DESIGN WORKSHOPS FOR INNOVATIVE CROPPING SYSTEMS AND DECISION-SUPPORT TOOLS: LEARNINGS FROM 12 CASE STUDIES

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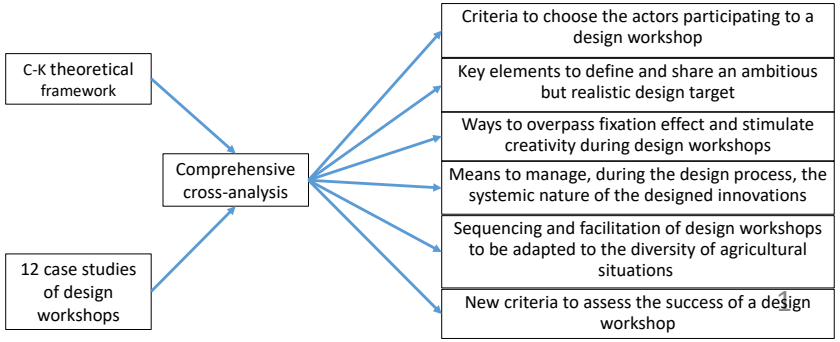


ADDRESSING THE ISSUES THAT AGRICULTURE IS FACING REQUIRES DISRUPTIVE INNOVATIONS, WHICH COULD BE STIMULATED THROUGH A PROCESS OF INNOVATIVE DESIGN

- To equip this process, several researchers (Vereijken, 1997; Lançon et al, 2007; Bos et al, 2009; Reau et al, 2012; Ravier et al, 2018) implemented 'design worskshops', *an approach in which a collective of actors explores and build disruptive solutions to reach ambitious goals*
- Yet, the literature poorly describes the way to organize, implement and capitalize design workshops

- To characterize a diversity of ways to prepare and implement design workshops in agriculture

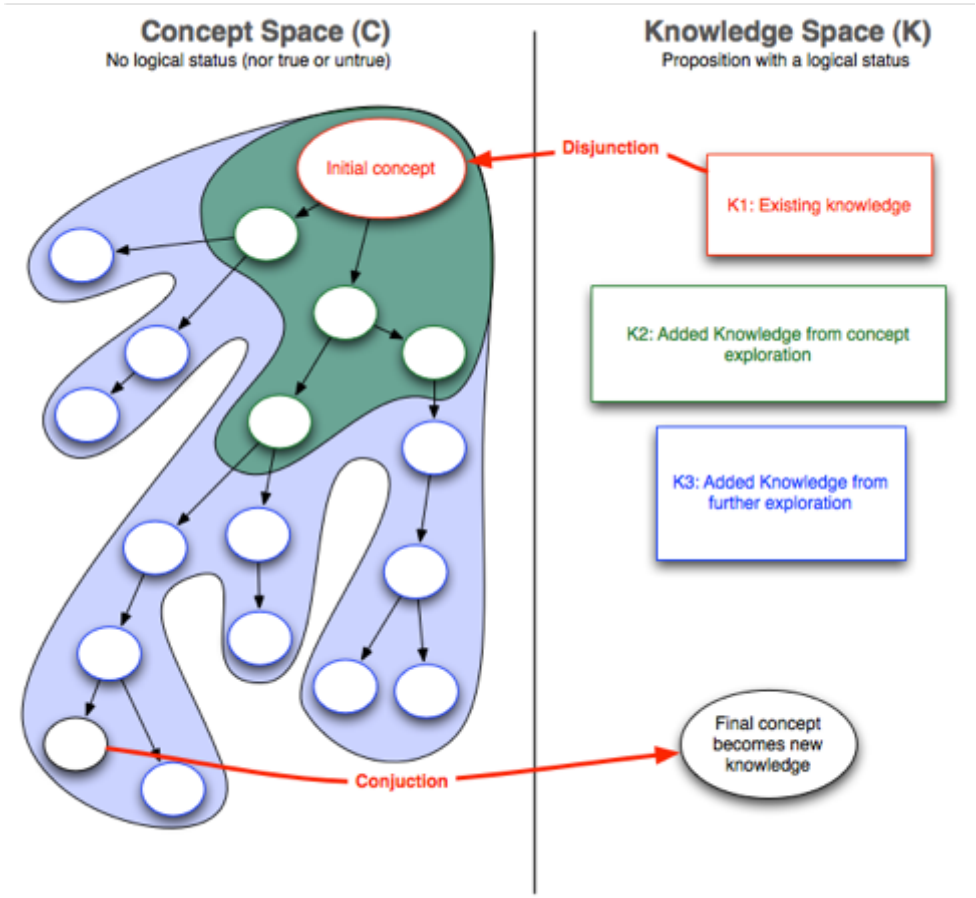
- To discuss their advantages and limitations, with a view:
  - to draw methodological lessons
  - to identify areas requiring vigilance

A COMPREHENSIVE CROSS-ANALYSIS…

- …of **12 case studies** aiming at designing either cropping systems or decision support tools

