Cropping systems and IPM in a sustainability perspective

Jacques WERY

wery@supagro.inra.fr

(Systems Analysis and Design in Agriculture)

PURE – Poznan – January 16 2015

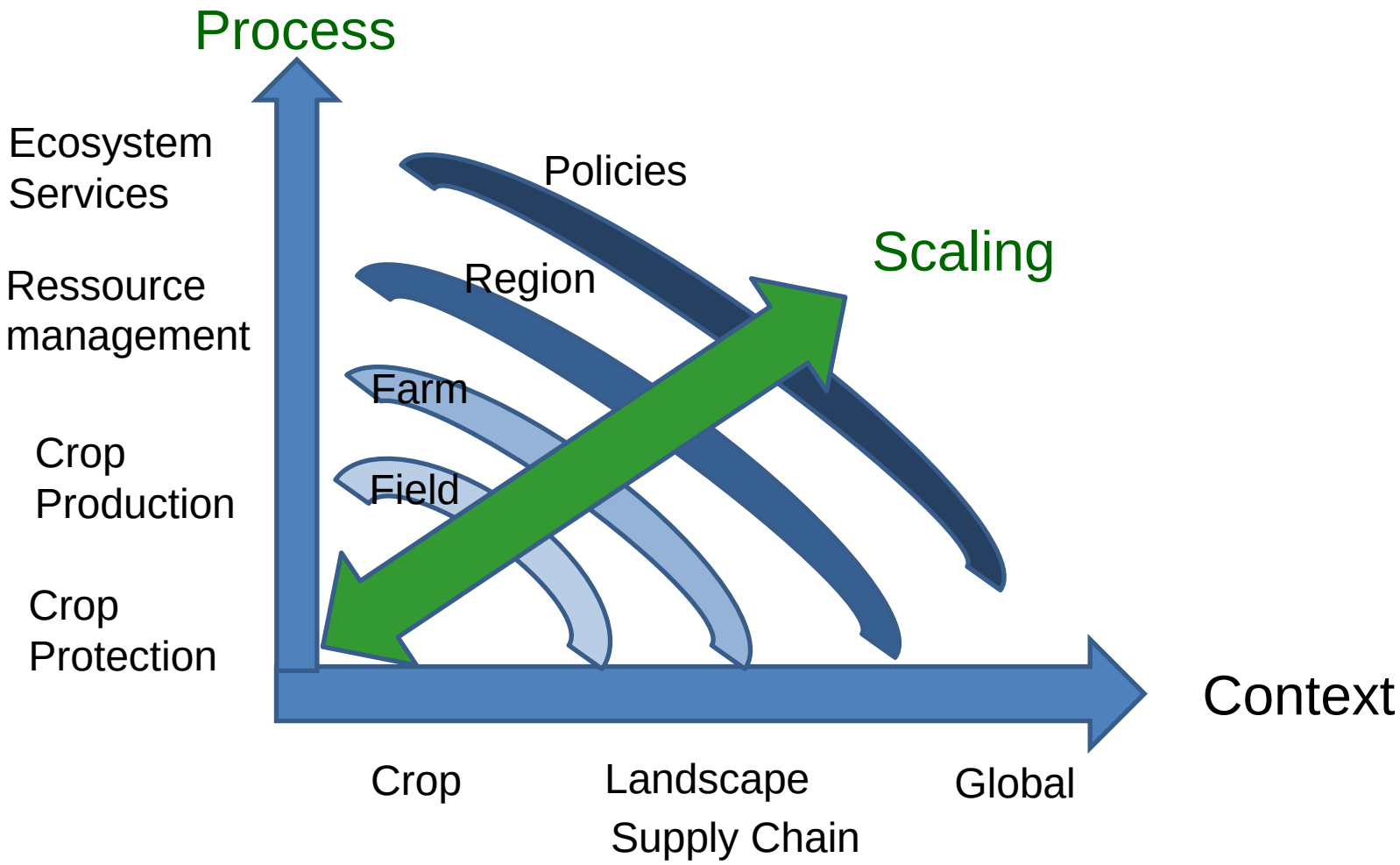
Outline

1. The workshop from my perspective
2. IPM as a component of an Agrosystem
3. Where are the papers from this session ?
4. Questions for this session

