Agricultural systems
by design

8th International Farming System Design Conference
Palaiseau – 25-29 August 2025

AgroParisTech

INRAE

ideas
INITIATIVE FOR DESIGN
IN AGRIFOOD SYSTEMS

Key-Note

Agriculture by Design
How to address differently Agricultural Challenges?

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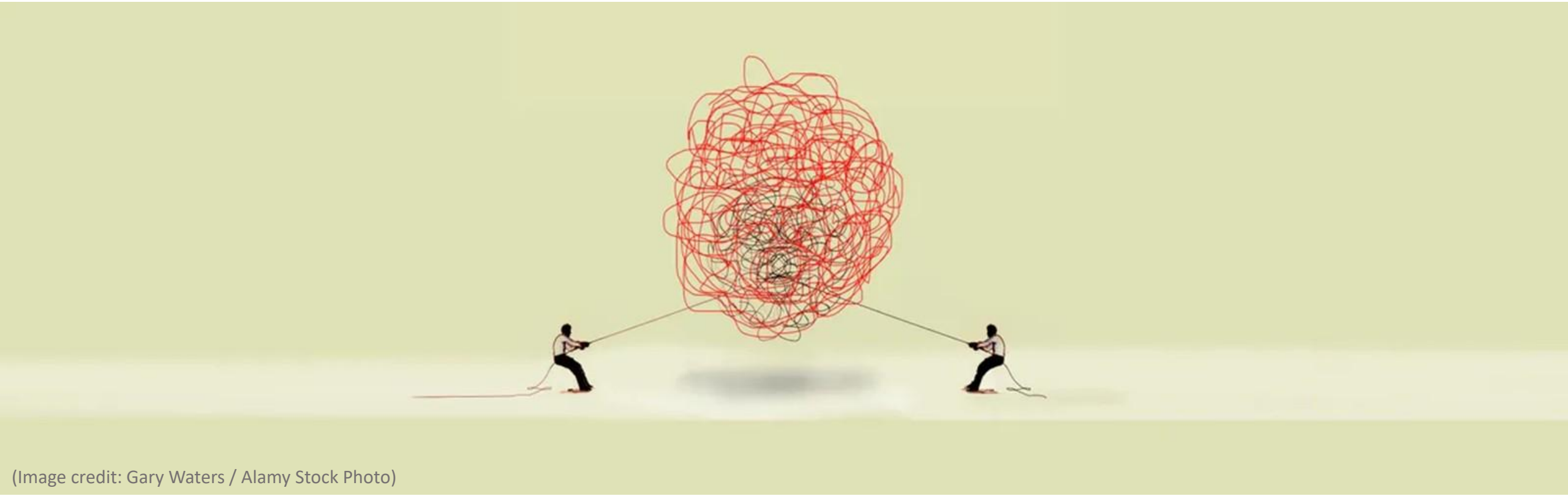
Agenda

I. What is design and why can it be seen as a potential for transformation in today's pressing challenges?
II. Moving design approaches to the food system level: scientific progress and challenges
III. What's next? Adressing differently agricultural challenges

