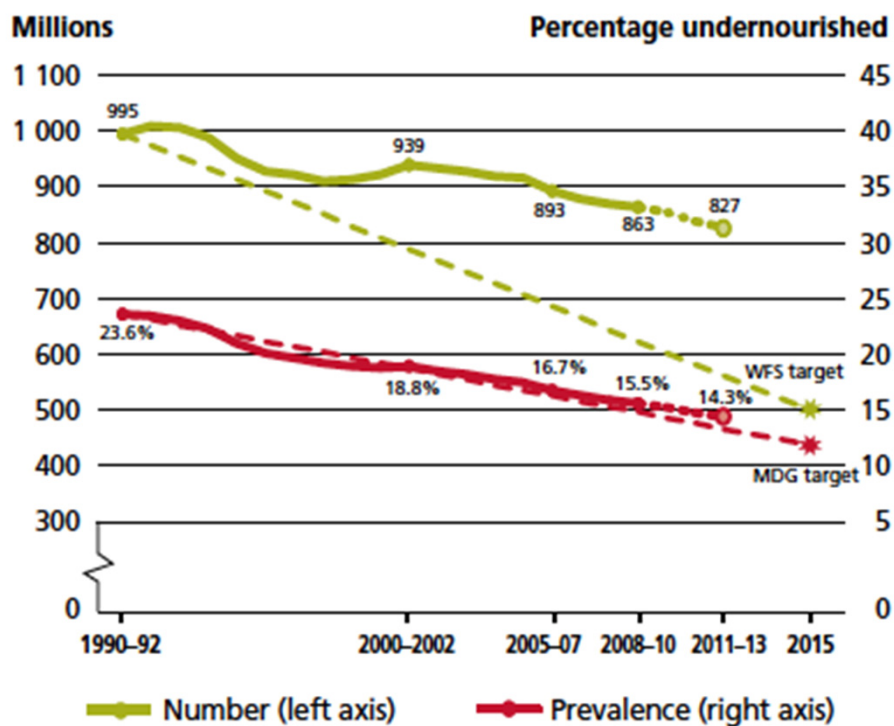


Price of wheat in Chicago 1973 - 2010



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# 1.3. The main issue of hunger is not the lack of production – some figures



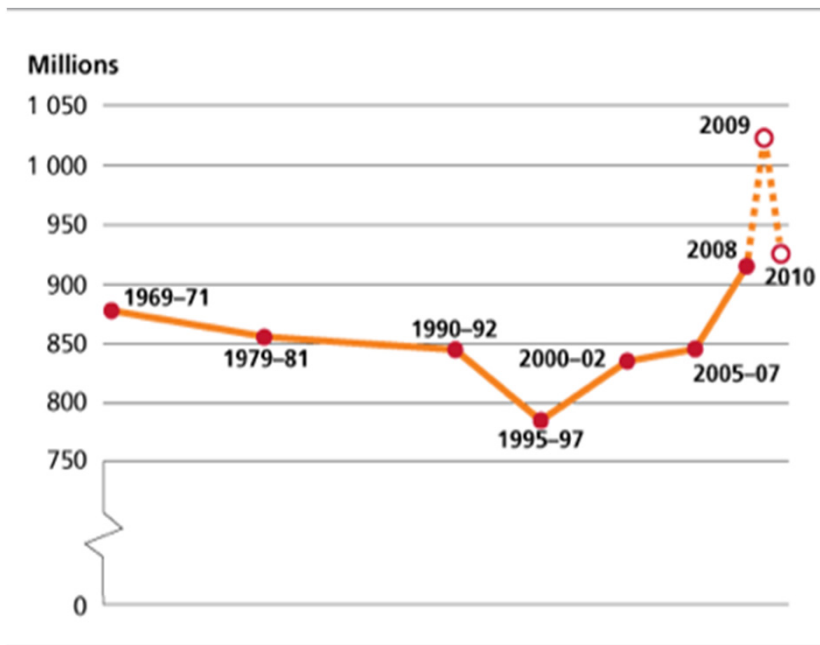
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## The main issue of hunger is not the lack of production – some facts

- Causes of hunger are diverse and complex
- « Increase in production = decrease in hunger » is an oversimplification
- Hunger is mainly a matter of access to food related to poverty
- Number of hungry people is more dependent on food price than on production
- If an increase in production, increases poverty, it will worsen the hunger issue
- 50 % of hungry people are food producers

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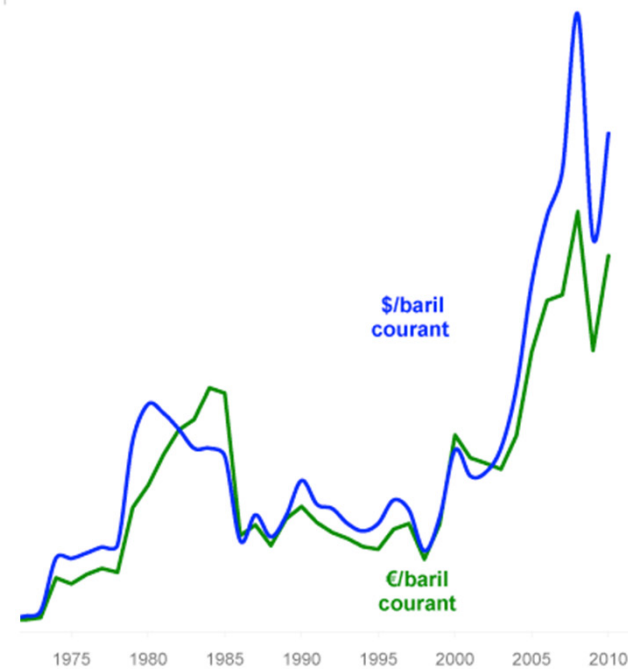
## The main issue of hunger is not the lack production – some graphs



Note: Figures for 2009 and 2010 are estimated by FAO with input from the United States Department of Agriculture, Economic Research Service. Full details of the methodology are provided in the technical background notes (available at [www.fao.org/publication/sofi/en/](http://www.fao.org/publication/sofi/en/)).