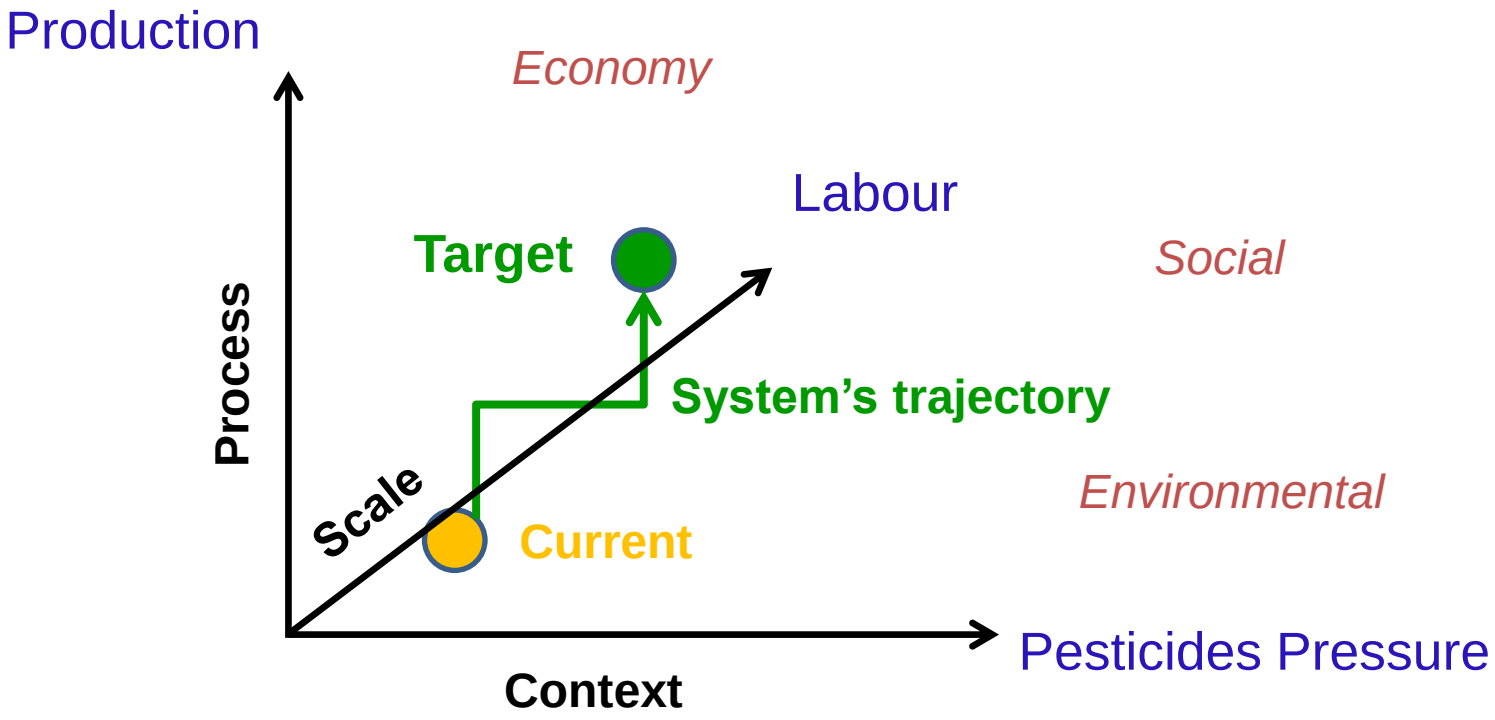
1. The workshop objectives from my perspective → the three pillars of an IPM Tool

1. **Integrated → System approach:**
   - IPM → plant health management in a cropping system
2. **In a Sustainability context:**
   - finding a system's trajectory In a « sustainability space »
3. **ImPleMentation → Engineering perspective :**
   - **Ergonomy** with regards to decision system of the farmer
   - **Cost-benefit** analysis
   - Designed for the **decision scale** (farm or set of fields with the same cropping system)

What is the Integrative nature of IPM ?

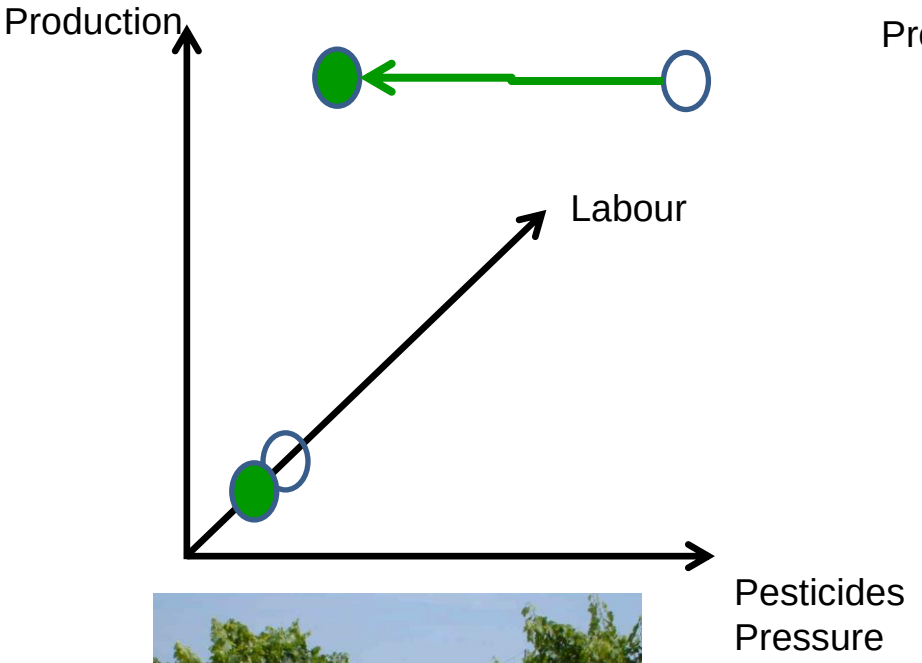


Define the Sustainability space and desired/possible trajectories ?

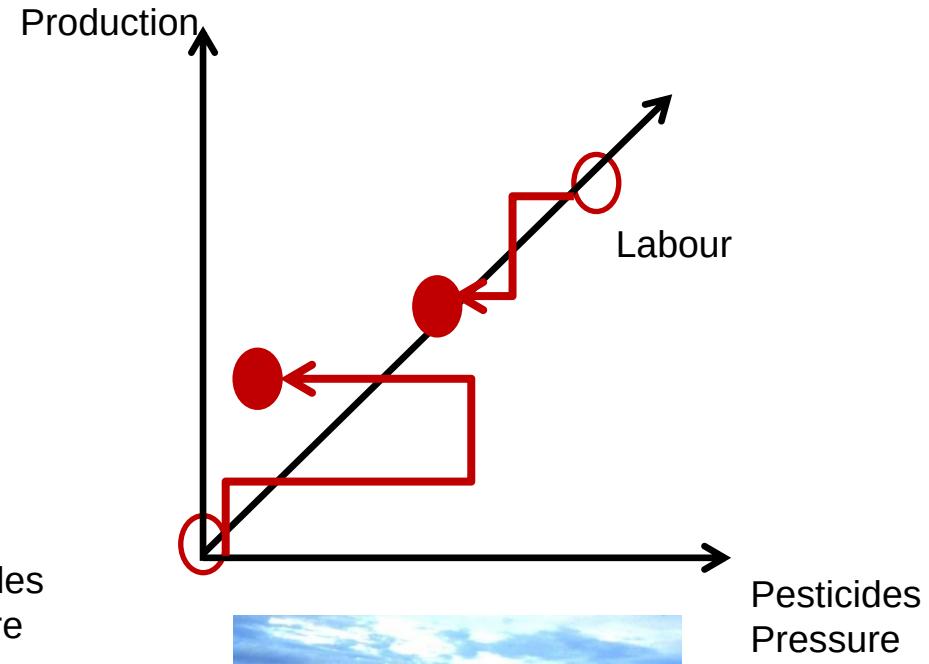


Sustainability domains → Assesment Criteria → Sustainability Drivers → Operational Assessment Indicators