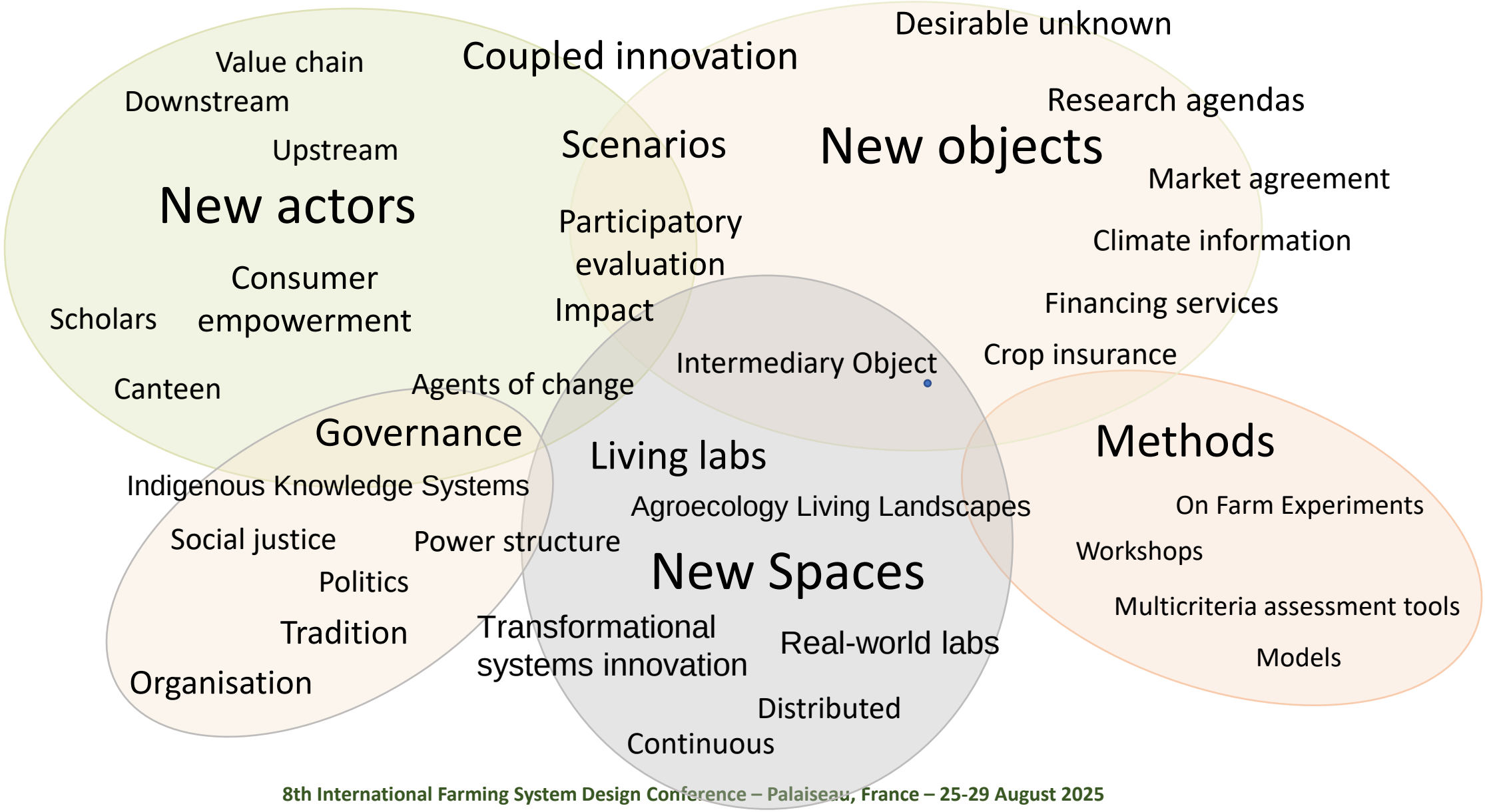
Let us first hear from you



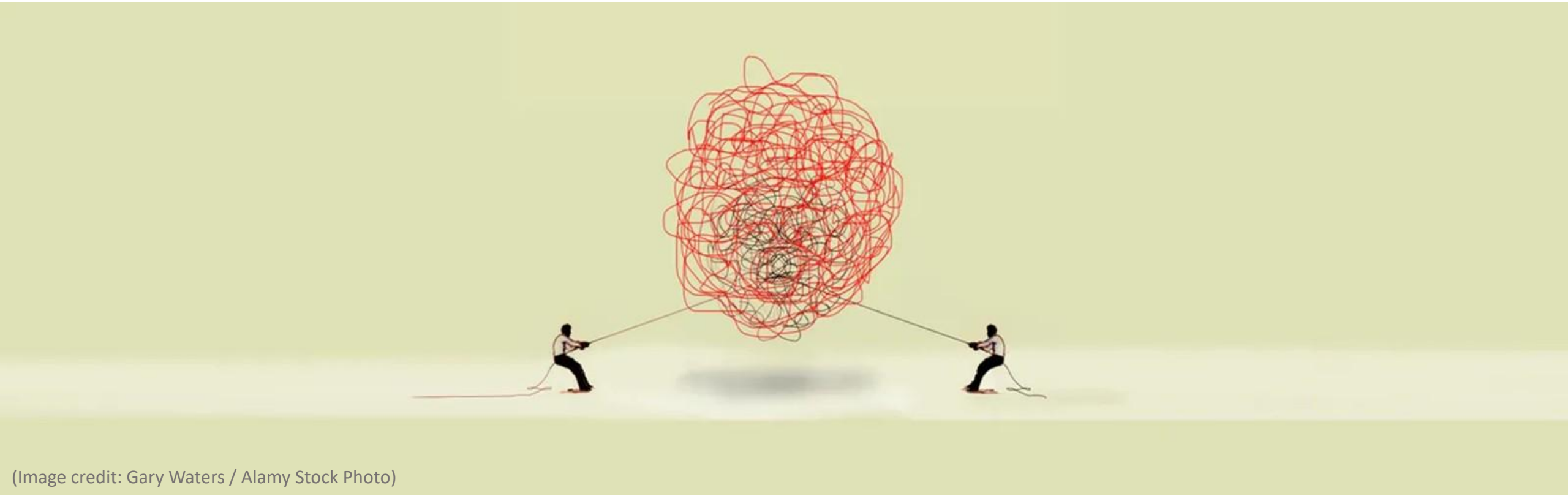
(Image credit: Gary Waters / Alamy Stock Photo)

Do you mobilise design in your research work?

Overview of your works presented during the conference



Another question



(Image credit: Gary Waters / Alamy Stock Photo)

Do you mobilise **design sciences** in your work?

What is de◆sign

And why can it be seen as a potential for transformation in today's pressing challenges?

What is de◆sign

Picture from Design to Change"
by Ruud Janssen, Roel Frissen
and Dennis Luijer (2024)

