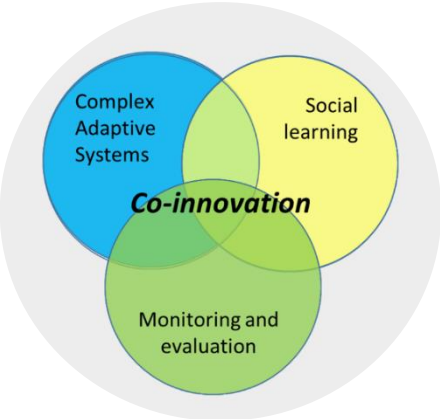
# Crafting co-innovation

Walter Rossing, Farming Systems Ecology, Wageningen University

With inputs by many



# Flow in the presentation

- Once upon a time
- Producing actionable knowledge
    - Analysis and design
    - For ecological intensification
    - Through projects
- Producing actionable knowledge through co-innovation
- Recent example DiverIMPACTS
- Lessons and questions

# Once upon a time...

EPIPRE – computer-based advice on pesticide application in wheat

- Contacts with growers crucial
- Defining the system properly
- Strength of agency (Zadoks, Rijsdijk)

*European Journal of Plant Pathology* **103:** 217–234, 1997.
© 1997 *Kluwer Academic Publishers. Printed in the Netherlands.*


**Operationalizing sustainability: exploring options for environmentally friendly flower bulb production systems**

Walter A.H. Rossing[1], Jan Eelco Jansma[1], Frank J. De Ruijter[2] and Jan Schans[2]
[1] *Dept. of Theoretical Production Ecology, Wageningen Agricultural University, P.O. Box 430, 6700 AK Wageningen, The Netherlands (Fax: +31-317-484892);* [2] *DLO Research Institute for Agrobiology and Soil Fertility AB-DLO, P.O. Box 14, 6700 AA Wageningen, The Netherlands (Fax: +31-317-423110)*

ELSEVIER

European Journal of Agronomy

European Journal of Agronomy 7 (1997) 271–283

Model-based explorations to support development of sustainable farming systems: case studies from France and the Netherlands

W.A.H. Rossing[a,*], J.M. Meynard[b], M.K. van Ittersum[a]

Prototyping and model-based exploration

- Proposed as complementary
- Field & farm levels
- Diagnosis, design, testing, dissemination
- Values and biophysical knowledge

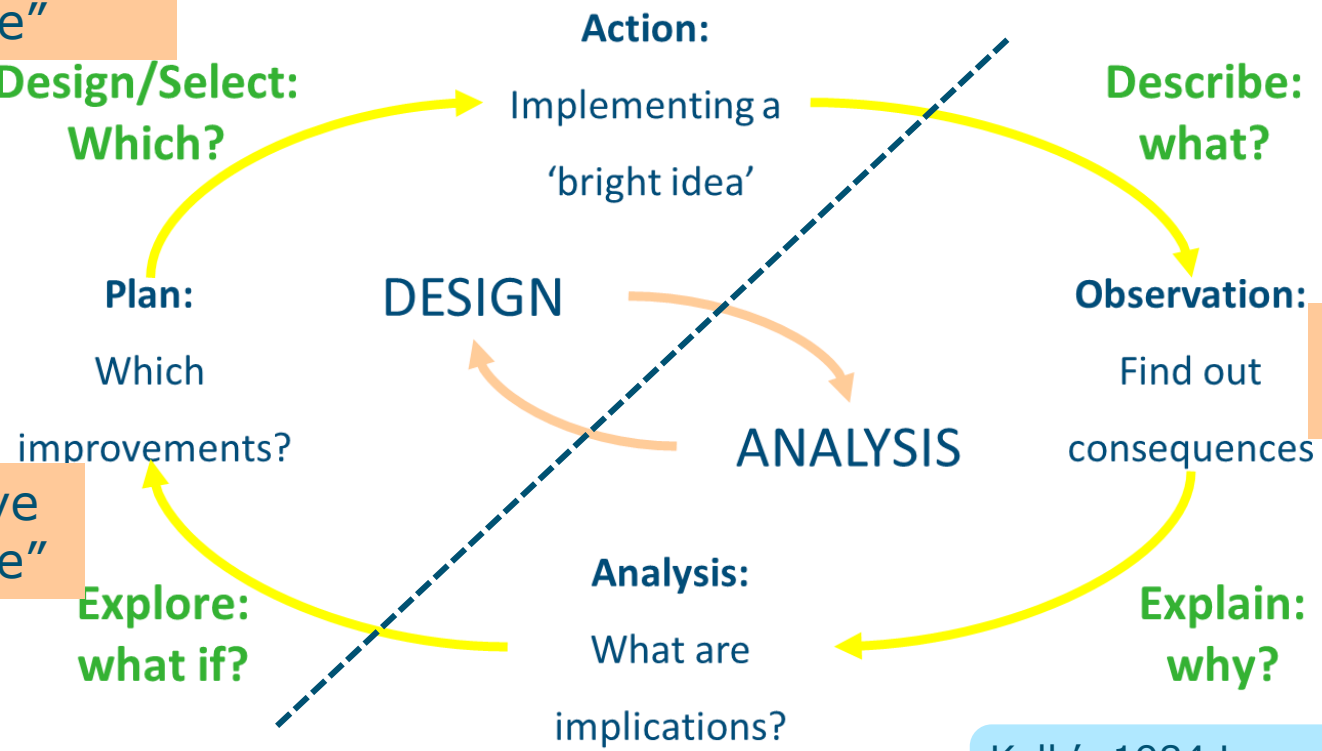
# Actionable knowledge

***Context-specific*** knowledge that ***assists actors*** in their decision-making to be better positioned to ***achieve their goals.***

Geertsema et al., 2016

# Producing actionable knowledge

"Transformative knowledge"




"Systems knowledge"

"Normative knowledge"