Source: FAO.

L'indice de prix des denrées de base dans le monde (base 100 en 2002-2004)



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## Myth 2 : There is a single pathway for agriculture



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## Myth 2 : There is a single pathway for agriculture

1. Reports on the future of agriculture point that business as usual is not an option
2. Prospective exercises pave the ways for a diversity of scenarios
3. Uncertainties on issues such as climate change ask formaintaining a diversity of solutions

## 18 | Reports on the future of agriculture point that business as usual is not an option

- IAASTD report
- SCAR report
- Wake up before it is too late
  
- -> business as usual is not an option
  - Environmental limits
  - Social dimensions → familial agriculture, small holder farming
  - Modification of AKIS (Agricultural of knowledge and innovation systems)

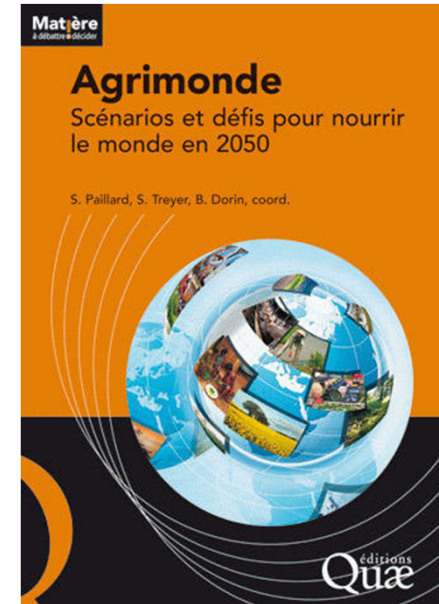




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## Prospective exercices pave the ways for a diversity of scenarios

- Futures may be science based
- Prospective is exploring scenarios that are not trendy
- Prospective exercice
  - Agrimonde
    - G0 : Global orchestration -> yield increase
    - G1 : Parsimony G1 -> decrease in meat consumption

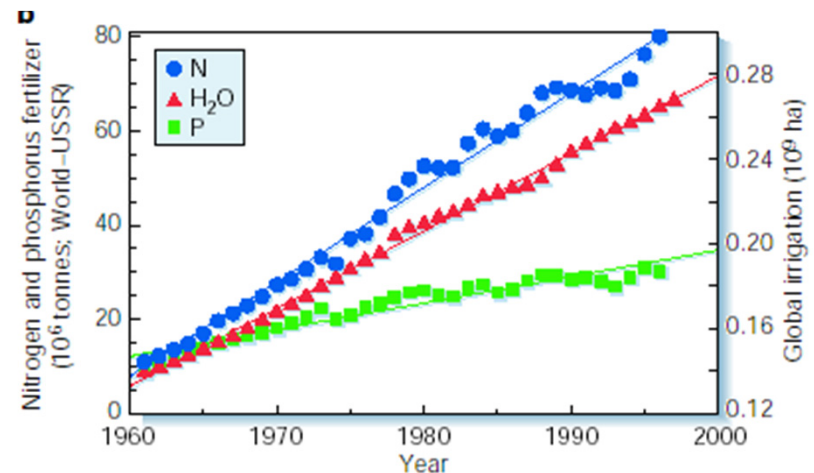


World	<b>AGO 2050</b>	<b>AG1 2050</b>
Food consumption (kcal/pers/day)	+ 20%	stable
Animal share (%)	23%	stable à 15%
Need in crop production (28 100 in 2000)	53 600 (+90%)	37 600 (+35%)

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## Uncertainties call for a diversity of solutions

- Complexity of issues and decrease in stability  
--> uncertain futures
- A way to cope with uncertainties is to have more than one solution.
- During the XXth century, most of the agricultures were converging towards a unique model of intensification based on yield increase by use of new seeds, fertilizers, pesticides and mechanisation.





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## A new agenda for world agricultures

- Food systems must ensure the availability of food for everyone
- Agriculture must develop in ways that increase the incomes of smallholders
- Agriculture must not compromise its ability to satisfy future needs

Right to food

Equity

Sustainability

Report submitted by the Special Rapporteur on the right to food, Olivier De Schutter (UN, 2010)

## Two agendas

### SUSTAINABLE INTENSIFICATION

Sustainability

Productivity

Profitability

### AGROECOLOGY

Right to food

Equity

Sustainability

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**Myth 3 : Agroecology, sustainable intensification, it is just a question of words**



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## Myth 3 : Agroecology, sustainable intensification, it is just a question of words