What can be designed

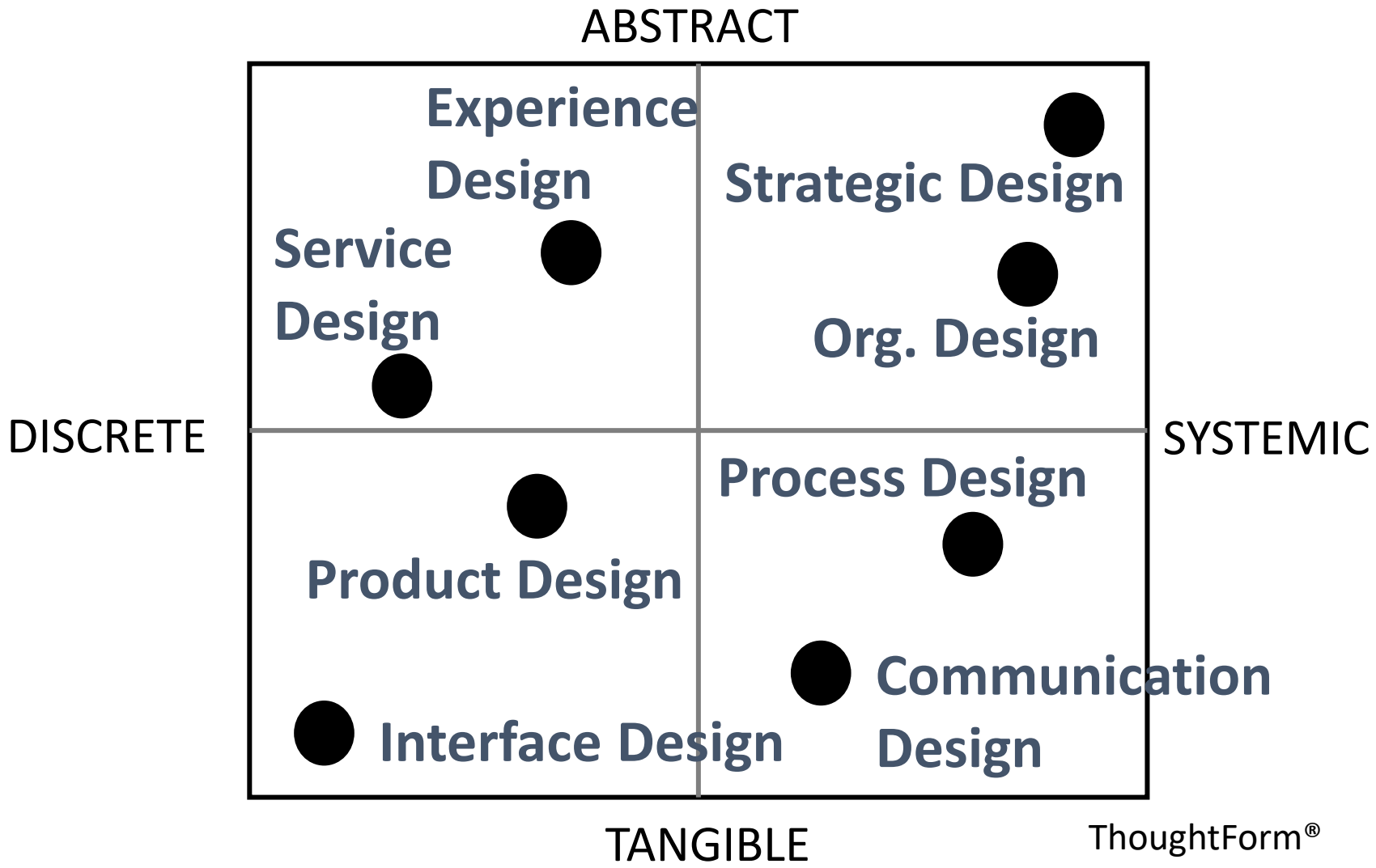
What can be designed

What can be designed

What can be designed

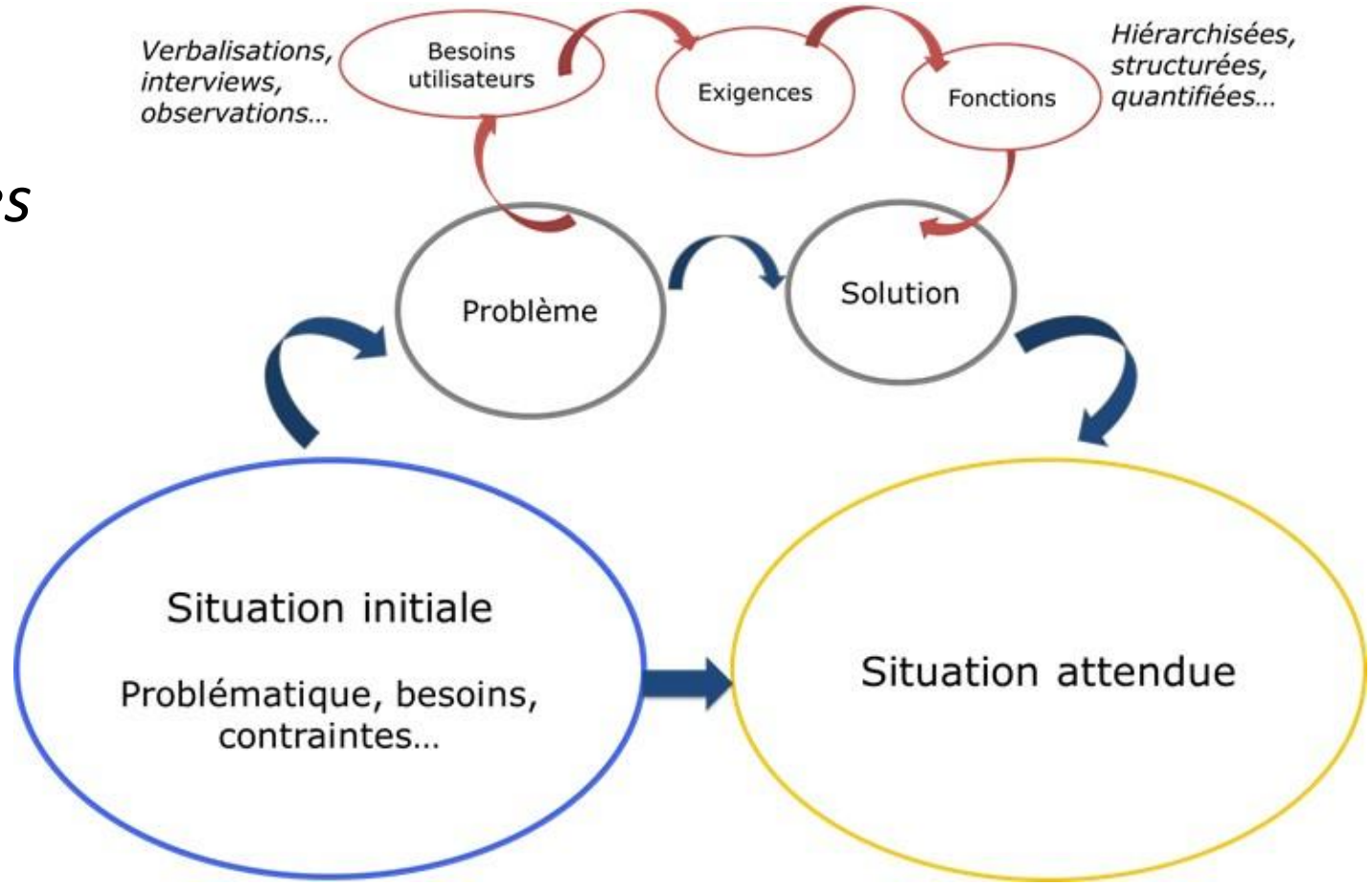
What can be designed

What can be designed



How do we design?

"Everyone designs who *devises courses* of *action aimed* at *changing existing* situations *into preferred ones*."
(Simon, 1968)



How do we design?

"In the real knowledge a design solution has unexpected functions"

Yoshikawa,

Design cannot be defined without a simultaneous knowledge "expansion" process.