Kolb's 1984 Learning cycle

Giller et al's 2001 Research cycle

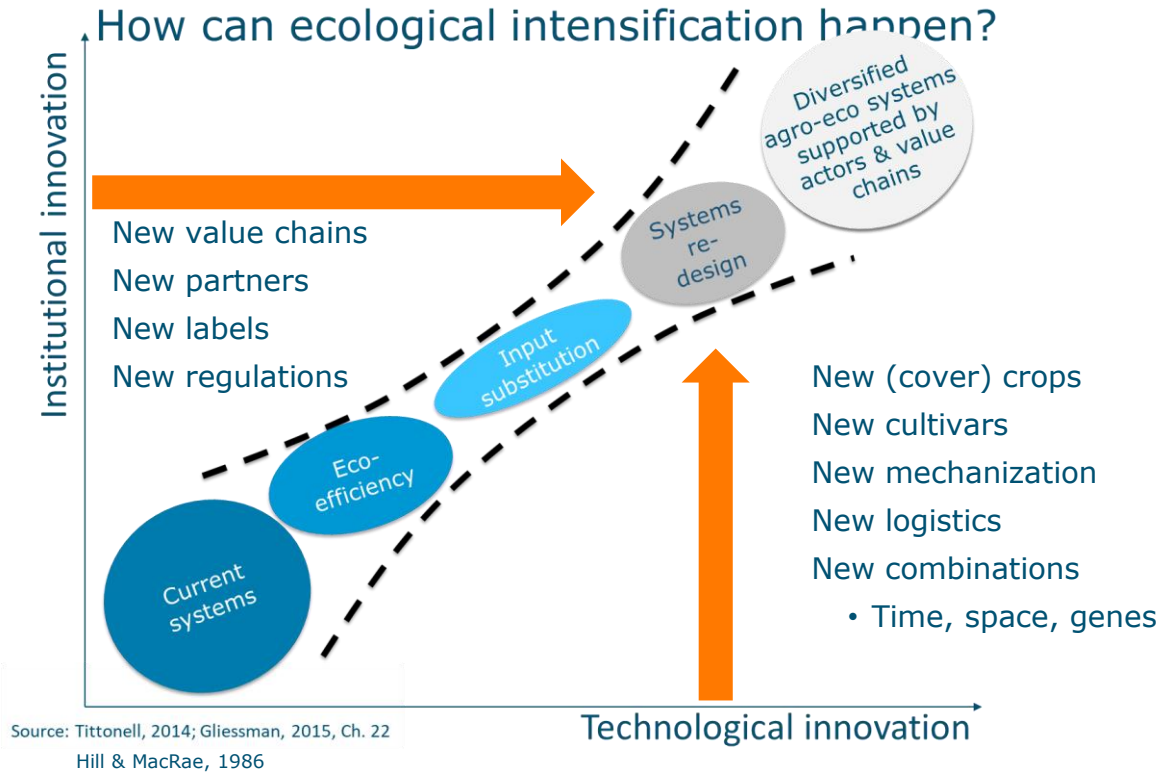
Rossing et al., 2021

# Ecologically intensive agriculture

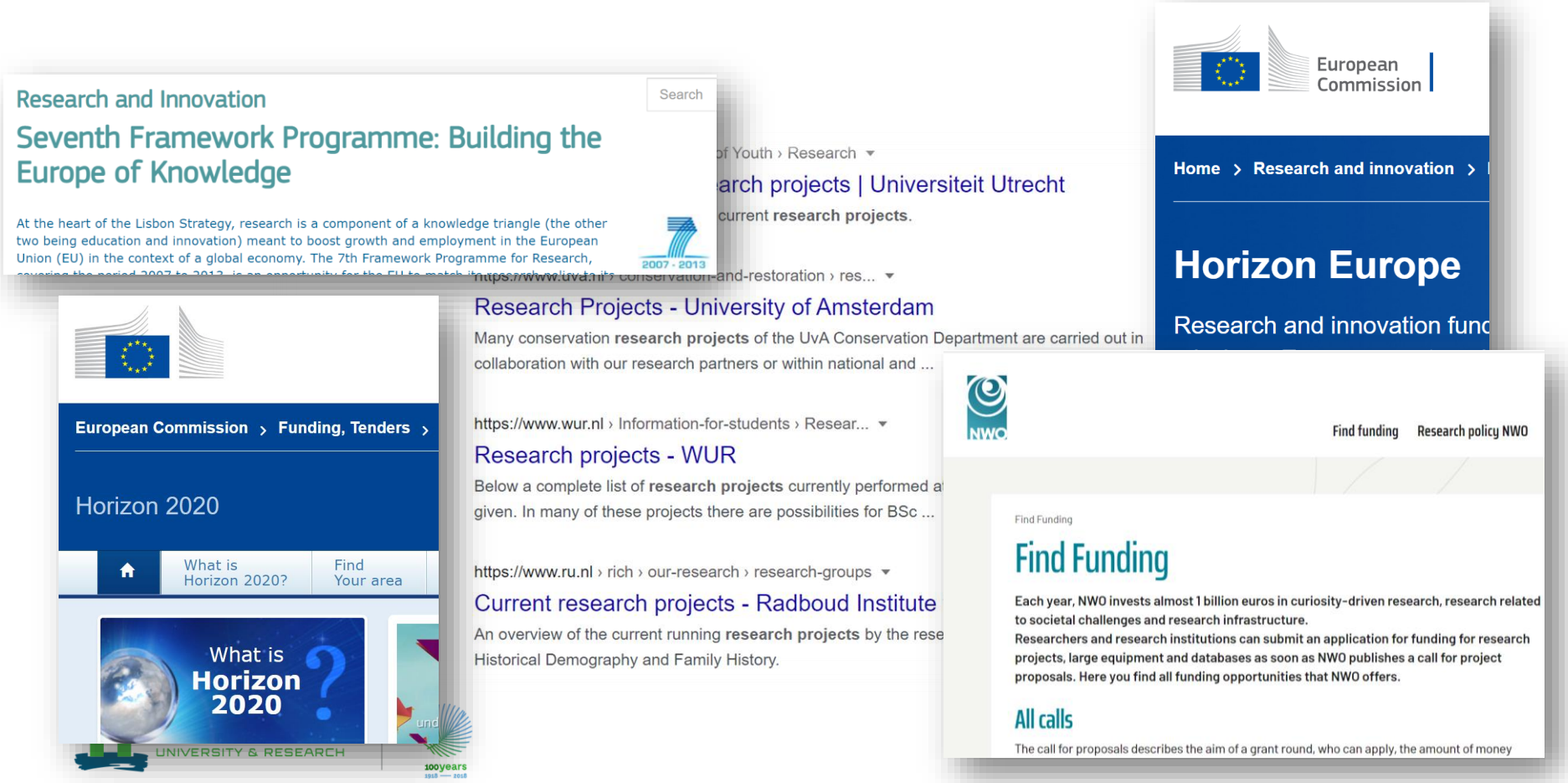
Approaches to agricultural production based essentially on the use of biological regulation to manage agroecosystems (Doré et al., 2011)

Eco-functional intensification (Levidow et al., 2012)

Biodiversity-based agriculture (Duru et al., 2015)



# Projects: the dominant way of organizing science



# Perspectives needed for actionable knowledge

- Innovation system: co-development versus ‘rolling out’
- Complex system: expect unexpected behaviour
- Adaptive system: managing for optimality based on control versus adaptation based on monitoring (safe-to-fail systems)
- Political system: determines what is salient, credible, legitimate. Trust may involve ‘taking sides’.

COLLOQUIUM PERSPECTIVE

COLLOQUIUM PERSPECTIVE

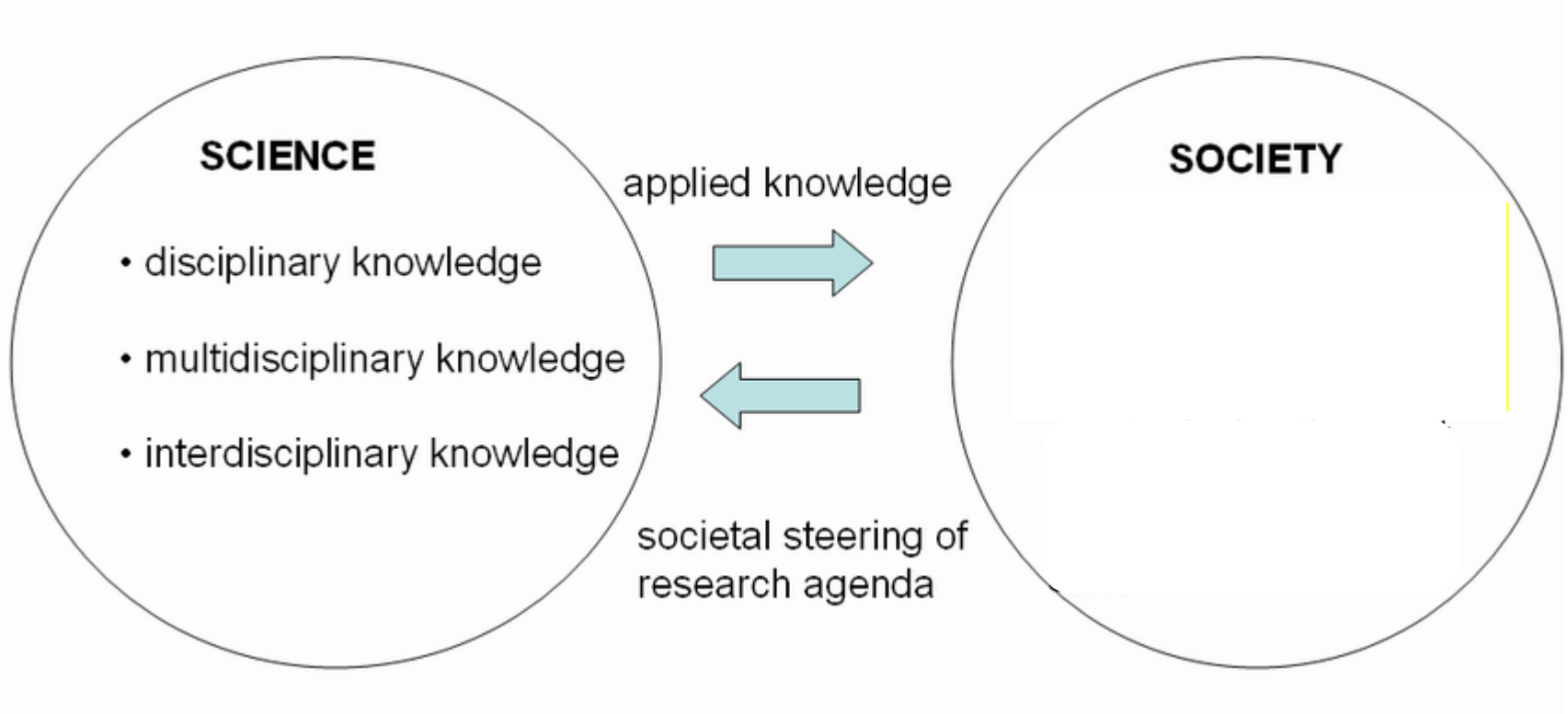
Crafting usable knowledge for sustainable development

William C. Clark[a,1], Lorrae van Kerkhoff[b], Louis Lebel[c], and Gilberto C. Gallopin[d]

Edited by B. L. Turner, Arizona State University, Tempe, AZ, and approved March 18, 2016 (received for review January 27, 2016)