Crop protection is often at the core of the desired transition pathways of cropping systems in the sustainability space



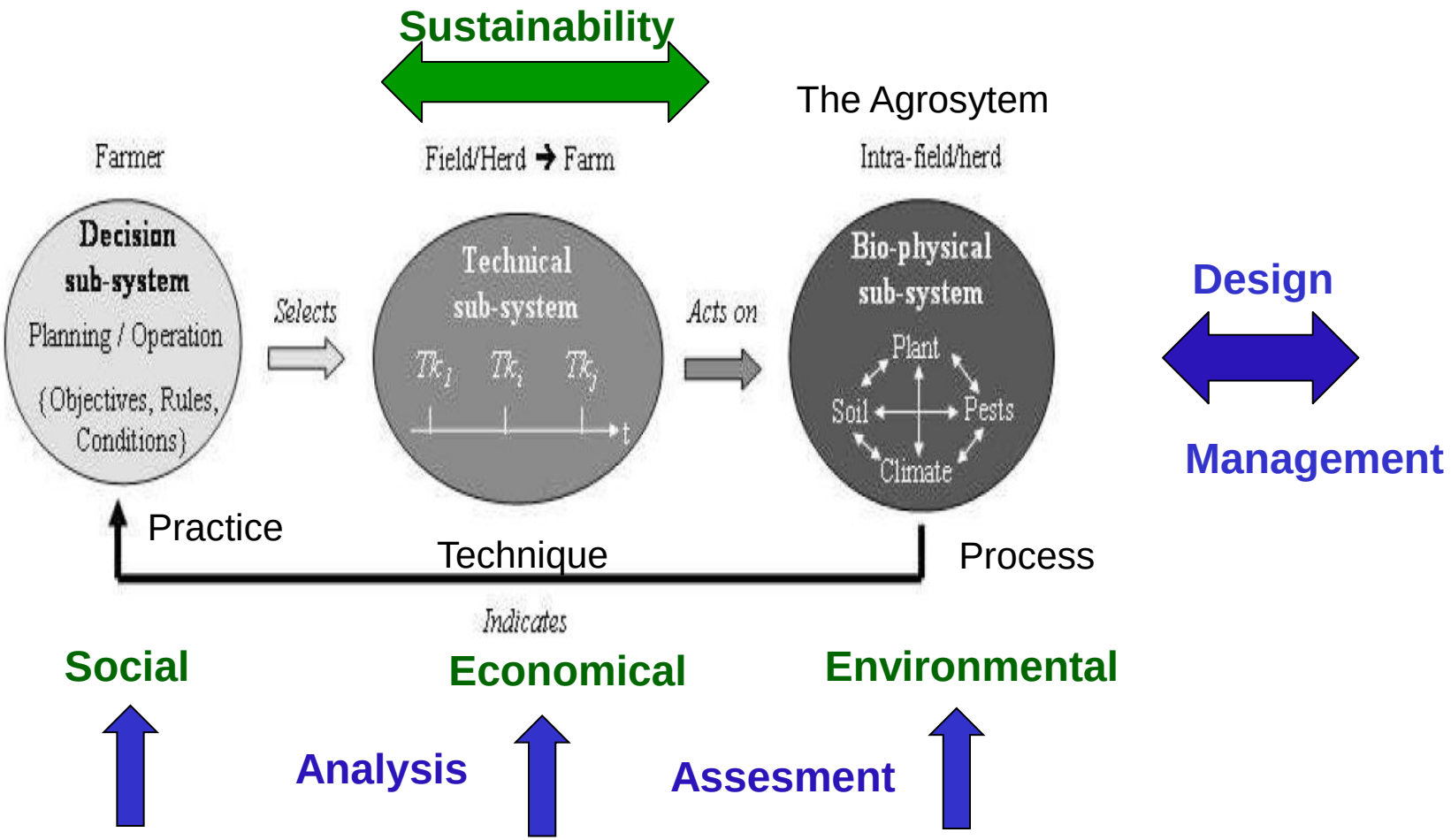
(Metral et al., 2014)



(Corbeels et al., 2013)