Hatchuel et al., 2003, 2009

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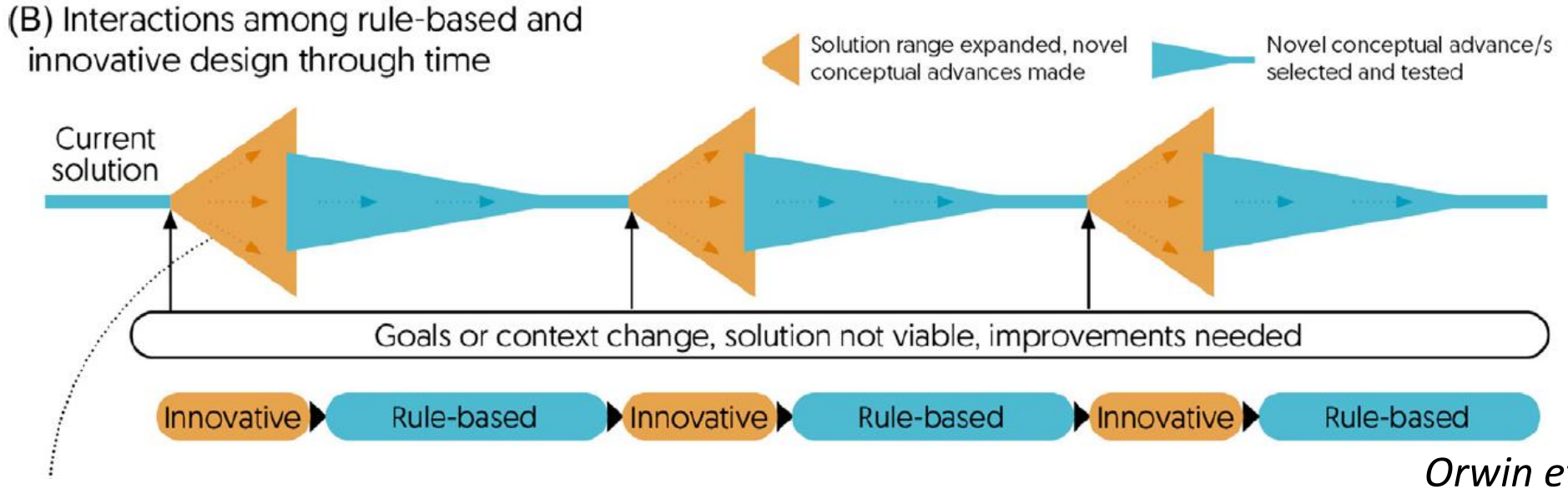
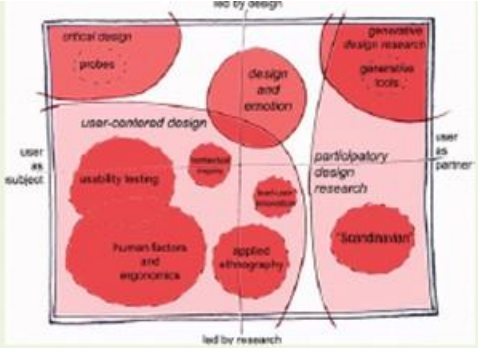
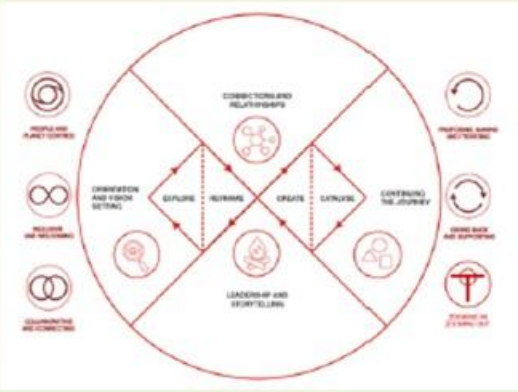
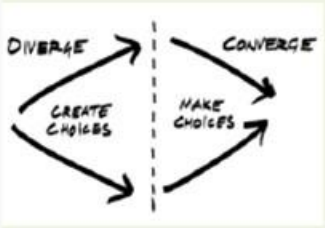
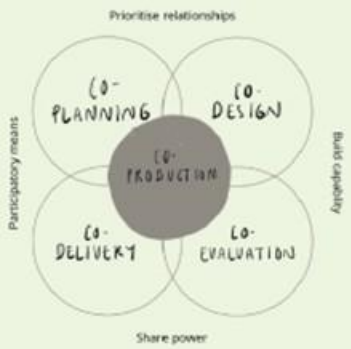