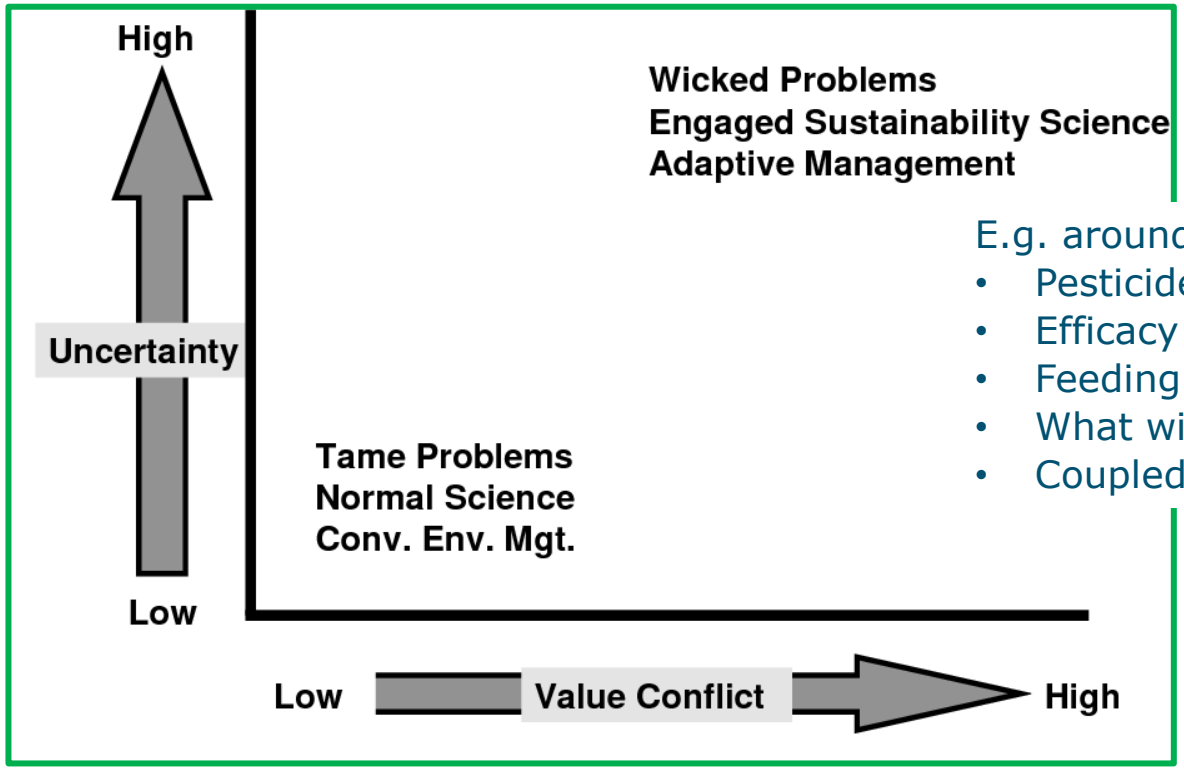
This paper distills core lessons about how researchers (scientists, engineers, planners, etc.) interested in promoting sustainable development can increase the likelihood of producing usable knowledge. We draw

# How to organize science for such transformation?




Wesselink and Merkx, 2007

# Wicked problems

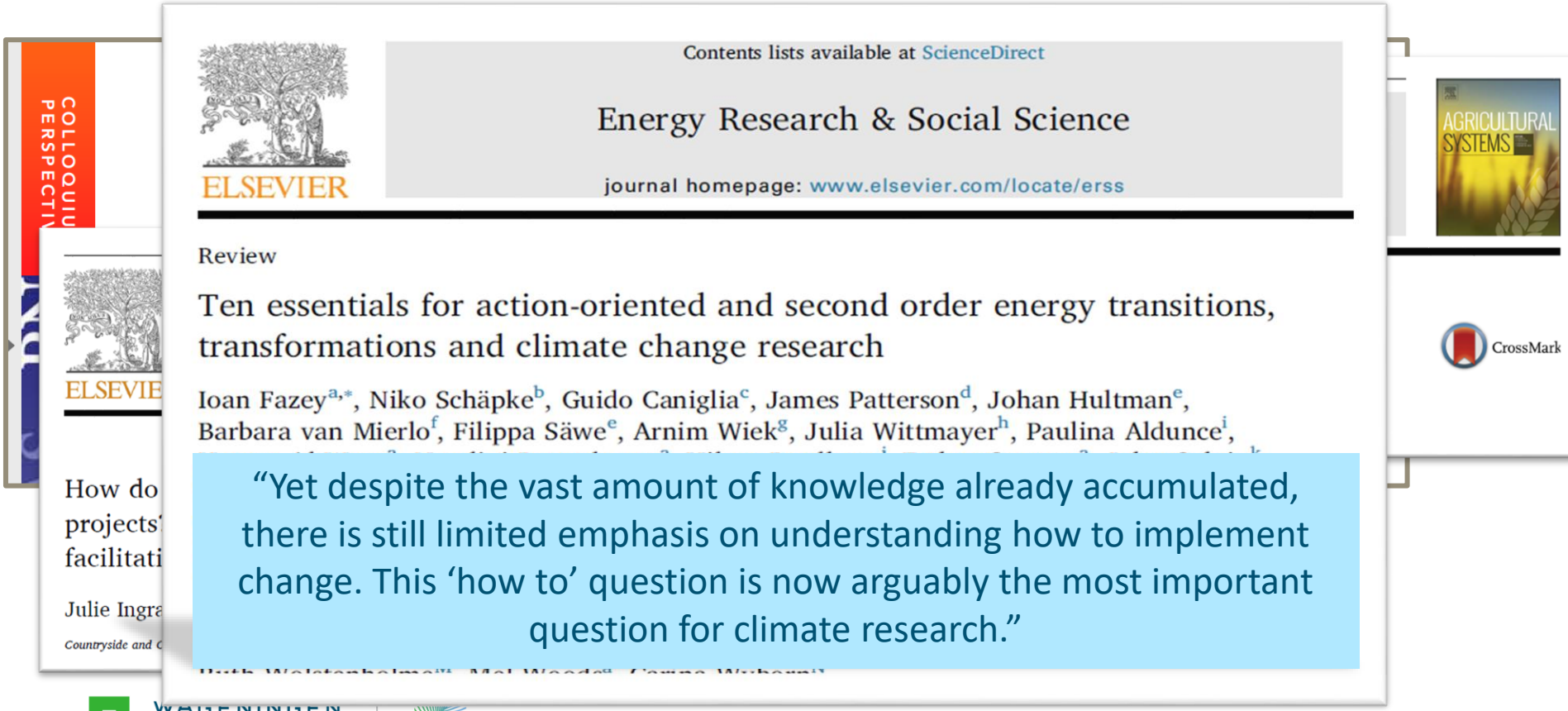



E.g. around pesticides

- Pesticides are acceptable?
- Efficacy of alternatives?
- Feeding the world narrative
- What will my neighbours say?
- Coupled advice+sales