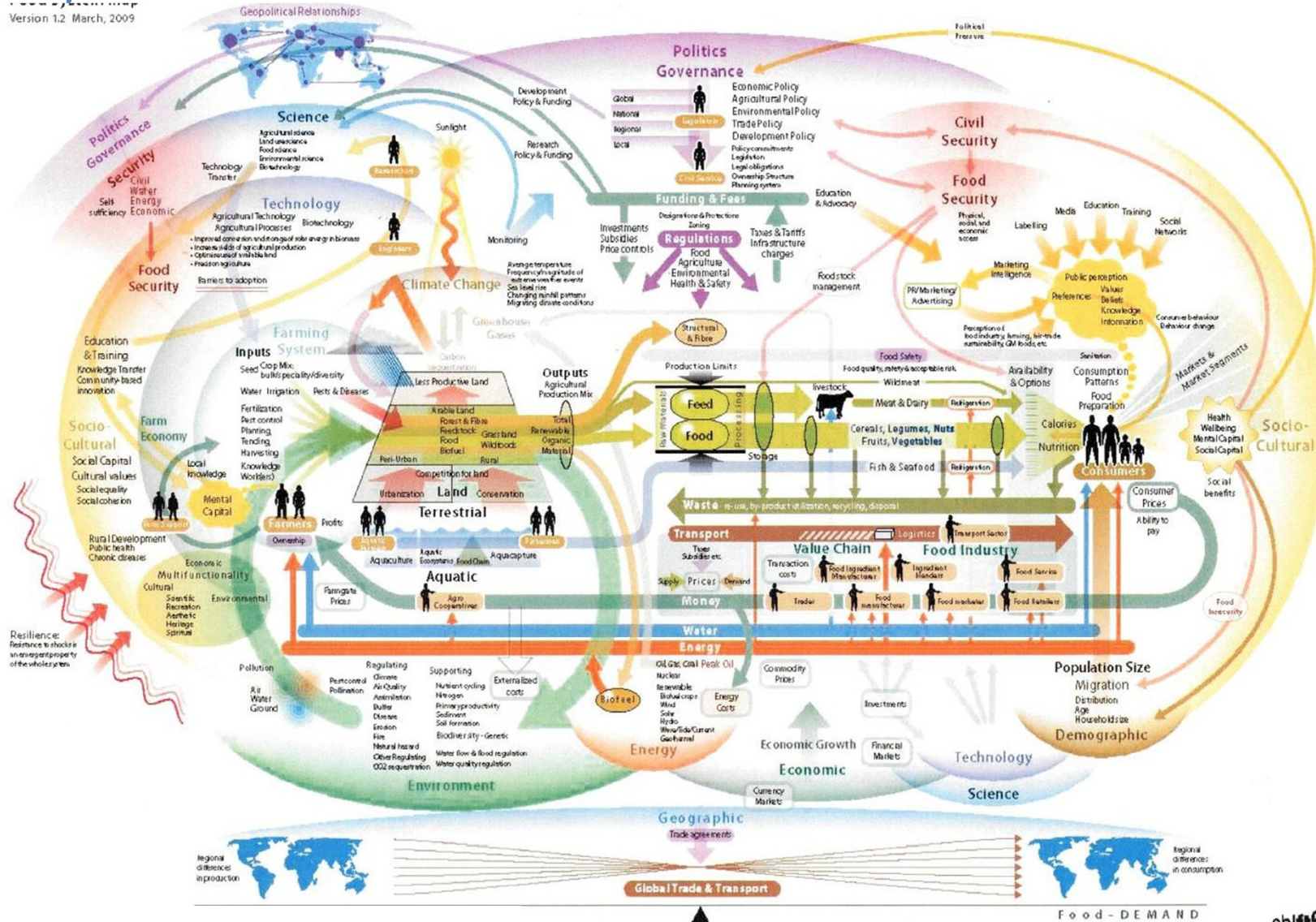
- A semantic issues for two reasons :
  - Most of the defintions are implicit
  - The same word used by different communities may have different meanings
- Example : Agroecology
  - The original Altieri's definition
  - The food systems definition
  - The CIRAD/INRA use of the agroecology concept

## Definitions of agroecology

- Agroecology uses ecological concepts and principles for the design and management of sustainable **agroecosystems** where external inputs are replaced by natural processes such as natural soil fertility and biological control (Altieri 1995)
- Agroecology is the application of ecological concepts and principles to the design and management of sustainable **food systems** (Gliessman, 2006)
- Agroecology is both a science and a set of practices (...) Agroecology is highly knowledge-intensive, based on techniques that are not delivered top-down but developed on the basis of farmers' **knowledge** and experimentation (De Schutter, 2010)