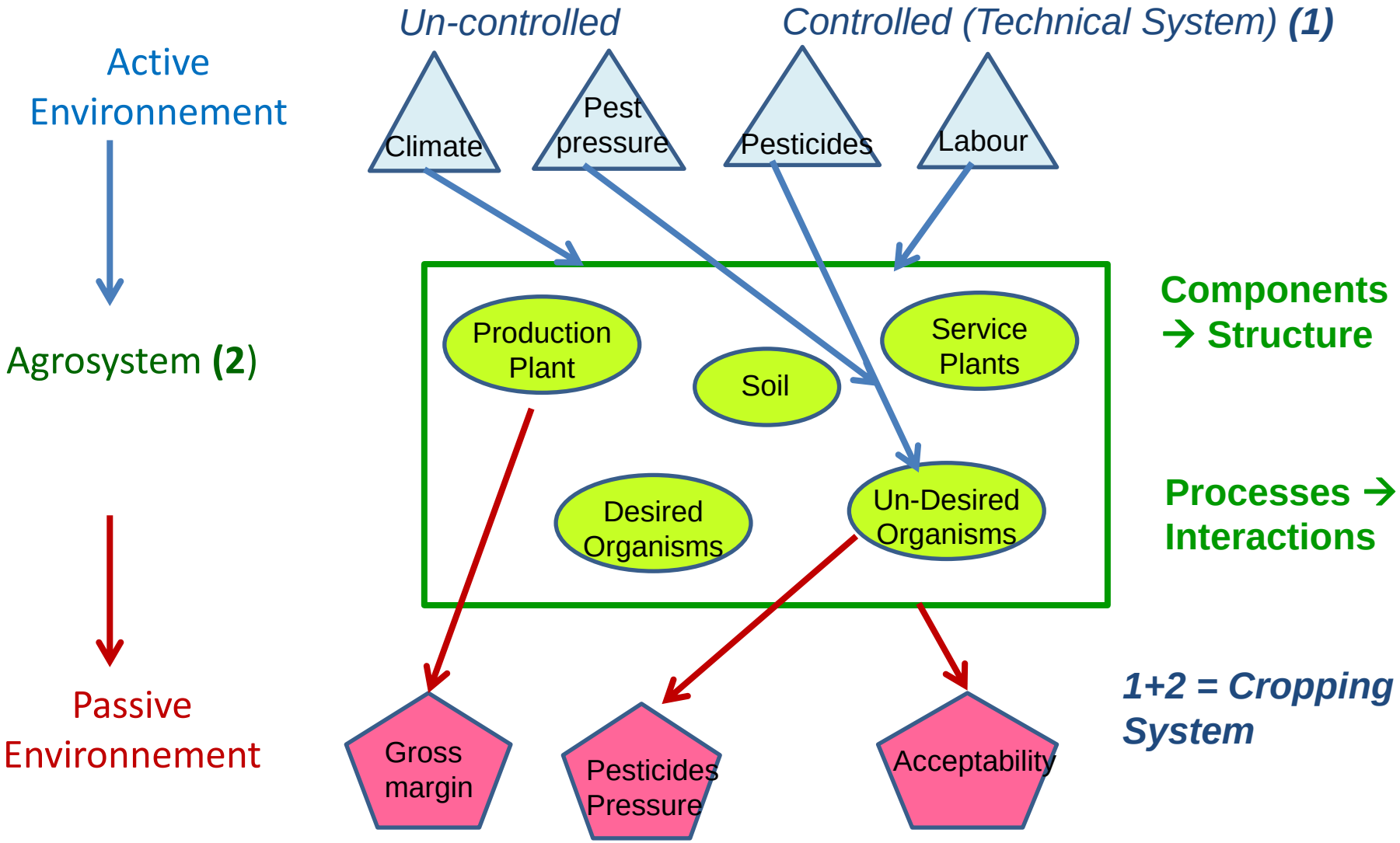
2. Functional Analysis of Agrosystems for IPM

(The Three interacting dimensions of Agricultural Systems)



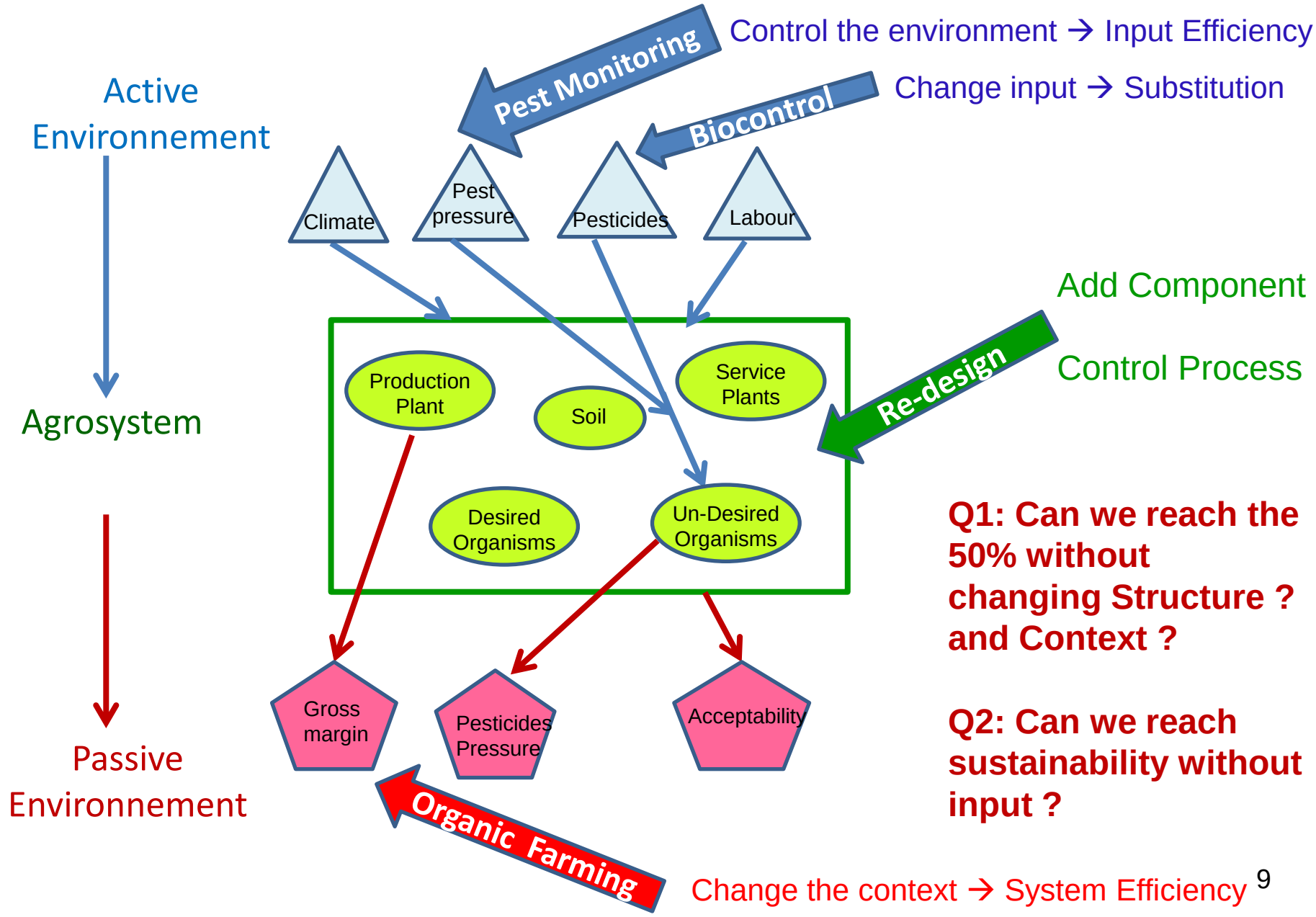
(adapted from Le Gal et al., 2010. EMS)