S. Batie, 2009

# Crafting to address the 'how-to' question



Contents lists available at ScienceDirect

Energy Research & Social Science

journal homepage: www.elsevier.com/locate/erss

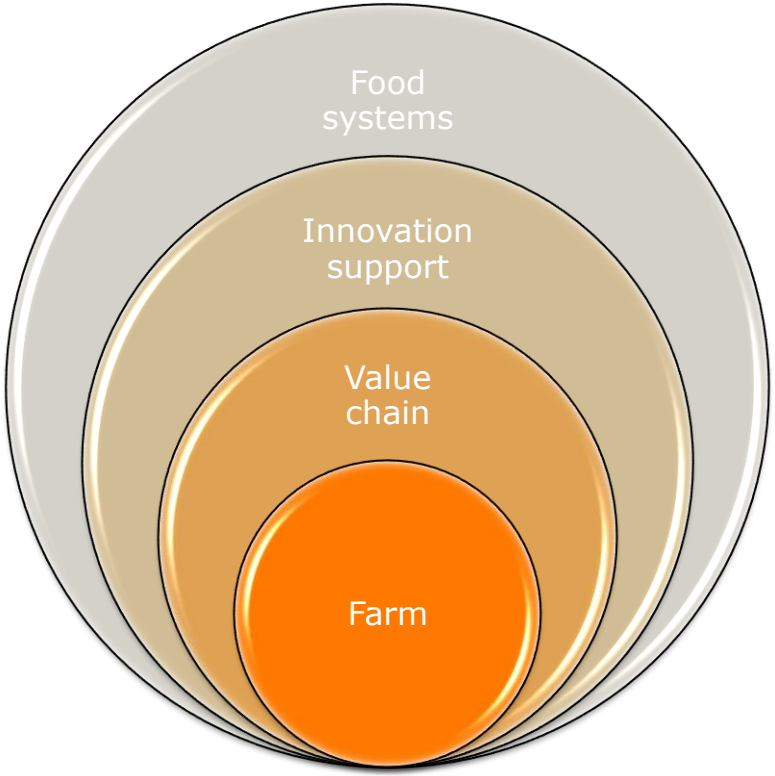
Review

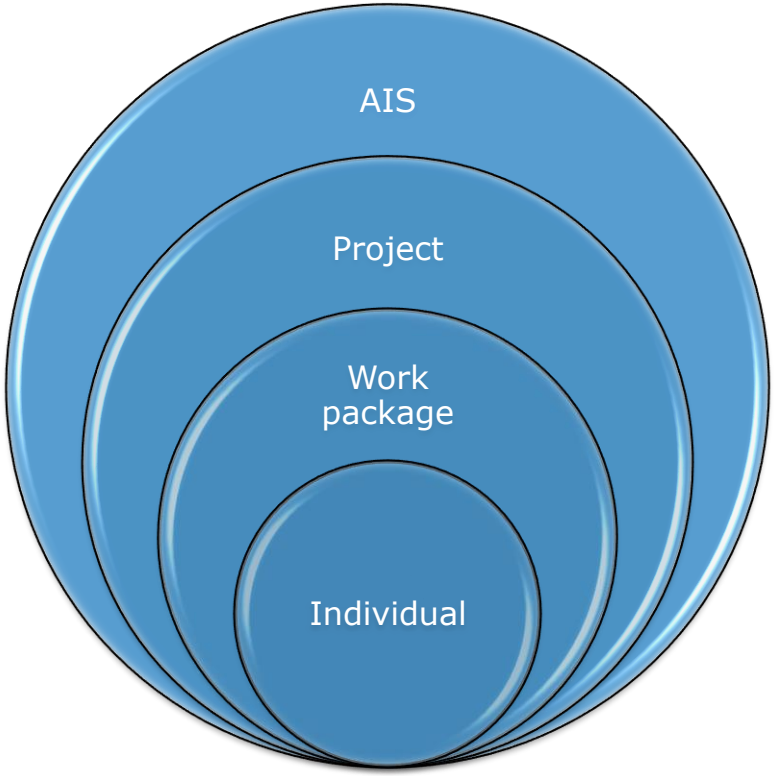
## Ten essentials for action-oriented and second order energy transitions, transformations and climate change research

Ioan Fazey[a,*], Niko Schäpke[b], Guido Caniglia[c], James Patterson[d], Johan Hultman[e], Barbara van Mierlo[f], Filippa Säwe[e], Arnim Wiek[g], Julia Wittmayer[h], Paulina Aldunce[i],

"Yet despite the vast amount of knowledge already accumulated, there is still limited emphasis on understanding how to implement change. This 'how to' question is now arguably the most important question for climate research."

# Crafting at multiple levels



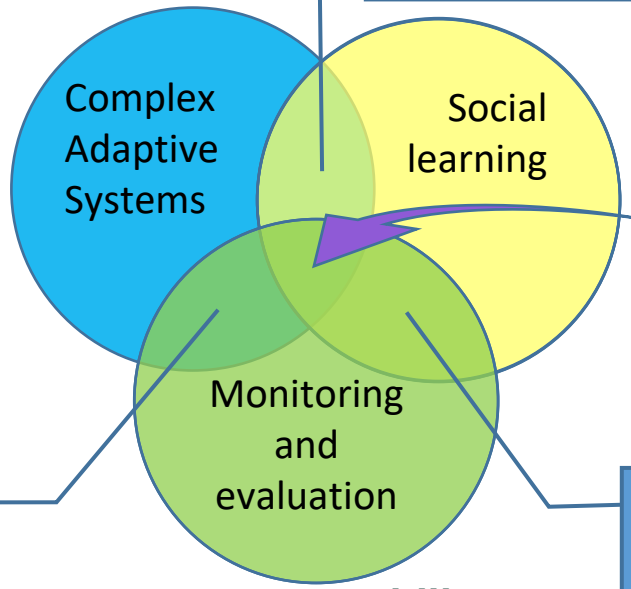



# Crafting in 3 domains

- **Systems at different levels**
- **Emergent behaviour**
- **Adaptive management**

How we see the world: *framing*

- **Perceptions of others**
- **Needs identification**
- **Networks of actors**




***Co-innovation***

Interventions and responses: *anticipating the unexpected*

- **Accountability**
- **Learning**

Are we doing the right things: *reflexivity*

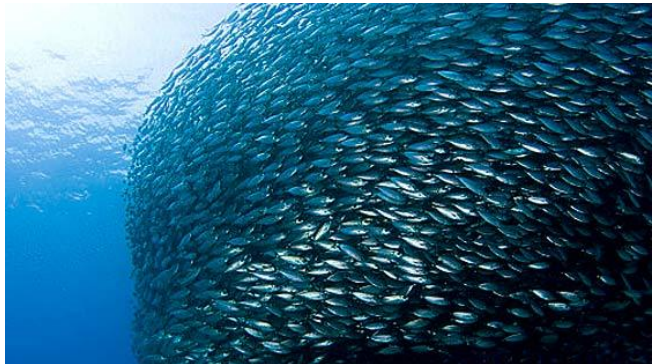
Rossing et al., 2010; 2021

# The three co-innovation domains

- **Complex Adaptive Systems**: agents, artifacts and strategies; learning selection
    - Foster variation (agents, strategies, interaction patterns) to stimulate novelty creation; support survival of effective ones
- **Social Learning**: the way collaboration changes individual values and behaviour, in turn affecting collective culture and norms
    - Regular events, safe spaces, common format
- **Monitoring and evaluation**: which and how project results are produced to assess of project actors still agree on project directions
    - Formative, accountability, summative

# Co-innovation: guiding principles

- A change-oriented project works within a societal system that consists of agents, artefacts, strategies and constitutes a Complex Adaptive System
- A change-oriented project itself constitutes a CAS
- Change at all levels is driven by 'Learning Selection' in analogy with natural selection (Douthwaite, 2002)
- Change is an emergent property from the reflexive interaction of agents, artefacts and strategies



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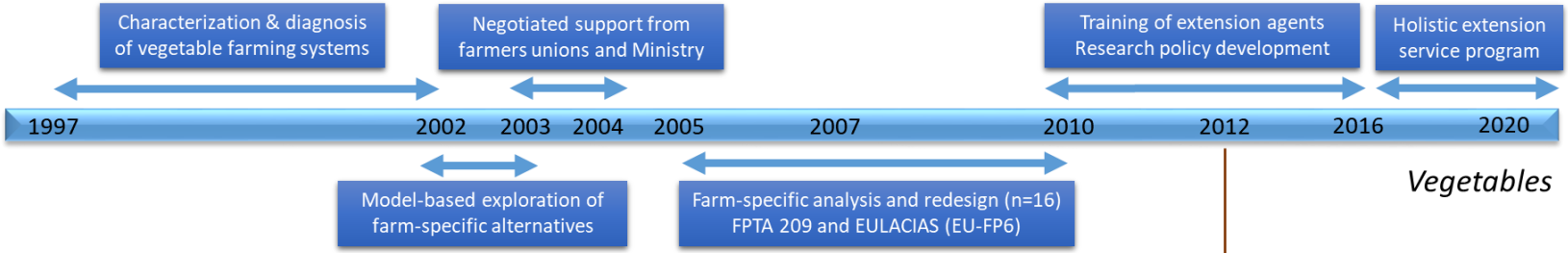
# Consequences for project organization

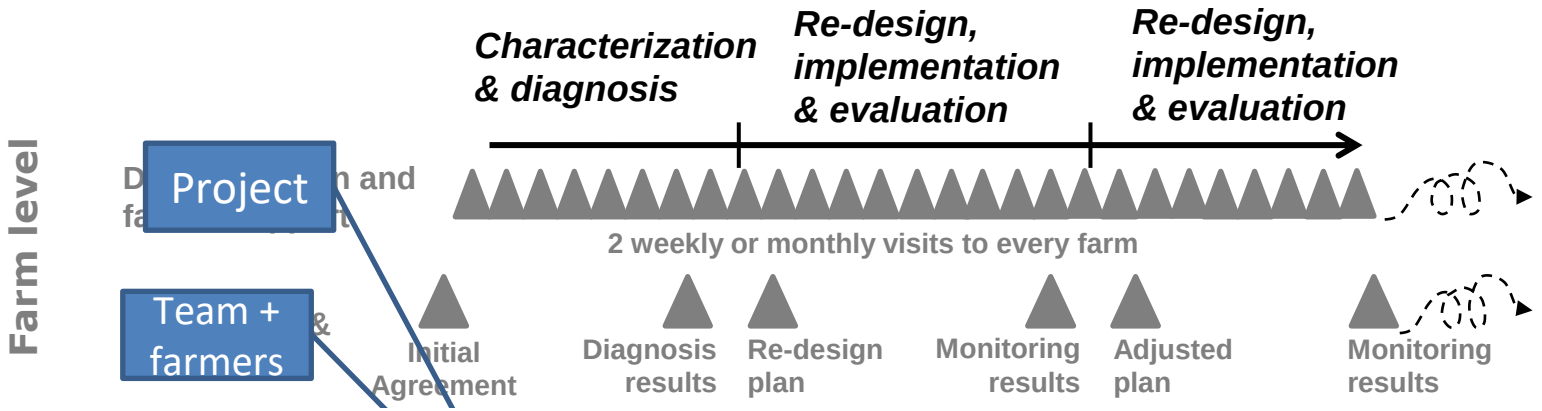
- Foster variation in agents, artefacts, strategies
- Stimulate (unexpected) changes in interaction patterns
- Support selection processes to assess fitness of a novelty, and better allow survival and spread