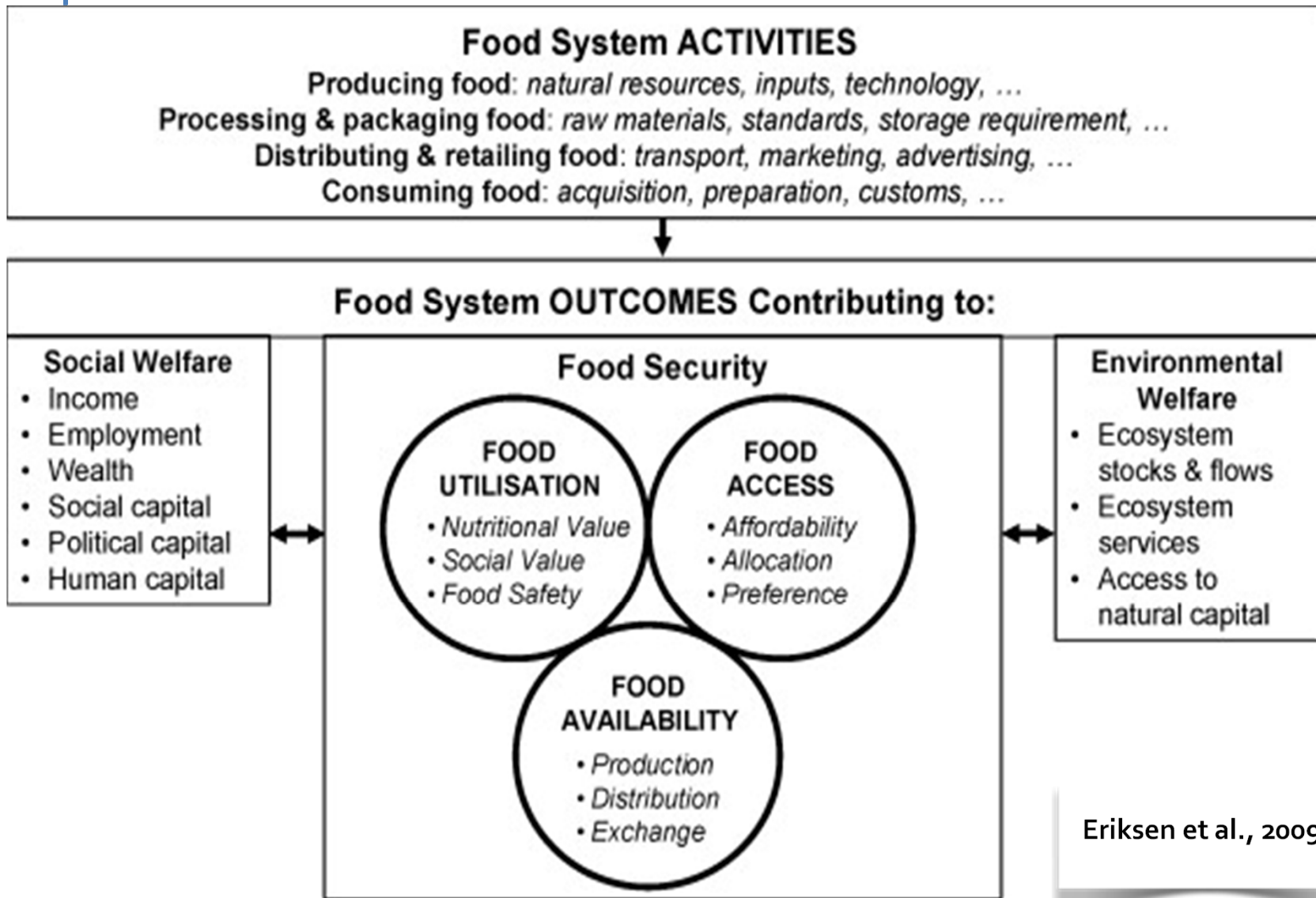


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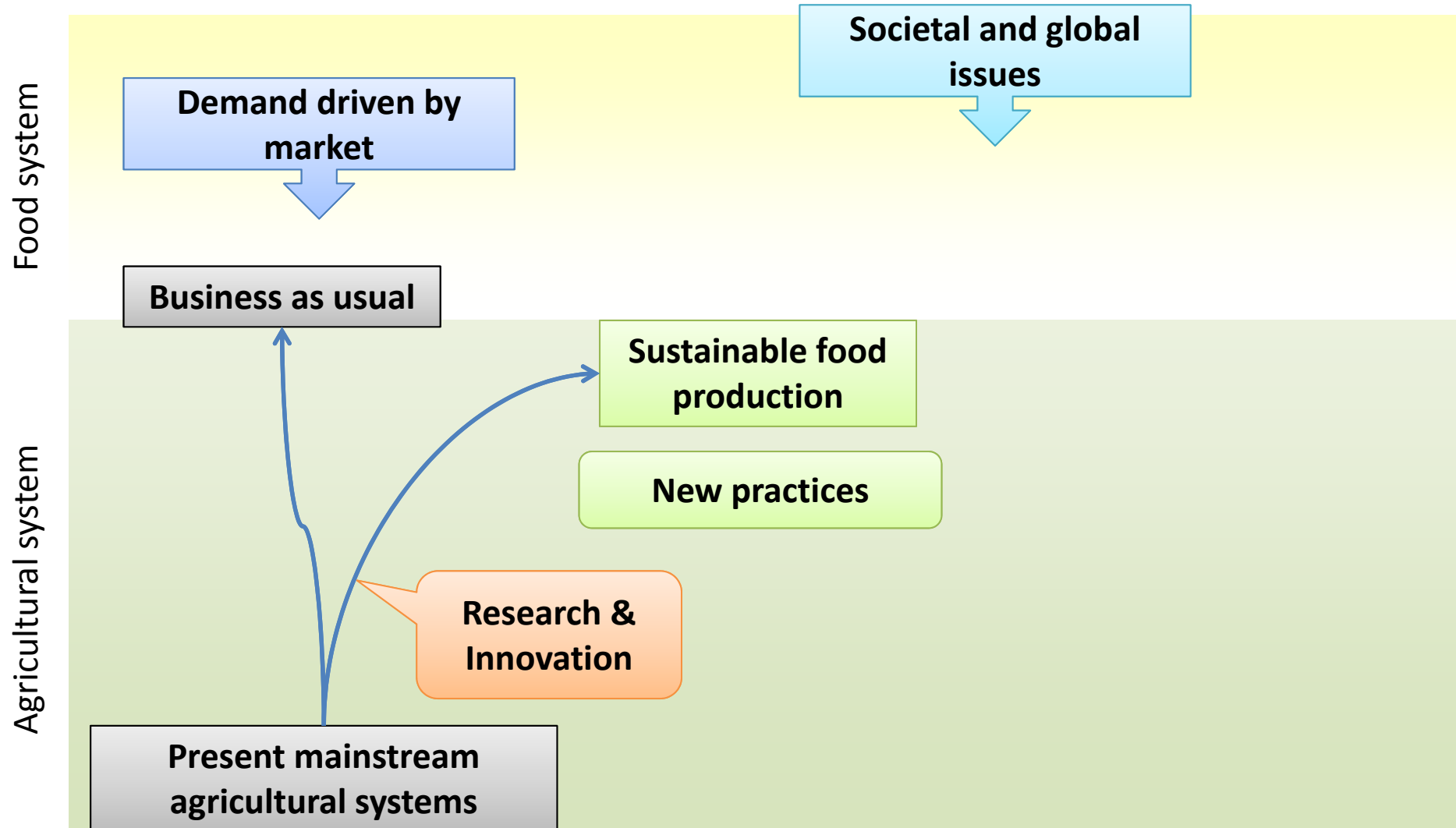
Source : <http://martysmarket.com/>