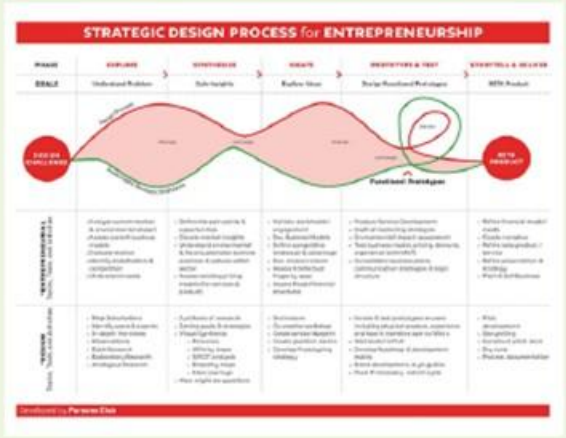
Orwin et al., 2022

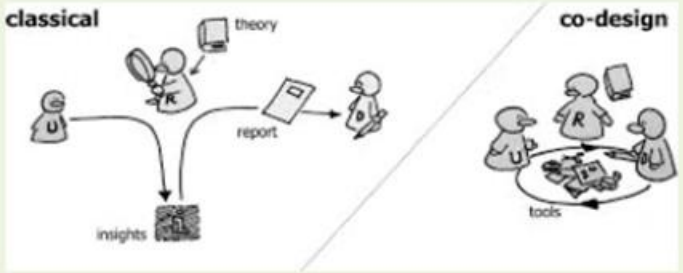


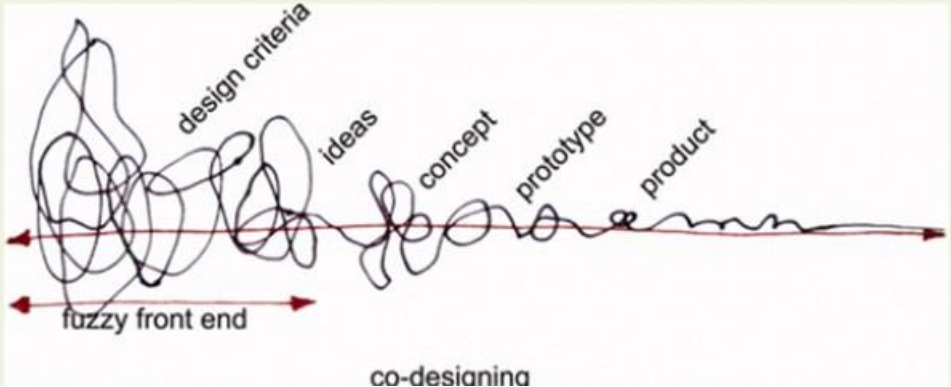


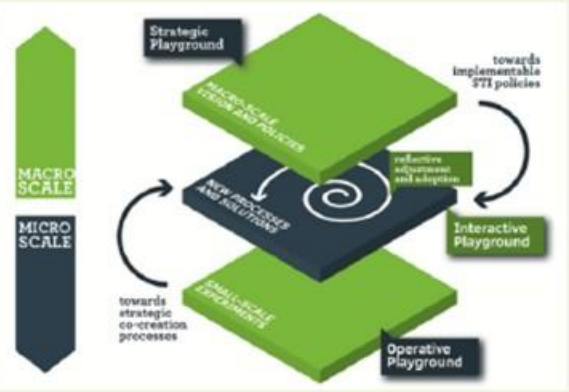












There are many approaches

How design can be seen as a potential for transformation in today's pressing challenges?

https://www.massivechangenetwork.com/publications

References to explore

Prost, 2021

Le Gal et al 2011

Moving design approaches to the agrifood system level: scientific progress and challenges

Designing agrifood ecosystems

The Living is evolutionary, self-functioning, and partly unknown...

…Yet we need to integrate it in design processes!

Ecological knowledge may generate concepts as departure points for agroecosystem design

Designing agrifood ecosystems

« Sponge territory »

Designing agrifood ecosystems

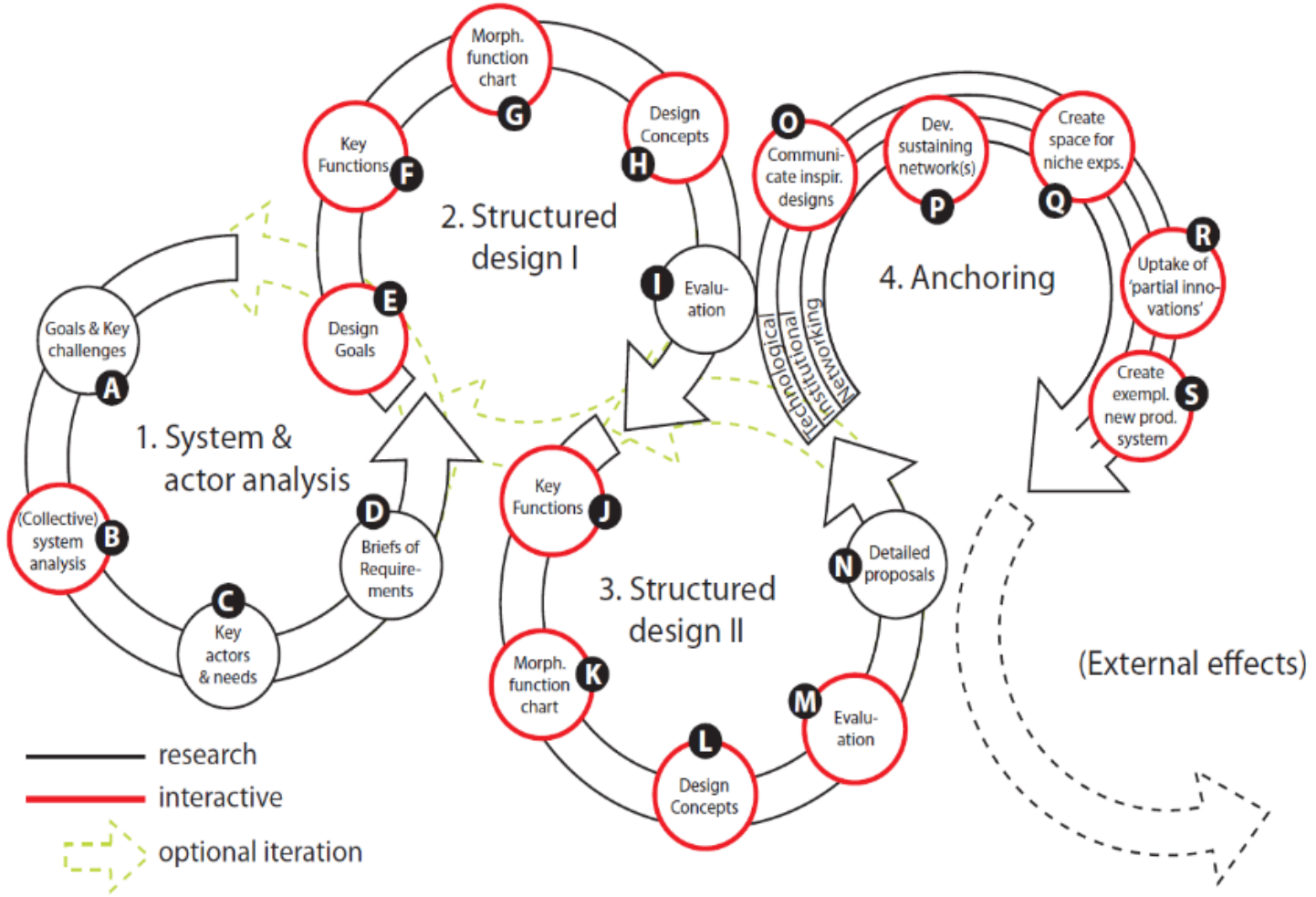
© Alexis PERNET, Larep, ENSP

Bridging design communities for systemic design

Bridging design communities for systemic design

Defining a common unknown as a long-term objective

Involve agents of change for agrifood system design



Bos and Grin 2012
Elzen and Bos 2019
Le Masson et al. 2012
Le Masson & Weil 2014

Figure 4: RIO version 2, as practiced in the Well-Fair Eggs and Broilers with Taste