# Co-innovation from 1997-2020

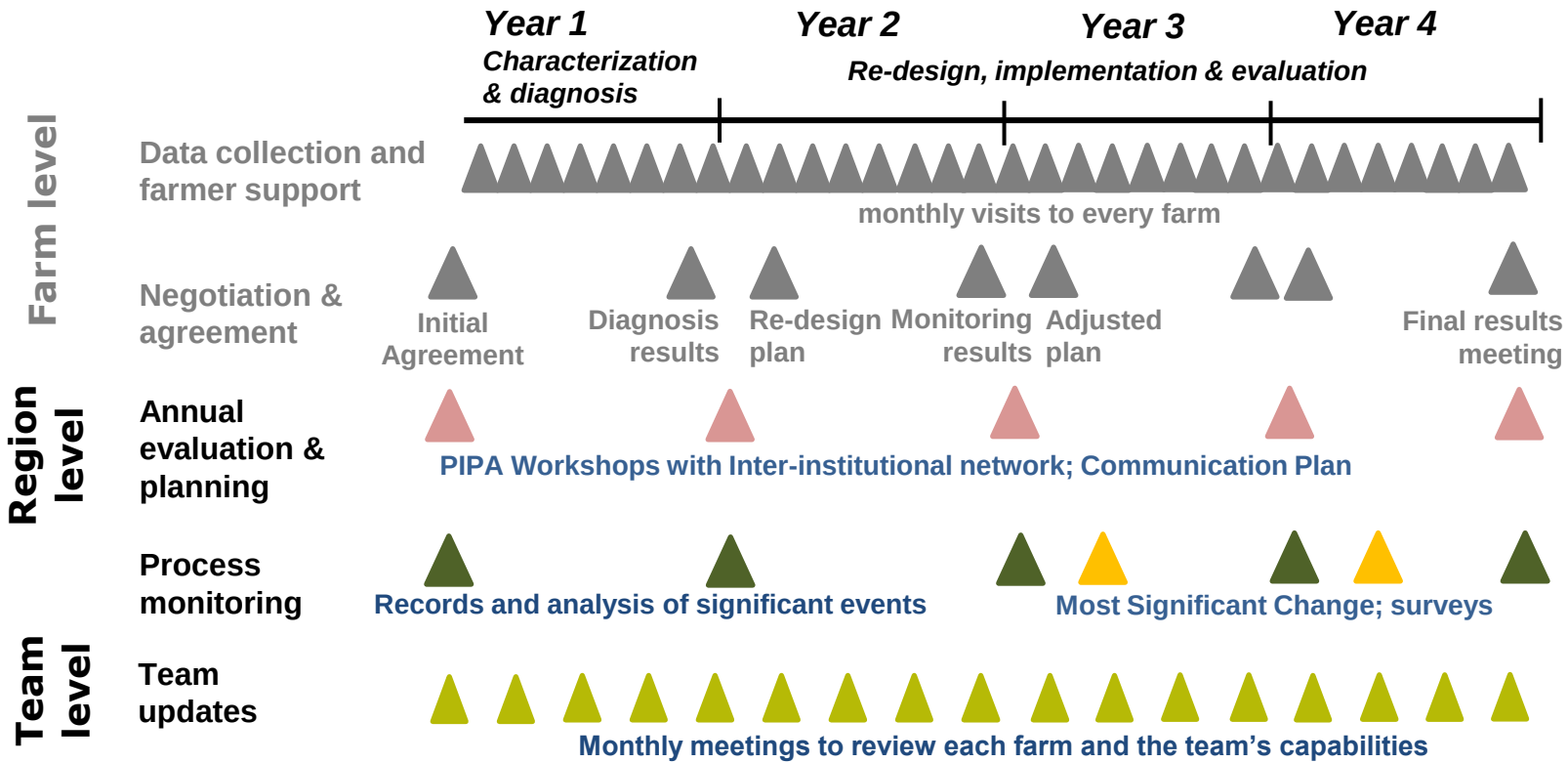



Pedigree of co-innovation projects in Uruguay and Europe

# Activity timelines EULACIAS



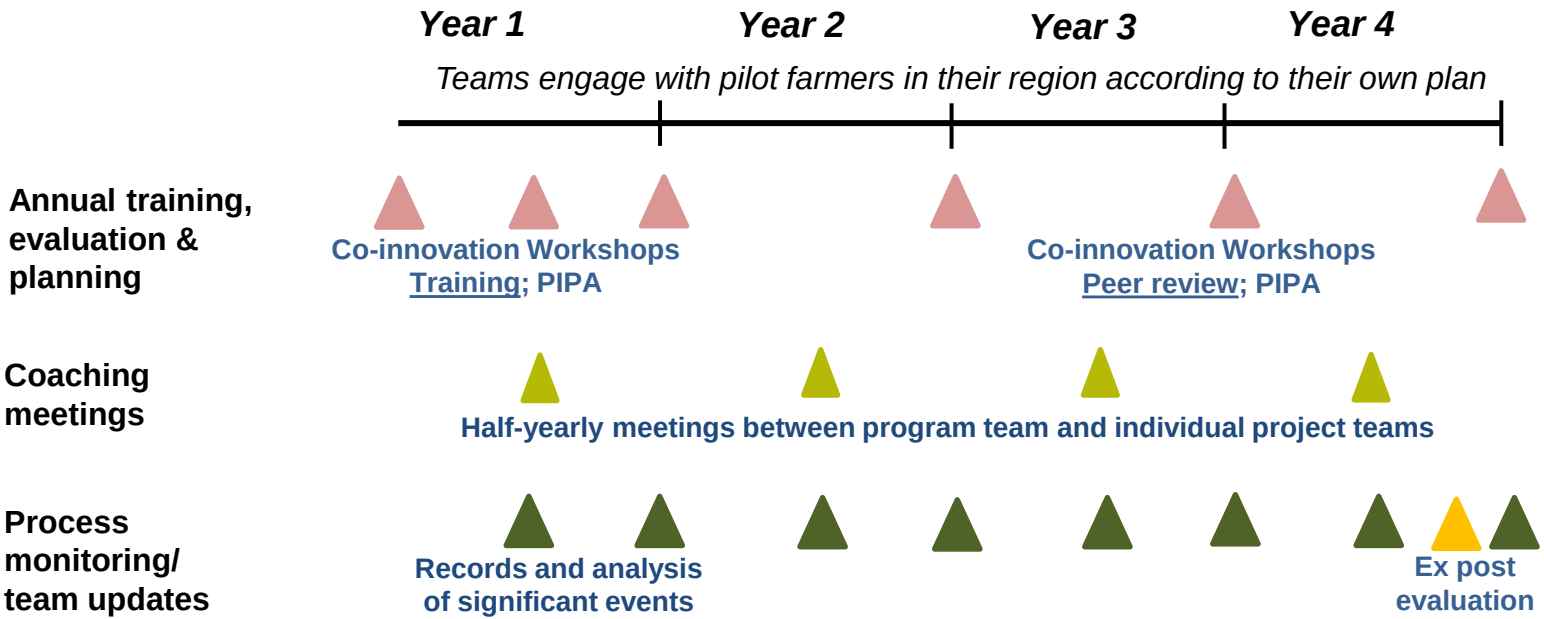
# Activity timelines Rocha



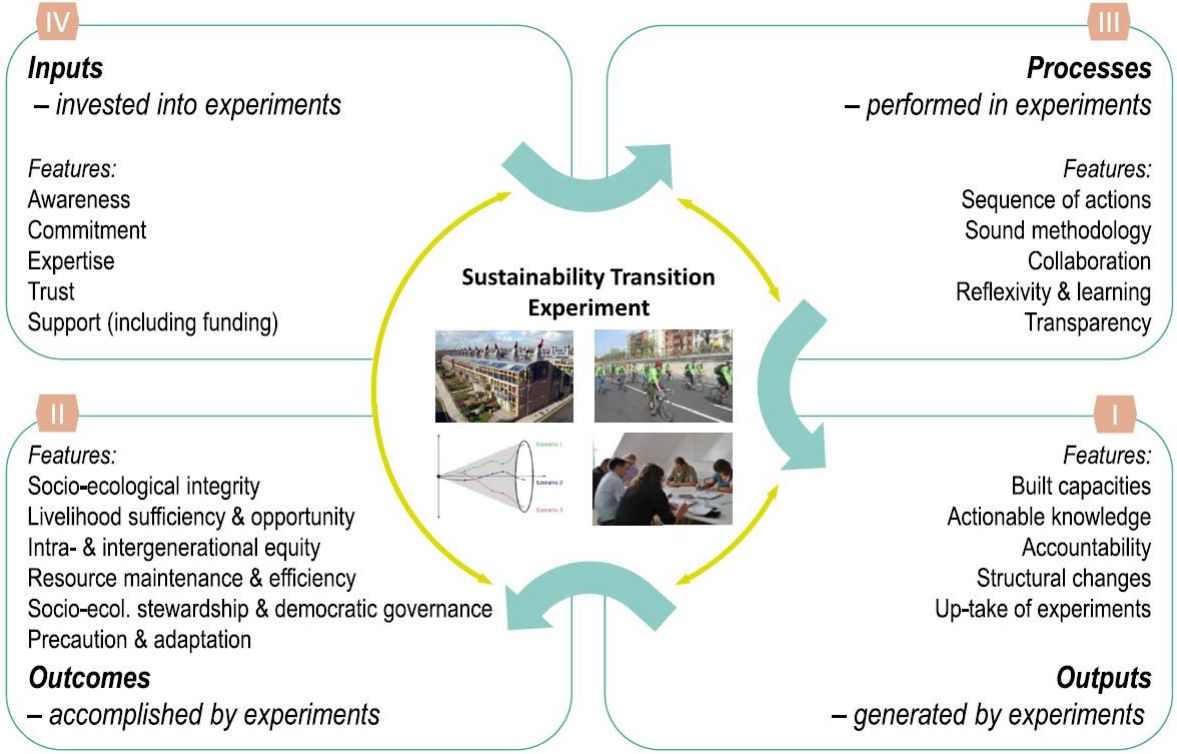



Albicette et al., 2017; Outlook on Agric.