# 27 | Food systems



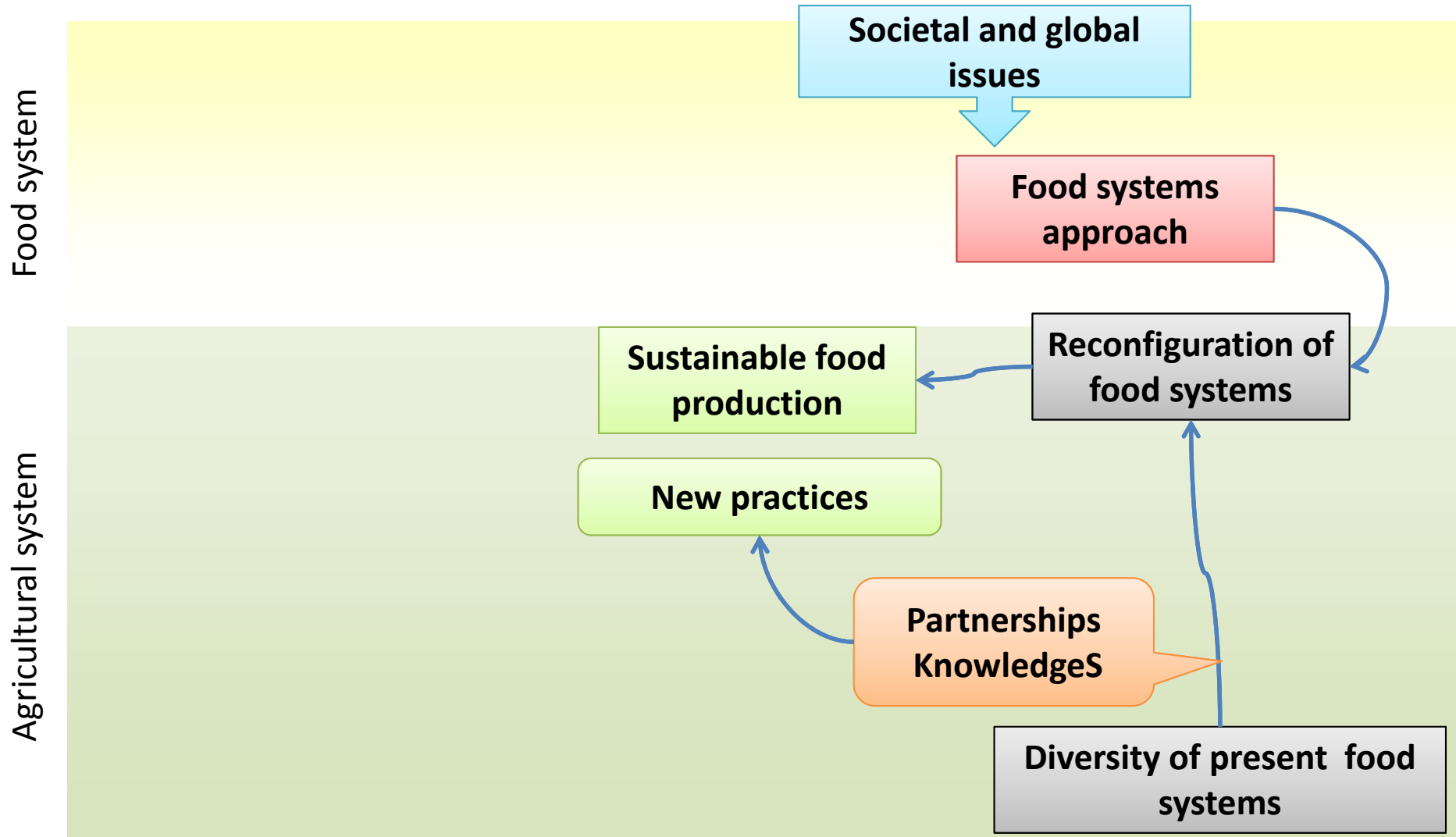
Eriksen et al., 2009

# Two approaches

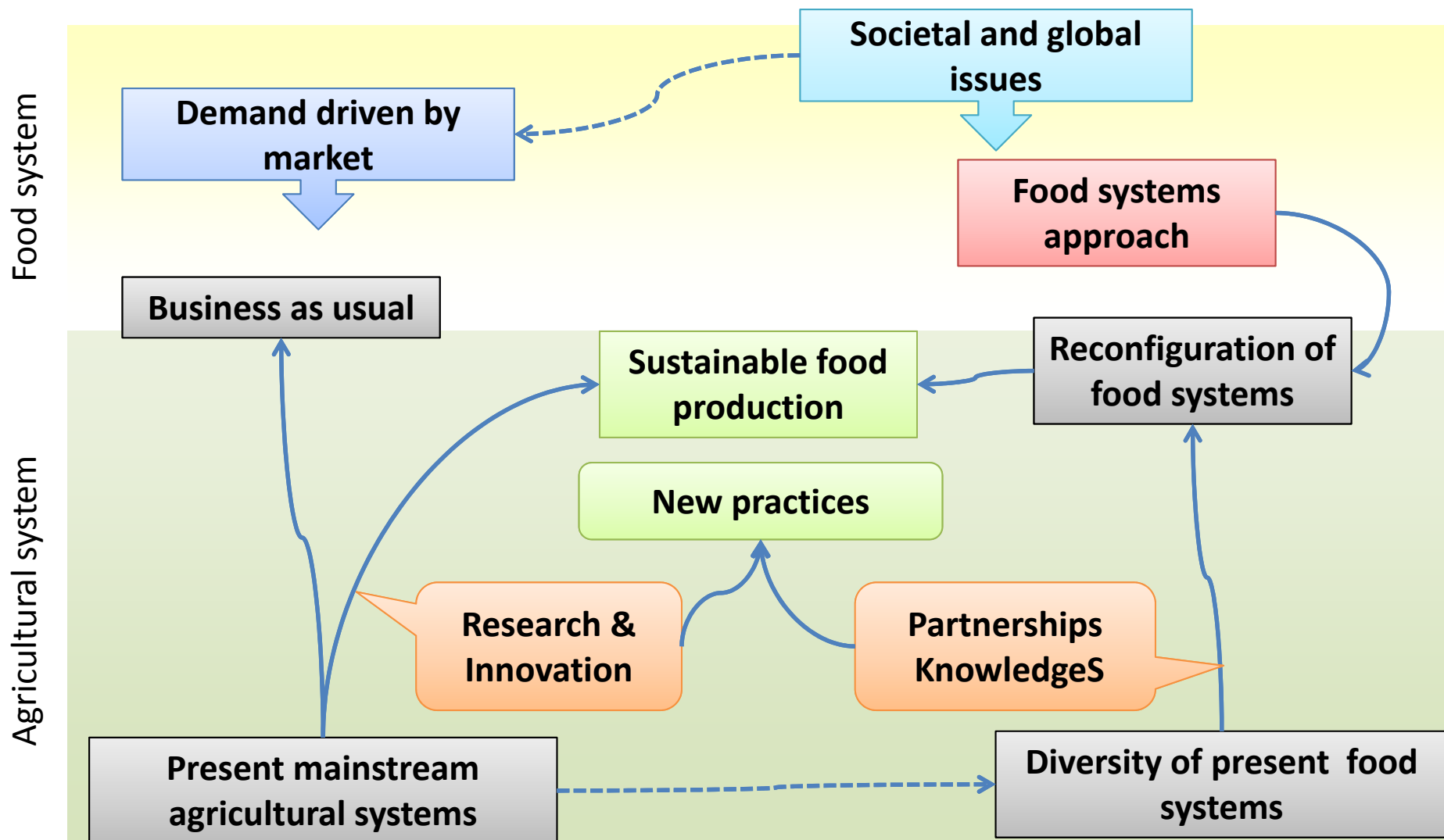




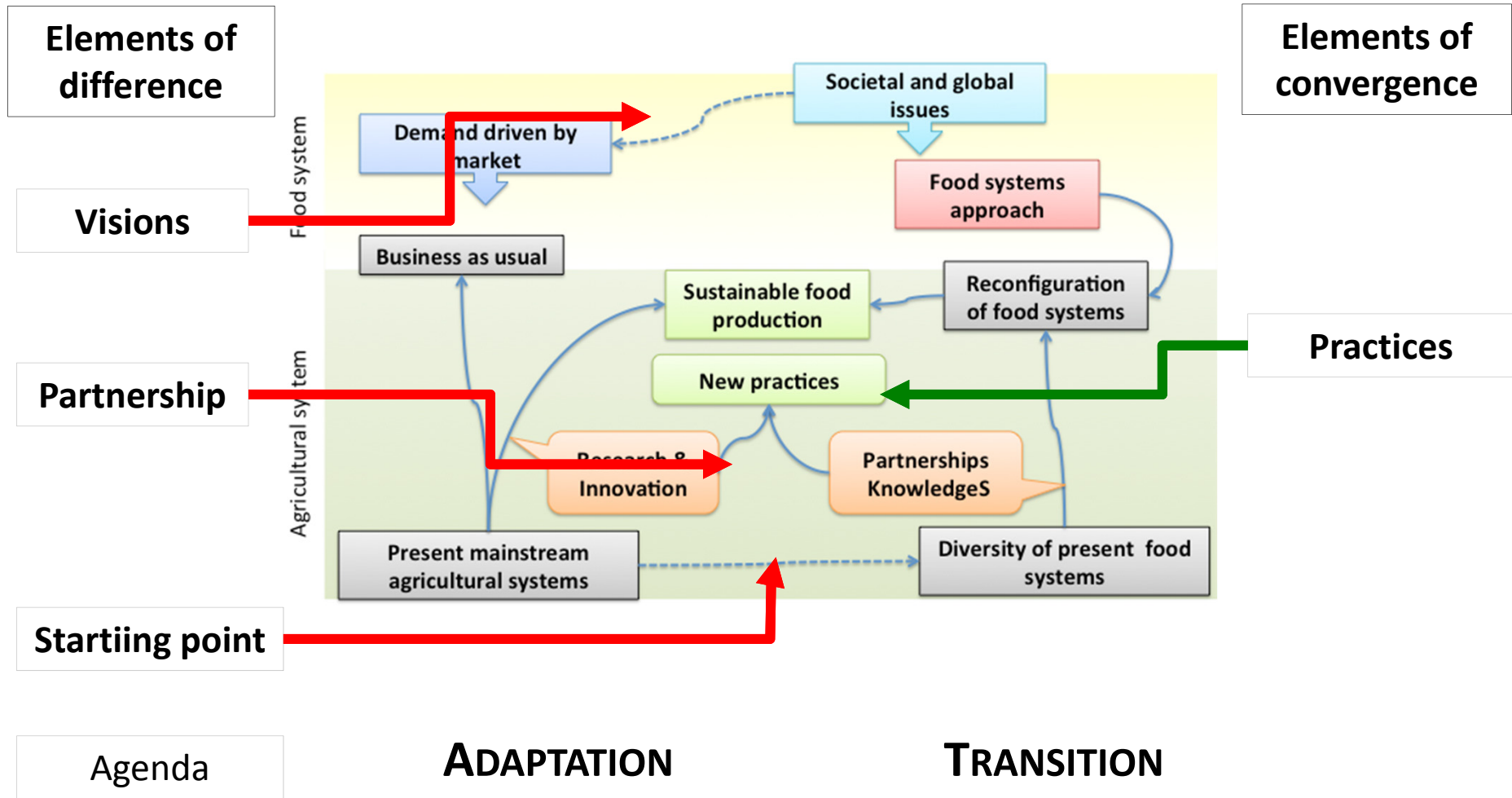
# Two approaches



## Two approaches



# Agroecology & sustainable intensification : a world of differences



## Some elements of difference

	Sustainable intensification	Agroecology
<b>Scale</b>	Plant, plot, animal, farm	Farm, food system
<b>Indicators</b>	Yield, sustainability, mainly technical and quantitative	Multi-criteria, capabilities, technical and social, quantitative and qualitative
<b>Partnerships</b>	Research, farming organisations, industry	Citizens, farmers, stakeholders, consumers, research
<b>Knowledge</b>	From research to field	All kinds of knowledges, co-design
<b>Model</b>	maximisation	optimisation

- Antibiotic resistance in pigs is mainly a correction of the excesses of an industrial system
- Change in meat consumption pattern can be a solution for the future
- A reconnection of crop and livestock systems may be a way of mitigating the nitrogen cycle issue
- Example of application of agroecology in livestock : Dumont et al., 2013

## Myth 4 : science is neutral



## Myth 5 : science is neutral

- Any scientific activity is of interest in a world of unlimited resources
- But in a world with limited intellectual and financial resources, the funding of a project means that four to ten other projects will not be funded
- The amplification by the Matthew effect is leading to an imbalance



FOR TO ALL THOSE WHO  
HAVE, MORE WILL BE GIVEN,  
AND THEY WILL HAVE AN  
ABUNDANCE  
THOSE WHO  
EVEN  
BE TA



## The Matthew Effect in Science



The reward and communication systems  
of science are considered.