Develop agents' creativity and design capacities to move towards innovative systems

- Identify cognitive biases that hinder creativity: effects of fixation
- Leadership strategies for ideation management
- Design workshops to enhance participants' design capacities

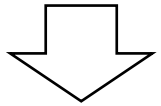
Agogué et al. 2014
Cassotti et al. 2016
Ezzat et al. 2017
Berthet et al. 2024

III. What’s next? Adressing differently agricultural challenges

Dealing with new clases of design problem

CLASS I

Problem with complete description



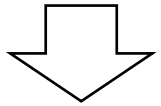
Design discrete solutions

Adapted from Ueda et al (2004)

Dealing with new clases of design problem

CLASS I

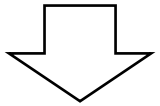
Problem with complete description



Design discrete solutions

CLASS II

Problem with incomplete environment description



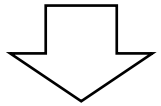
Design systems

Adapted from Ueda et al (2004)

Dealing with new clases of design problem

CLASS I

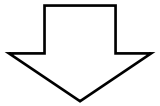
Problem with complete description



Design discrete solutions

CLASS II

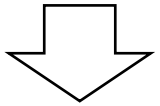
Problem with incomplete environment description



Design systems

CLASS III

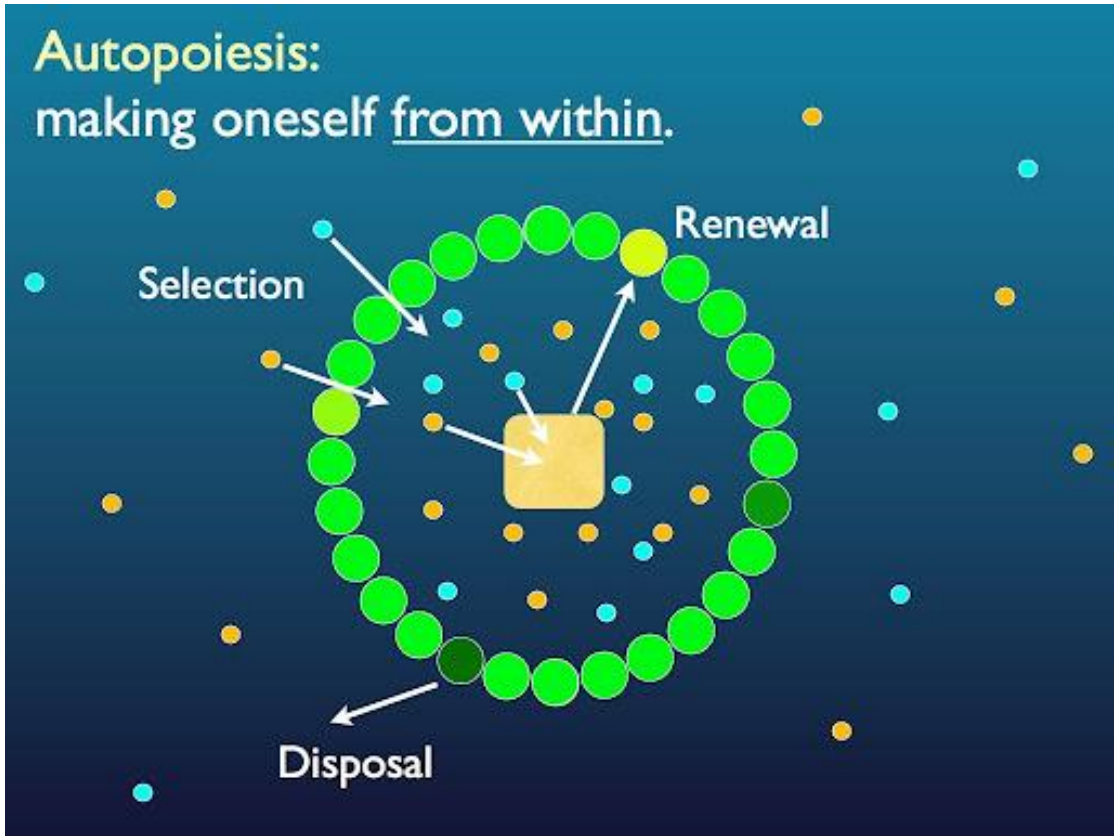
The environment description and the purpose are incomplete