# Activity timelines PURE



# Evaluation of sustainability transition experiments




- 'Tentative evaluation scheme'
- Follows log-frame, but starting from outputs dimension
- Indicators per dimension
- Need for iteration as part of learning

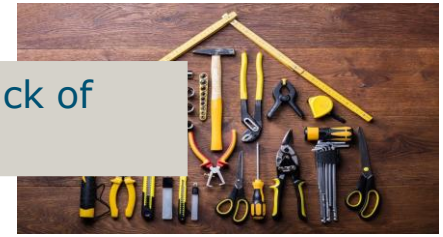
Luederitz et al., 2017; J. Cleaner Prod.

# Evaluation of sustainability transition experiments

Luederitz et al., 2017; J. Cleaner Prod.

| Evaluative dimensions | Feature | EULACIAS | Rocha | PURE-1 | PURE-2 | PURE-3 | PURE-4 |
|---|---|---|---|---|---|---|---|
| Outputs | Built capacities | 5 | 5 | 4 | 5 | 2 | 2 |
| | Actionable knowledge | 4.5 | 4.5 | 4 | 4.5 | 2 | 1 |
| | Accountability | 5 | 5 | 2.5 | 5 | 2 | 1 |
| | Structural changes - physical structures | 5 | 5 | 3 | 5 | 1 | 1 |
| | Structural changes - societal realms | 4 | 4 | 3 | 4 | 1 | 1 |
| | Facilitate uptake - transferability | 5 | 5 | 3 | 5 | 2 | 2 |
| | Facilitate uptake - scalability | 4 | 4 | 3 | 4 | 2 | 2 |
| | Facilitate uptake - unintended effects | 2 | 2 | 3 | 4 | 2 | 2 |
| Outcomes | Socio-ecological integrity | 5 | 5 | 3 | 4.5 | 1 | 1 |
| | Livelihood sufficiency & opportunity | 5 | 5 | 4 | 5 | 1 | 1 |
| | Intra- & intergenerational equity | 4.5 | 4.5 | 3.5 | 4.5 | 1 | 1 |
| | Resource maintenance & efficiency | 4 | 4 | 3 | 4 | 1 | 1 |
| | Socio-ecol. stewardship & democratic governance | 5 | 5 | 3 | 4.5 | 1 | 1 |
| | Precaution & adaptation | 4 | 4 | 4 | 4 | 2 | 2 |
| Processes | Sequence of actions | 5 | 5 | 3 | 4 | 3 | 1 |
| | Sound methodology | 5 | 5 | 5 | 5 | 2 | 2 |
| | Collaboration | 4 | 5 | 4 | 4 | 3 | 2 |
| | Reflexivity and learning | 5 | 5 | 5 | 5 | 5 | 5 |
| | Transparency | 4 | 4 | 4 | 4 | 4 | 4 |
| Inputs | Awareness | 5 | 5 | 5 | 5 | 5 | 5 |
| | Commitment | 5 | 5 | 5 | 5 | 3 | 1 |
| | Expertise | 5 | 5 | 4 | 4.5 | 2 | 2 |
| | Trust | 5 | 5 | 4 | 5 | 2 | 2 |
| | Support (incl. funding) | 5 | 5 | 3 | 3 | 2 | 3 |

# Crafting – overcoming barriers



"We are researchers"
"I have run out of time in the project"

Researchers felt lack of access to farmers

| Institutional level | Institutional dimension |
|---|---|
| Personal | Professional identities, roles and routines of researchers |
| Community and organization | Composition of the pilot team |
| | Fixed institutional roles and objectives |
| | History of the pilot |
| | Fixed rules in the project |
| Agricultural innovation system | Fixed rules in the national AISs |
| | Country-specific cultural norms |

National versus local mandates in advice and research organizations

Acceptance of complexity-aware approaches

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# Co-innovation for project governance: example

- What is the role of a project in systems transformation?
- What project governance for effective change?
- How to keep energy high in the project on a daily basis?

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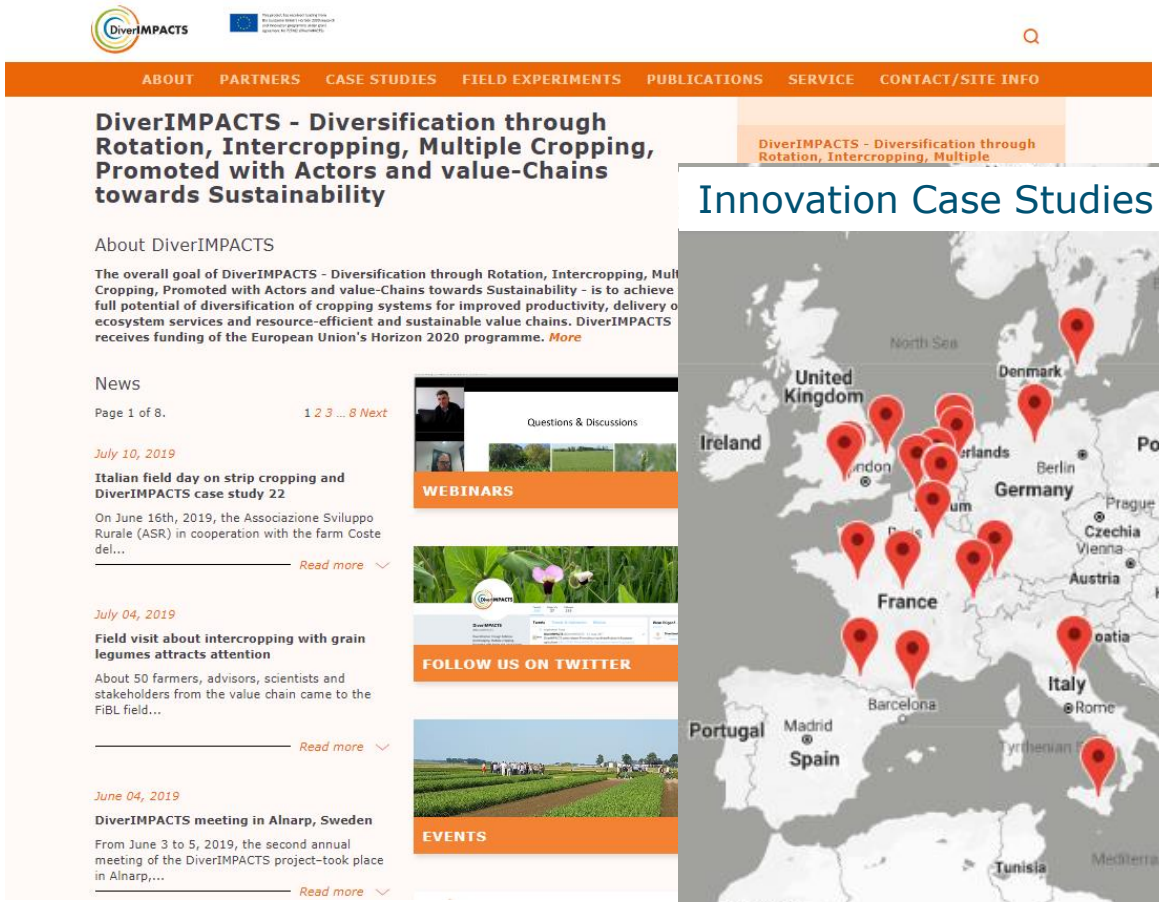
100years
1918 — 2018




## Innovation Case Studies

Delegation for Scientific Expertise, Foresight and Advanced Studies

diversification: obstacles
vers

rms and supply chains

ard, A. Messéan, A. Charlier, F.
l. Farès, M. Le Bail, M.B. Magrini, I.
3. Crop diversification: obstacles and
y of farms and supply chains. Synopsis
y report, INRA, 52 p.