Conceptualisation of IPM in an Agrosystem



(protocol to « conceptualise a problem into a system » by Lamanda et al., 2012)

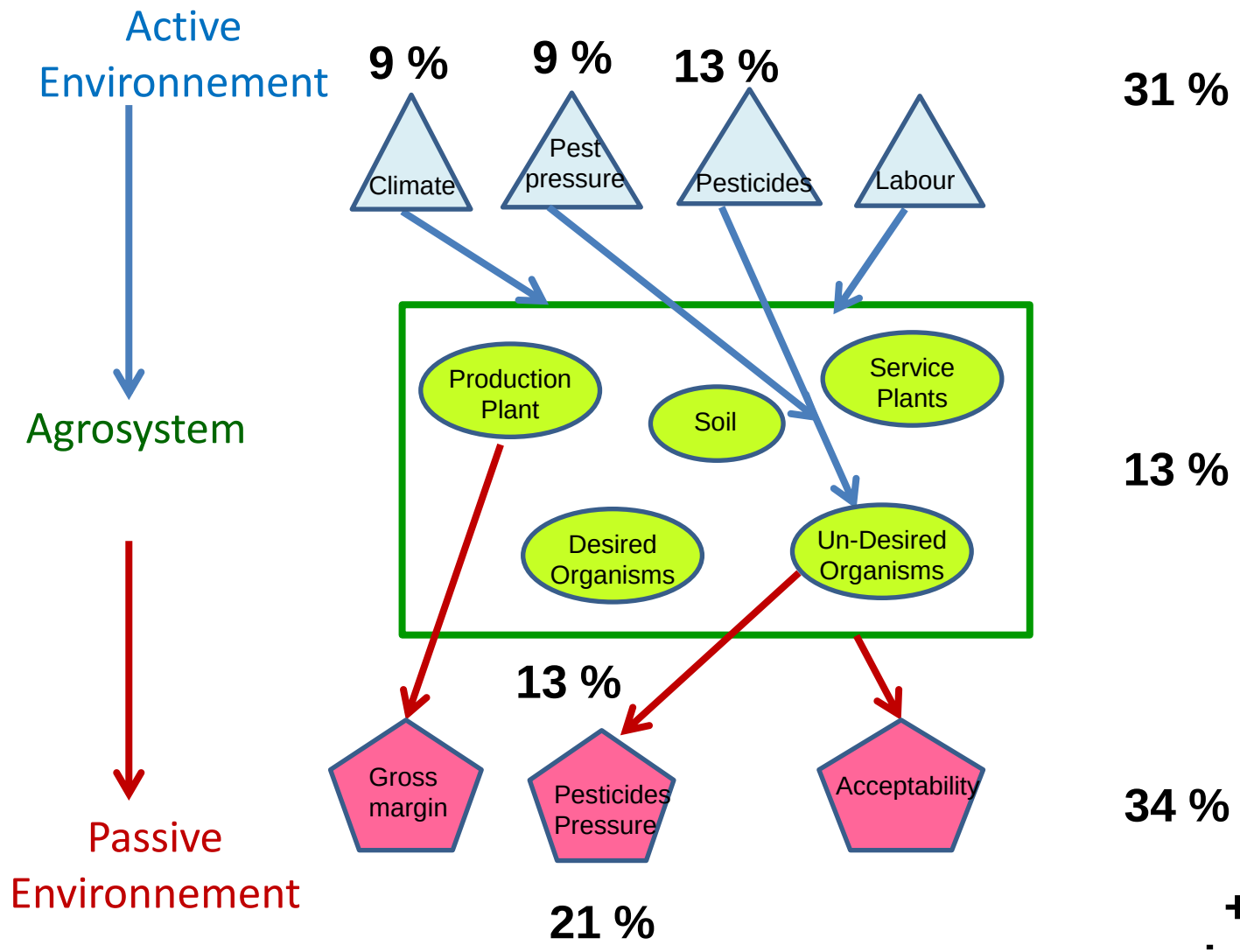
Where do innovation enter into the System ?



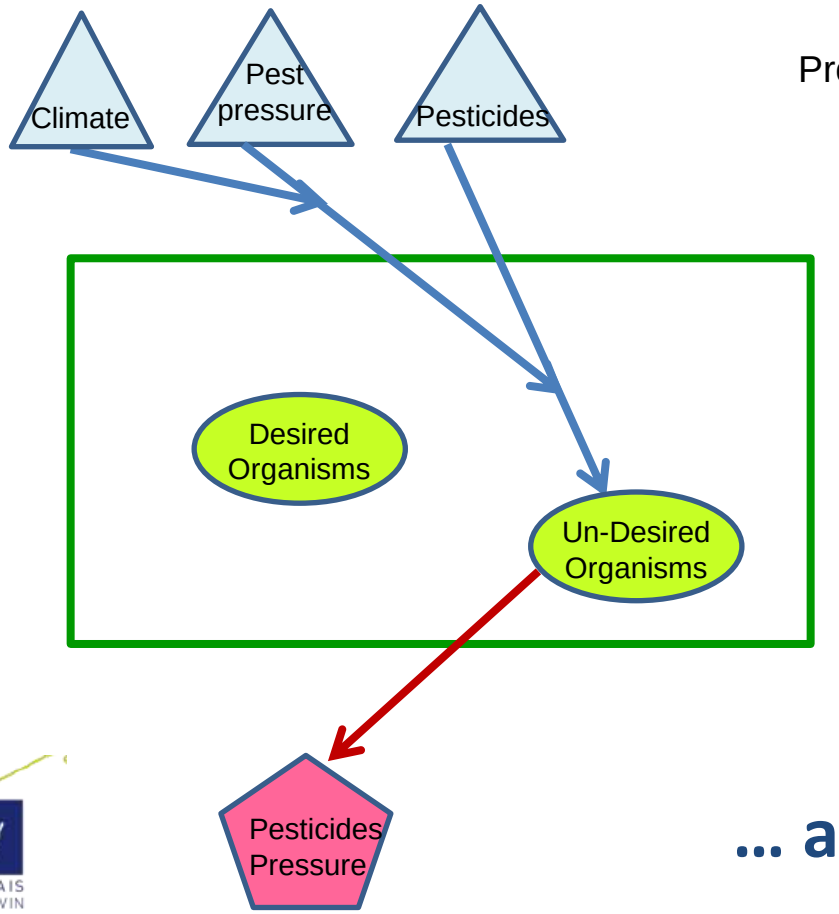
Q1: Can we reach the 50% without changing Structure ? and Context ?