Robert K. Merton

## Myth 5 : science is neutral

- The different paradigms are in competition for intellectual, financial and communication resources:
  - Sustainable intensification : Long term and high level of investment, aligned
  - Agroecology : Low and recent investment, desaligned

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## How agricultural research systems shape a technological regime that develops genetic engineering but locks out agroecological innovations

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### ABSTRACT

Agricultural science and technology (S&T) is under great scrutiny. Reorientation towards more holistic approaches, including agroecology, has recently been backed by a global international assessment of agriculture S&T for development (IAASTD). Understanding the past and current trends of agricultural S&T is crucial if such recommendations are to be implemented. This paper shows how the concepts of technological paradigms and trajectories can help analyse the agricultural S&T landscape and dynamics. Genetic engineering and agroecology can be usefully analysed as two different technological paradigms, even though they have not been equally successful in influencing agricultural research. We used a Systems of Innovation (SI) approach to identify the determinants of innovation (the factors that influence research choices) within agricultural research systems. The influence of each determinant is systematically described (e.g. funding priorities, scientists' cognitive and cultural routines etc.). As a result of their interactions, these determinants construct a technological regime and a lock-in situation that hinders the development of agroecological engineering. Issues linked to breaking out of this lock-in situation are

## Key roles for scientists

- By their action, scientist are part of a knowledge system
- They support a given vision of agriculture
- They have an ethical responsibility
  - in the choice of their research topics
  - in communication
  - as experts

- The imbalance between the different pathways for agriculture is huge
- Agroecology is lacking of support and legitimacy or ...
- Agroecology is lacking of capacity of proving or disproving its legitimacy as an alternative pathway more radical than sustainable intensification

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## The coexistence of models is questionable

- In a globalized market, all kinds of agriculture are in interaction and these interaction are not « per se » positive
- Coexistence of pathways is not always possible
- Coexistence by default is a myth
- Coexistence can be an object of research

- A transition process implies a reconfiguration of the (mainstream) systems and a concomitant development of niche innovations
- Transition needs time, commitment and resources but should lead to a win-win sustainable situation

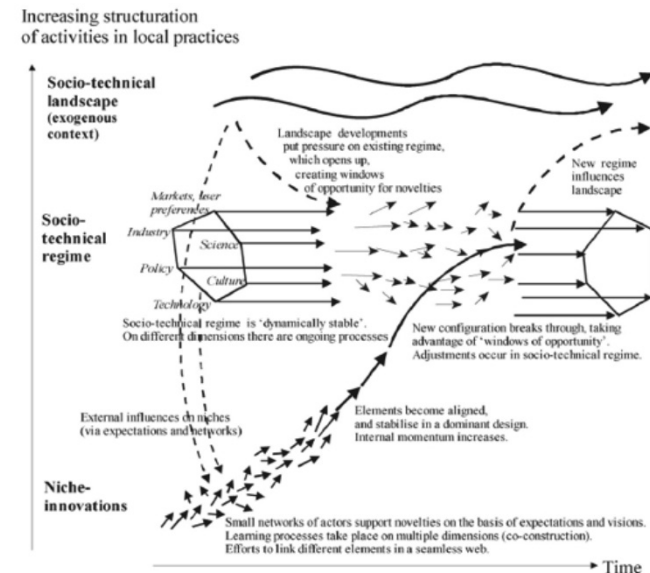


Fig. 1. Multi-level perspective on transitions (adapted from Geels, 2002, p. 1263).



- The objectives of agriculture is not only to feed the world but are also economic, social and environmental
- Present agricultural systems are not fully relevant for the challenges of the XXIst century as they are market driven and imbalanced in favor of an irrelevant industrial model
- Sustainable intensification is focus on the animal/plant level, is driven by yield as the main indicator and locks out the agroecology proposition
- A new agroecological vision of agricultural systems will consider the system dimension in partnership with all actors : farmers, consumers, scientists, decision makers.