out by INRA
es in charge of Agriculture and Ecology

INRA SCIENCE & IMPACT

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# DiverIMPACTS entry points to Research&Innovation

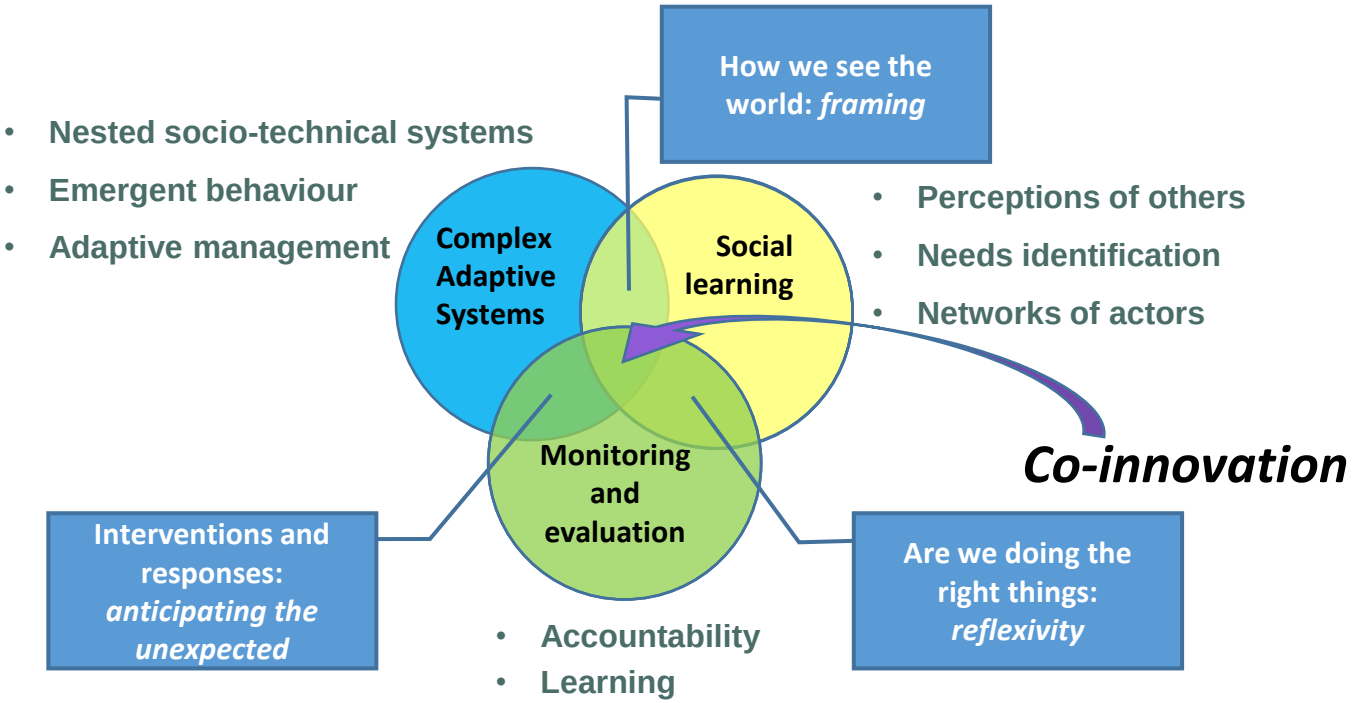
- Transforming mono-cropping requires *actionable knowledge*
  - *Context-specific* knowledge that *assists actors* in their decision-making to be better positioned to *achieve their goals*

- Consider projects as temporary travel companions to innovators
  - Think long-term, act in the short term, take time for a legacy

- Accept complexity in R&I: change happens in unpredictable ways
  - Use context-sensitive R&I project governance

- 'Crafting' a context-sensitive R&I approach is legitimate
  - The only failure is the failure to learn from unexpected developments

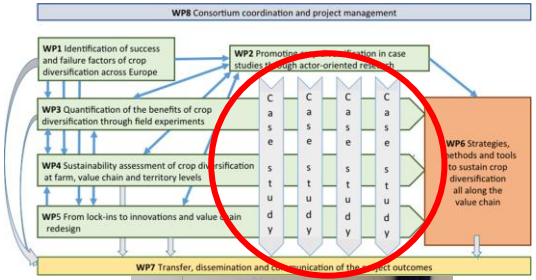
# Co-innovation: framework for context-sensitive R&I governance

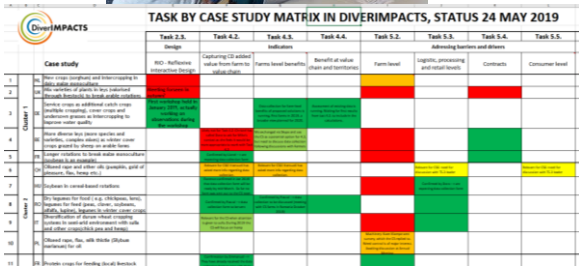



Rossing et al., 2010; 2021

# Context-sensitive governance at project level

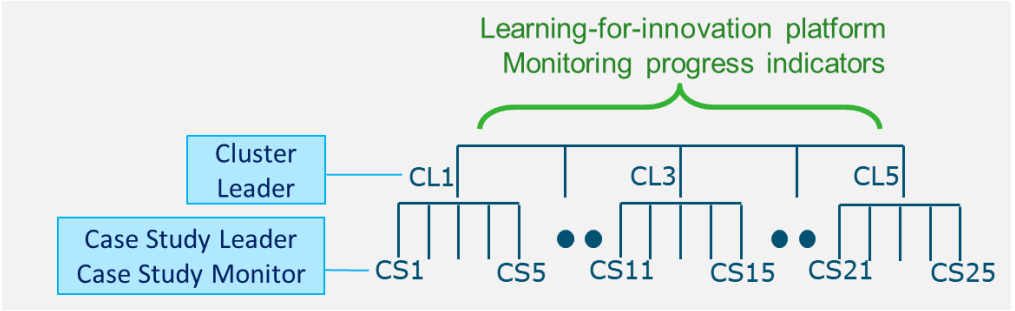
- Use WP matrix, balancing research and innovation
- Promote learning between WPs and Case Studies towards project impacts
- Monitor knowledge exchange between WPs and CSs
- Respond to emerging needs: webinars, seed money



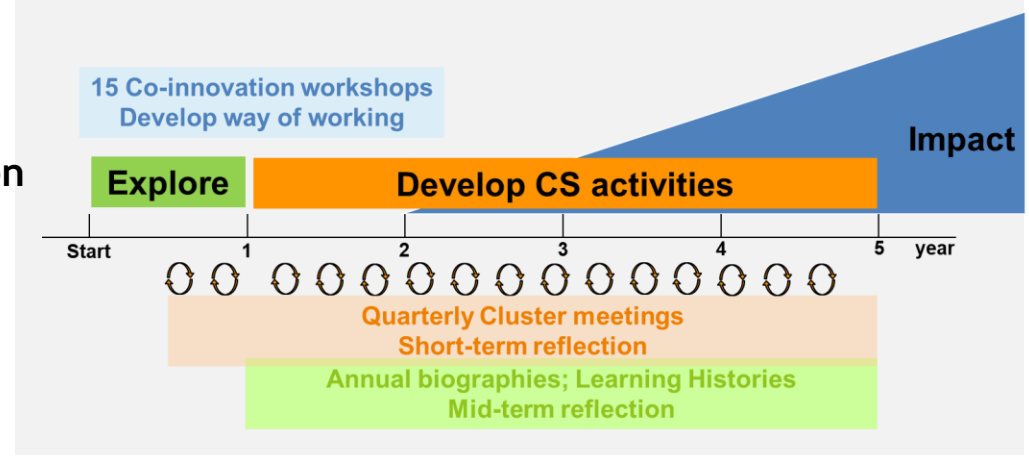


# Context-sensitive governance at Case Study level - 1

- **Structure**
  - 25 CS teams: leader + monitor
  - 5 Clusters with Cluster Leaders
  - Learning-for-innovation Platform




- **Common way of working**
  - Co-innovation workshops
  - Year 1 to explore vision and mission
  - Action and reflection cycles
  - Early-on think about legacy