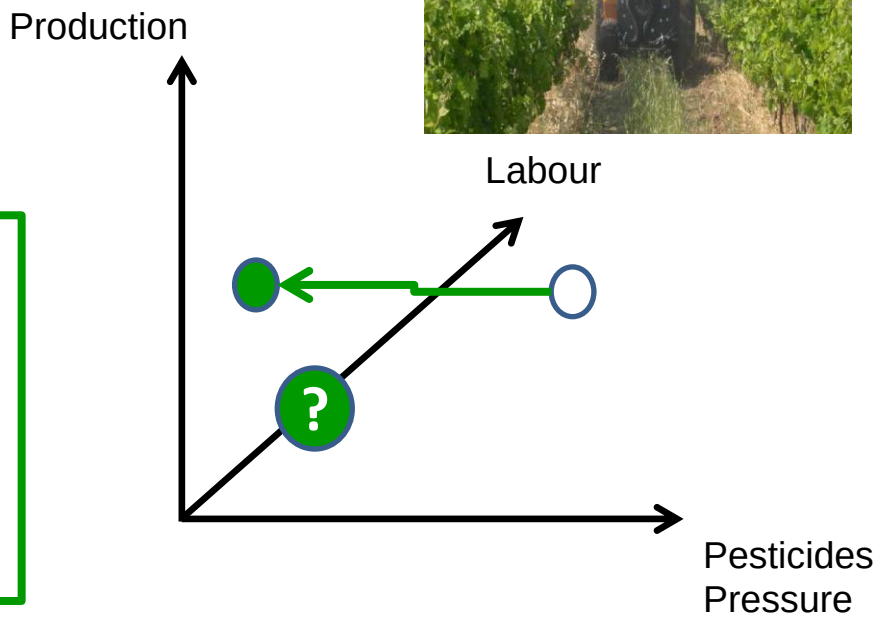
Q2: Can we reach sustainability without input ?

3. Where are the 23 papers of this session ?



Solutions to monitor and control the pests and diseases components are becoming operational both with conventional and biocontrol solutions…

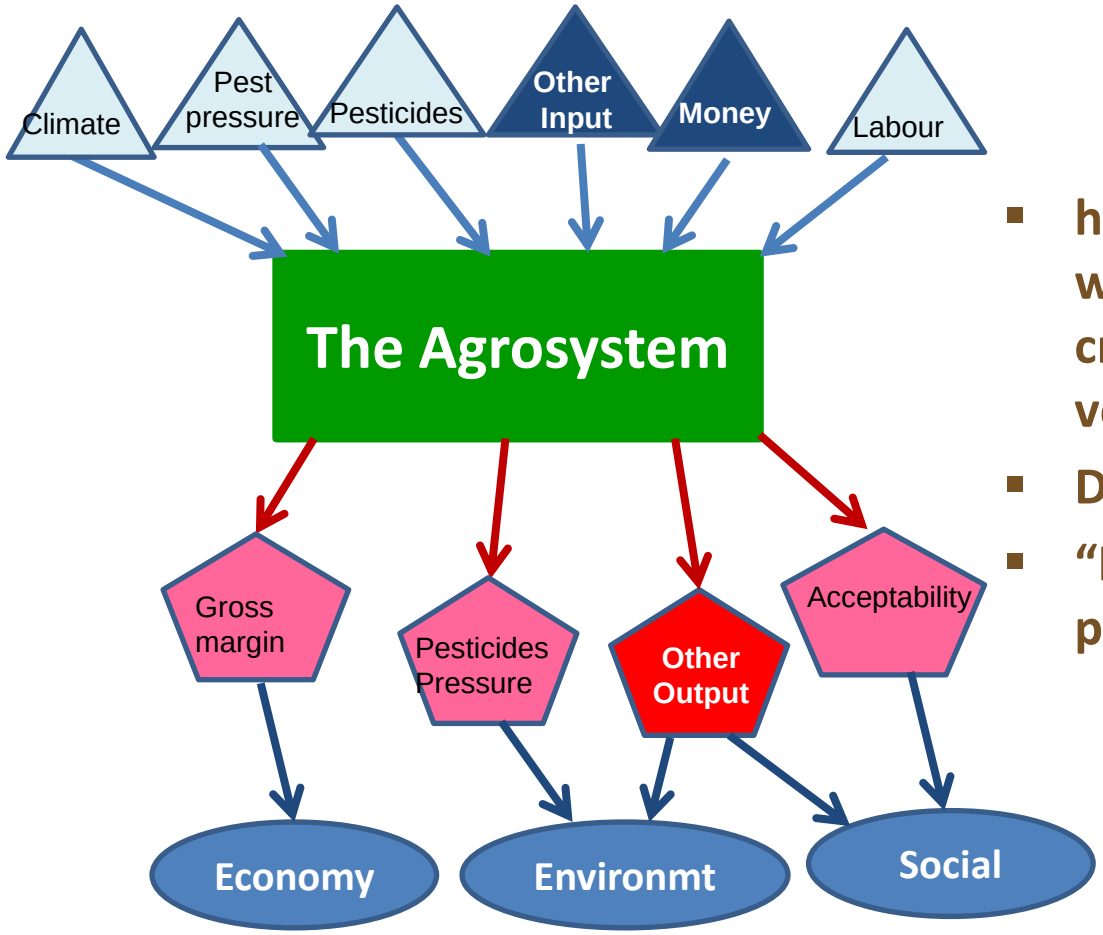




… at least at field level.