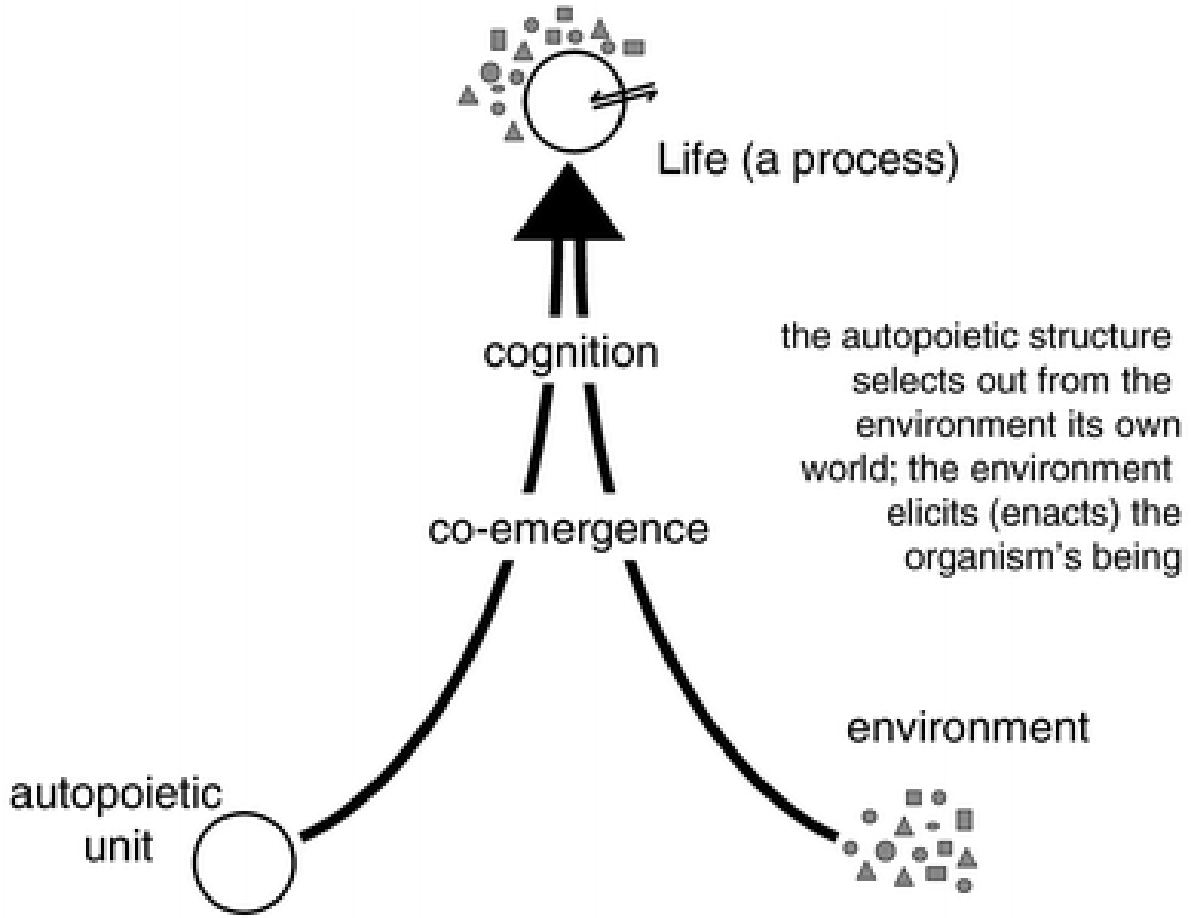
Design rules of structure of the system to self-organise

Adapted from Ueda et al (2004)

Design rules of structure of the system for self-organisation

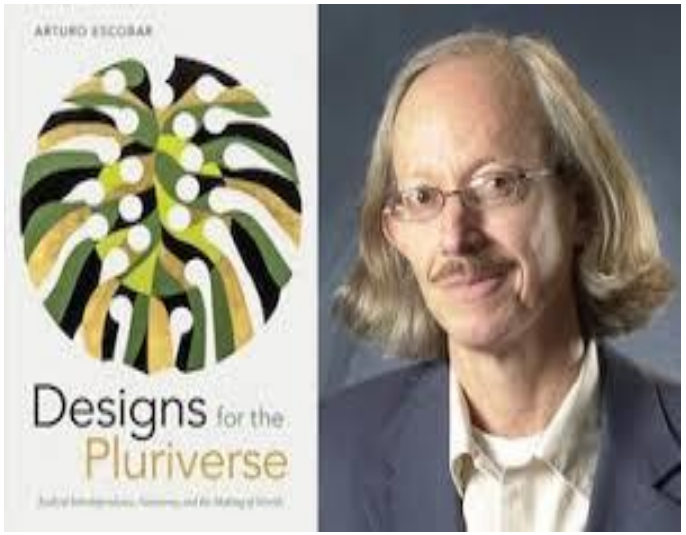


Continued self-creation of structures



"The key to autonomy is that a living system finds its ways into the next moment by acting appropriately out of its own resources" (Varela, 1999)

Autonomous design principles



Design things that are unfinished, open-ended, self-organized

CLASS I

CLASS II

CLASS III

Design things that are unfinished, open-ended, self-organized

CLASS I

CLASS II

CLASS III

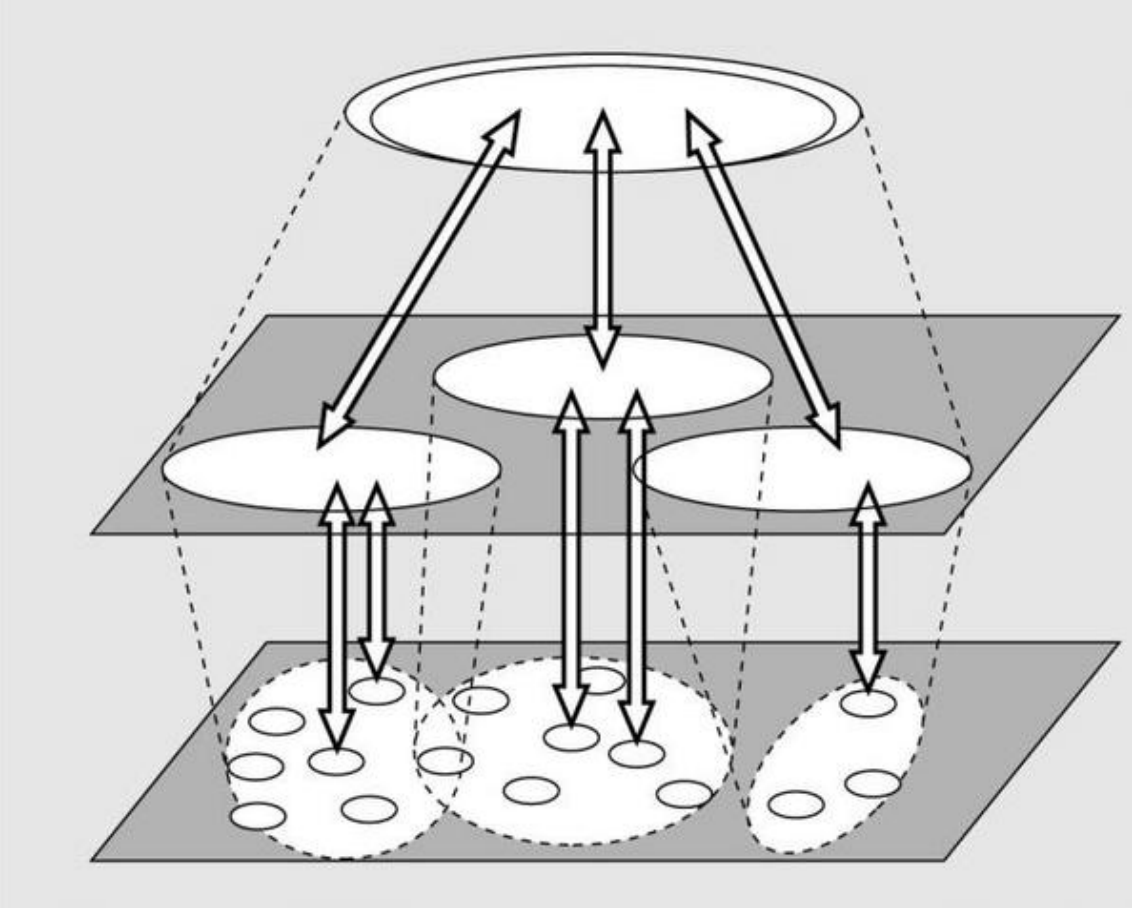
Design things that are unfinished, open-ended, self-organized