**New objectives**

**Reconfiguration  
of food systems**

**Change of  
framework for  
R&D**

**New  
partnerships**

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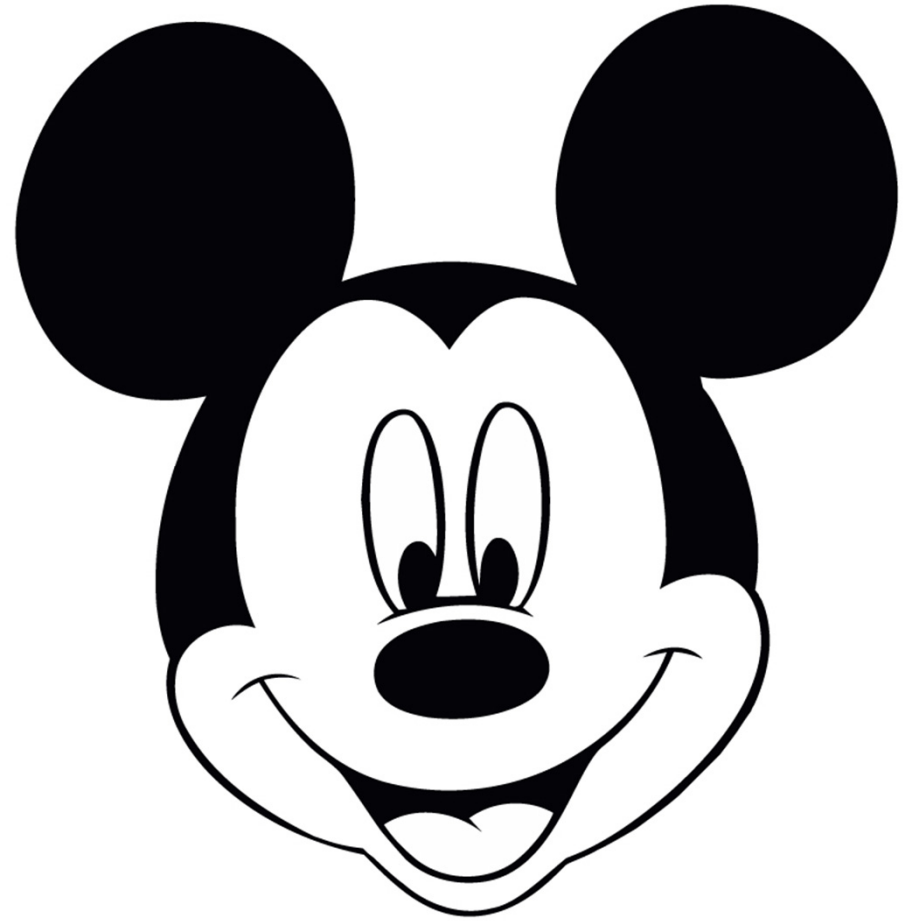
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- [www.agroecologie.be](http://www.agroecologie.be)
- [www.philagri.net](http://www.philagri.net)



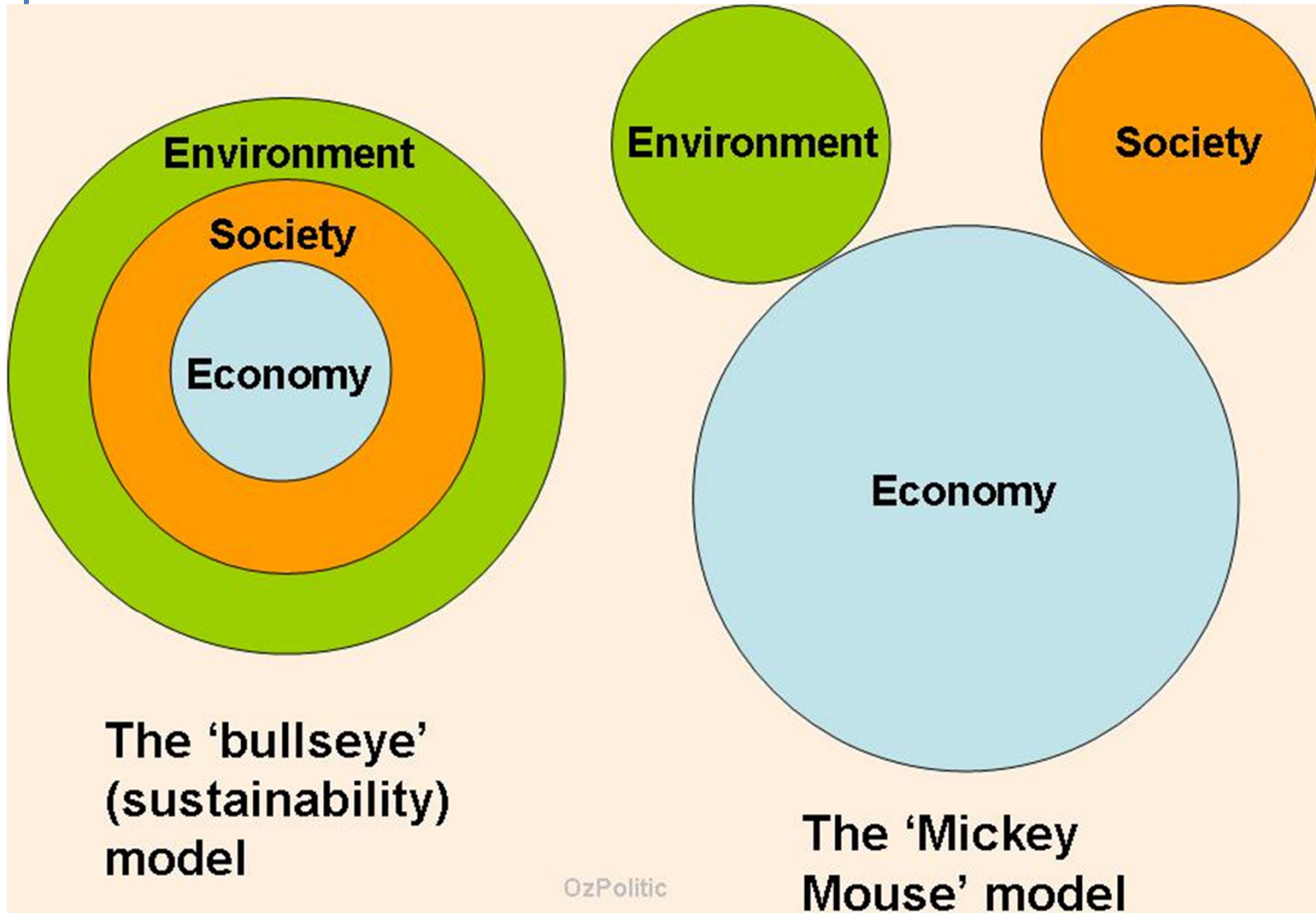


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## Bull's eye vs. Mickey



## Weak and strong sustainability



## The keyboard paradox



- **The QWERTY keyboard : an innovation in a context**
- **Is it still relevant ?**
- **If not, why is it surviving ?**
- **Path dependency contribute to maintaining “irrelevant” systems**