For the first 30 reduction – As the first step in the transition pathway

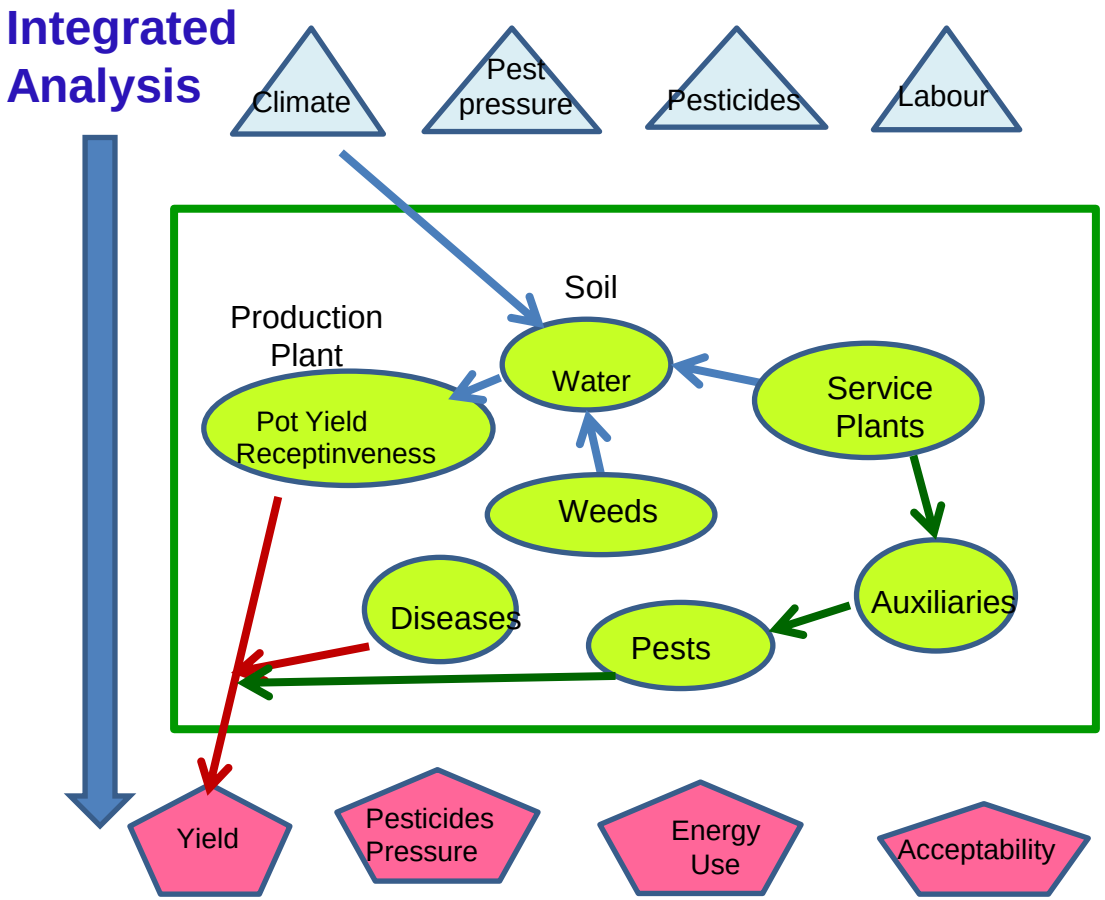
Towards operational tools to assess the position of Agrosystems in the sustainability space



- have been launched in a wide range of crops (grain crops, orchards, vineyards, vegetables) (e.g. Dexi-PM)
- Data and model are key
- "Intermediate objects" for participatory research

Sustainability Assessment

Emerging Research targeting the engineering of complex interactions among the agrosystem's components



Design

EcoViti

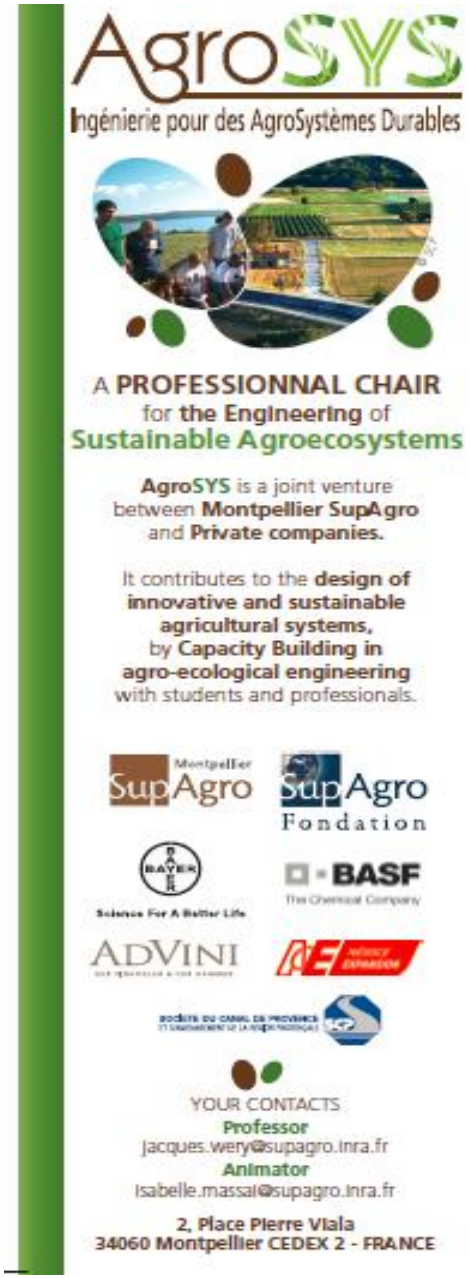
- **Conceptualization** Protocols
- **Indicators** (Analysis, Assessment, Design)
- Numerical **models** (analyse, predict)