CLASS I

CLASS II

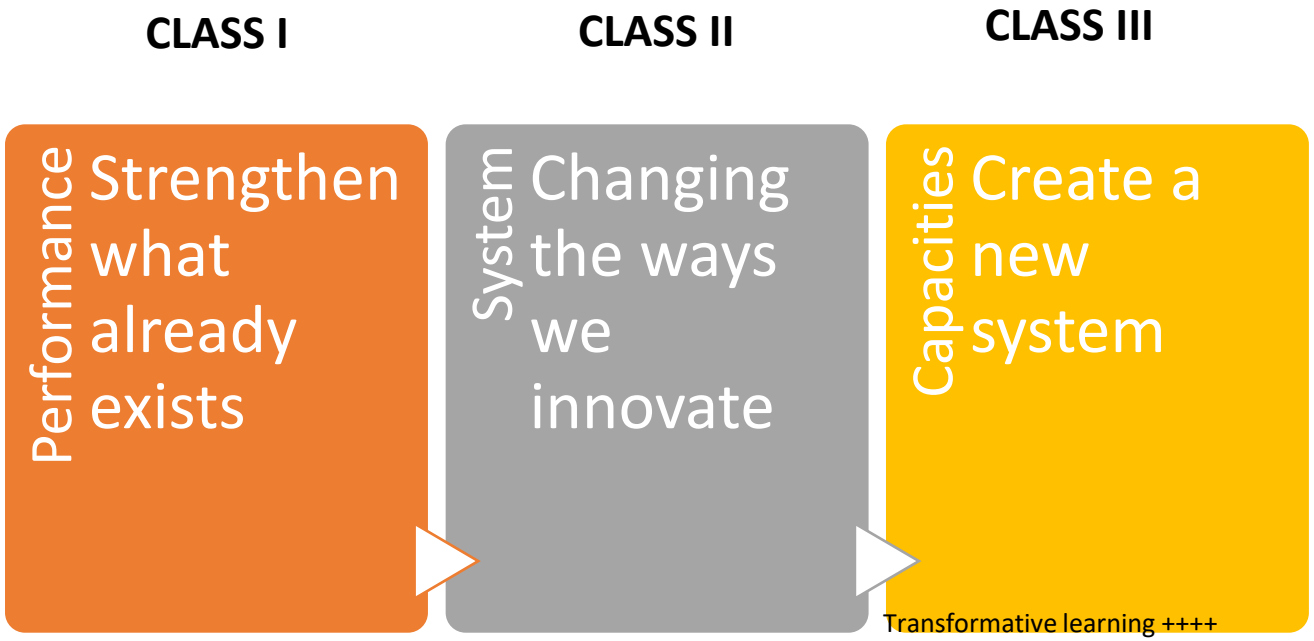
CLASS III

The right level



The right level is the intermediate level for bricolage to contaminate ideas and solutions for scaling dynamics (Caron, 2025)

Role and competencies of research



Toillier et al, 2022

Possible roles of research in supporting transformation

Where do you stand?

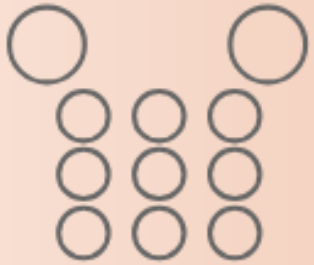
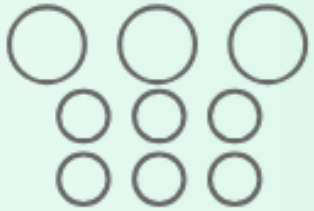
Epistemology Driving force Participation Axiology	Positivist Laws None Neutral		Interpretivist Agency Inclusive Engaged
Methodology Problematization Investigation	Preconceived Reductionist Hands-off		Adaptive Holist Transformative
Implementation Adoption Assessment	Instrumental Transfer Accountability		Emergent Sense-making Learning

Fig. 2 | Heuristic tool for discussing a research stance. The different choices which define a research stance are organized in three main fields: epistemology (the nature of the knowledge), methodology (the method of producing the knowledge) and implementation (the use to which the knowledge will be put).

Hazard et al. 2019

Where do you stand?

We'll be happy to discuss

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Hatchuel A. and Weil B., C-K design theory: An advanced formulation, Research in Engineering Design,

19(4):181–192, 2009; Agogué, M. and Kazakçi A., « 10 Years of C–K Theory: A Survey on the Academic and

Industrial Impacts of a Design Theory. » An Anthology of Theories and Models of Design. Springer London, 2014.

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