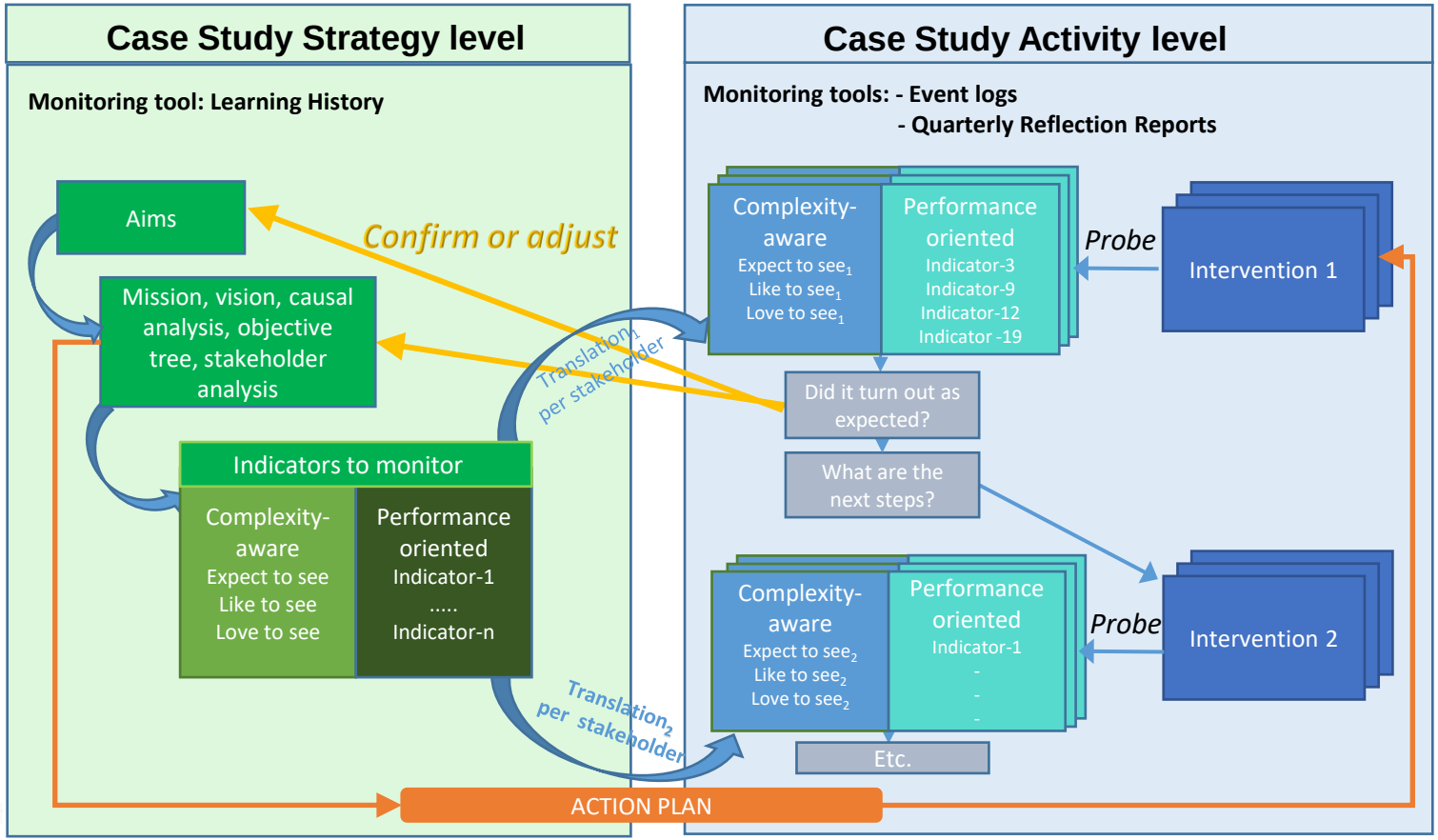
# Context-sensitive governance at Case Study level - 2

PIPA

Outcome mapping

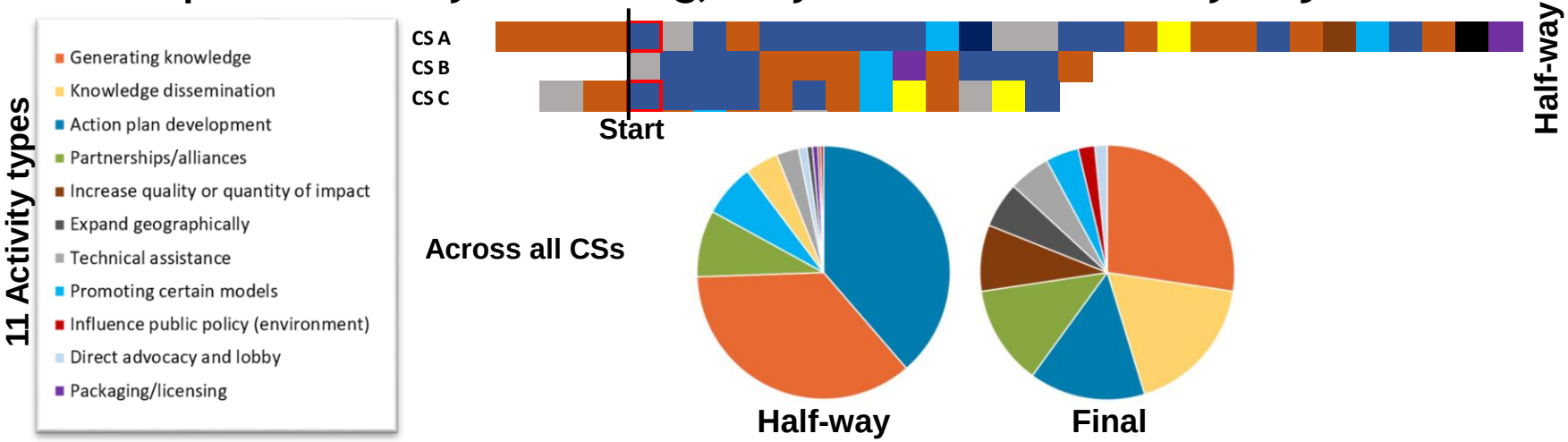
MCA

Reflexive monitoring in Action



# Insights - 1

- **Despite same way of working, very different CS activity trajectories**




  - **Differences in CS age, system focus, types of lock-ins, team's experience**
- **Assessment methods:**
  - **Process indicators relevant throughout: Learning Histories as a useful tool**
  - **Quantitative indicators increased in relevance as a CS matured**

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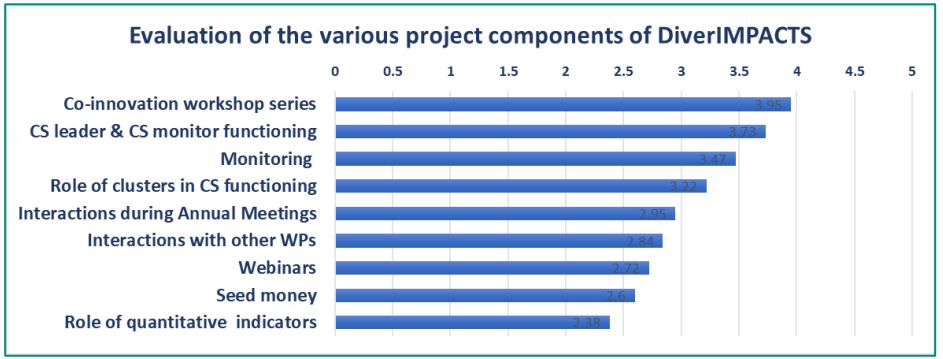
# Insights - 2

- **Usefulness of co-innovation components according to CSs**
  - Social learning, social capital, empowerment of innovators

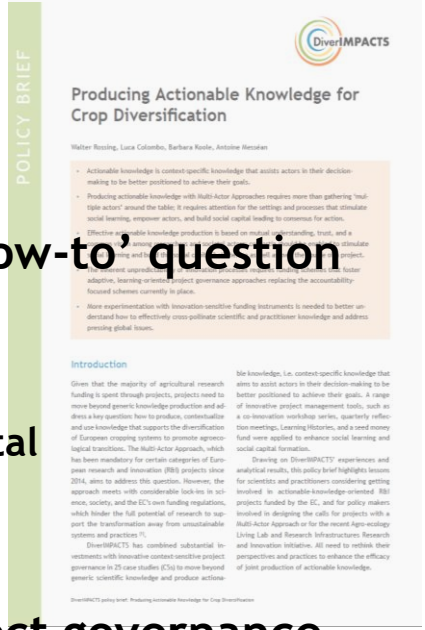



- **Change in perceptions on how to do projects**
  - Project plans are fixed from the start; change of plan = failure
  - Projects are a way to fund business-as-usual: 'projectivisation' of organizations

- **Ample opportunity for on-the-fly learning across projects**
  - Few new insights from other MAA projects or EC reviews

# Conclusions on Producing actionable knowledge

- R&I projects: underexploited resources for the pressing ‘how-to’ question
  - Co-innovation as a context-sensitive MAA
- Three key mechanisms of producing actionable knowledge
  - Stimulating social learning; empowering actors; building social capital
- More effective R&I requires changes
  - In researchers, practitioners and research policy design
- Evolve ‘multi-actor’ approaches to complexity-aware project governance
  - Build indicator frameworks for *social learning* at different levels
  - Build science-society alliances *before* the start of a project and secure *legacies*
  - Create more *flexibility* for project managers to respond to emerging developments


POLICY BRIEF

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Producing Actionable Knowledge for Crop Diversification

Introduction

DiverIMPACTS

# Questions to you

**Differences with your approaches?**

**How to analyze process without focusing on one tool?**

**How to move from ‘niche’ level to ‘regime’?**

# Thank you for your interest

Change is prepared in everyday conversations

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