(Rapidel et al., 2009; Metral et al., 2014)

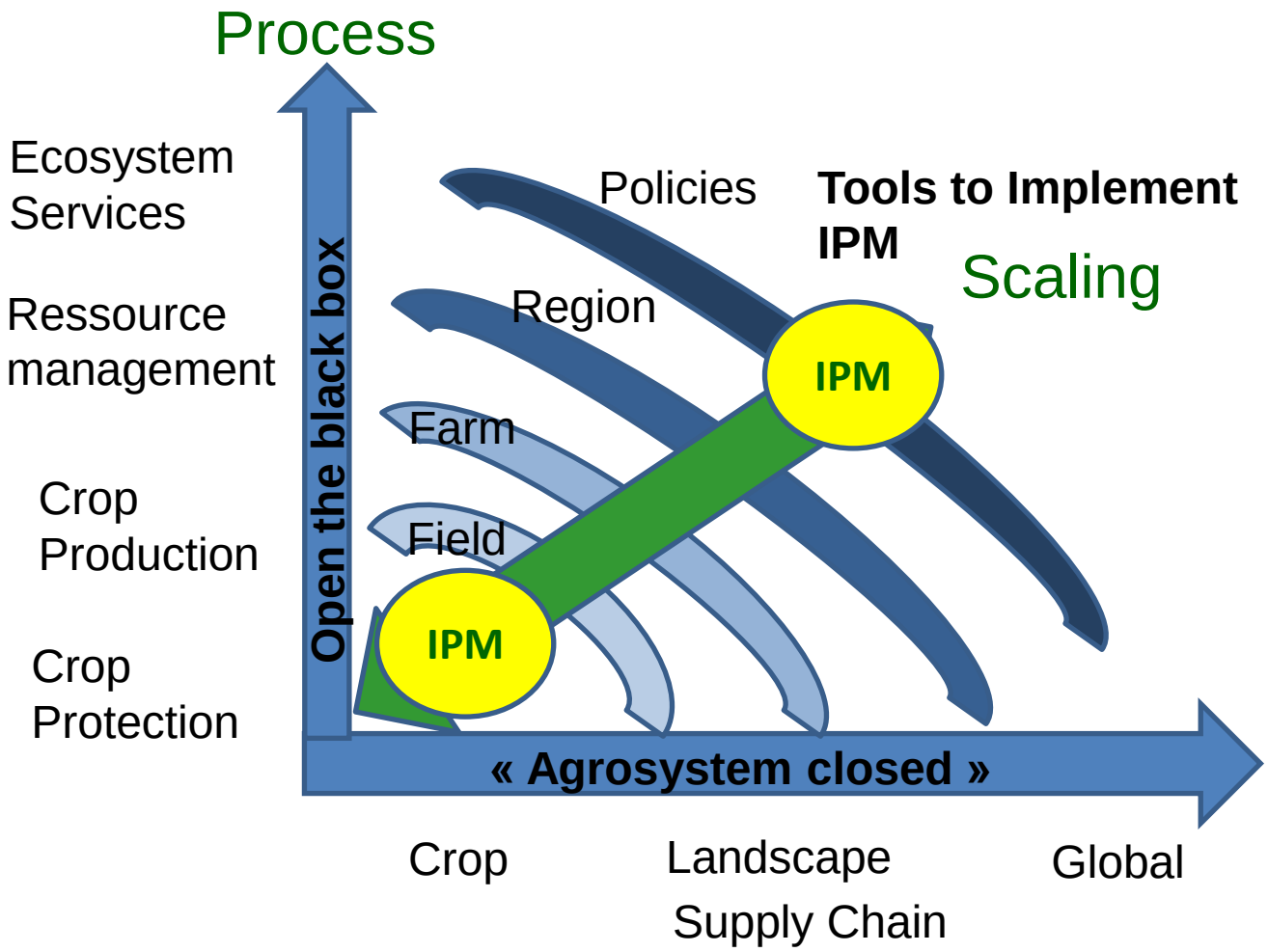
- **have been launched in a wide range of crops (grain crops, orchards, vineyards, vegetables)**
- **are still in infancy with regards to knowledge and methods.**
- **Tension between Systemic and Analytical experiments**

Science-based Cropping Systems engineering for IPM

- **Interactions** among components and with the environment should be the major drivers of change
  - Instead of additive and technology driven process which has shaped our current cropping systems.
- Sustainability will emerge from the design and management of **transitions at farm level**
- **Outscaling from research will be on Methods not on Solutions**
  - agrosystems and the technical system to manage them will have to be **adapted to local conditions**
  - a specific set of **resources** (← farmer)
  - a desired **position** in the sustainability space (← stakeholders, policies, supply chains).
- **Capacity building** in this domain (AgroSYS chair and the AgroDesign master (C. Neema)



Where is IPM today and what systems analysis can bring ?



Can it be both a site-specific system and a policy component ?

4. A no Conclusion - To open the session

- The efficient management of pesticides is on its way ?
- Why IPM has not yet opened the “black box” of the Agrosystem for its re-design?
  - → Going from IPM to Integrated Management of Resources and Undesired Organisms in Agrosystems ?
- Does research produce operational decision aid tools for IPM ?
  - → which tool for which decision by whom ?
  - To produce knowledge, prototypes or cropping systems tailored to local conditions?
  - At which level of organisation : field ? Farm? landscape?
- Are systems theories and methods mature and operational enough for IPM ?
- Yours ???