		Designed object	
		Cropping systems	Decision support tools
Issues	Pesticide-free management	**AGROSEM SDCI, VIVLEBIO**	
	Reduction of N-fertilizer use	**AUTO'N**	**APPI-N**
	Cropping system diversification	**LEGITIMES CAPS, CASABIO**	
	Climate change mitigation	**SYSCLIM SIC, CONSYST**	
	Work organisation		**DST-WORK**

- …mobilizing theoretical elements from design science (Hatchuel and Weil, 2009)



INSIGHTS ON THE WAY TO **PREPARE** DESIGN WORSKSHOPS

- Define **and share** an ambitious but realistic design target

  …in some cases from a specific work

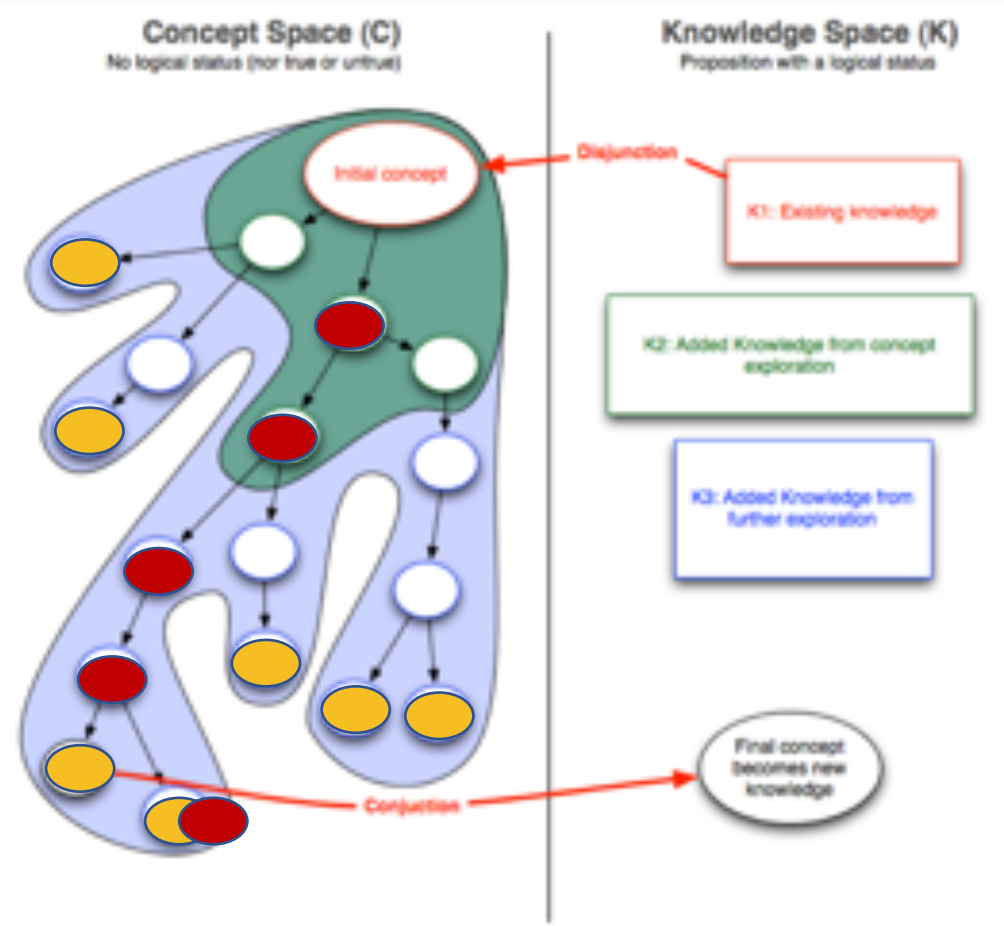
  - Oxymoron: e.g. *"Living in harmony with perennial weeds"* (VIVLEBIO) **On-farm innovation tracking**
  - Out of step with advised practices: e.g. *"To fertilize without defining a target yield"* (APPI-N) **Diagnosis of use**
  - A strong constraint on inputs: e.g. *"Seed production systems without pesticides"* (AGROSEM)

- A crucial step: the choice of actors
  - With diverse expertise and from various professional structures **OR** only actors sharing the same profession
  - Taking into account the prior inter-knowledge of the actors

- Choice of the knowledge to be shared before design
  - A diagnosis of the current situation (LEGITIMES, SDCI, AUTO'N, DST-WORK, APPI-N)
  - A common presentation of the process involved in the agroecosystem functioning (CAPS, VIVLEBIO, SYSCLIM)
  - Disruptive ex. to stimulate creativity (VIVLEBIO, AGROSEM)

INSIGHTS ON KEY STEPS TO MANAGE DESIGN WORSKSHOPS

- **Broad exploration OR deepening some paths** (to implement solutions)



- Aims (and modalities) of the workshop facilitation
  - To manage the systemic nature of the solutions
  - To stimulate and facilitate collective discussions
  - To stimulate creativity and avoid fixation effects

A MAIN ISSUE IS TO AVOID FIXATION EFFECTS
IN ORDER TO STIMULATE CREATIVITY

Fixation effects occur « *when we propose solutions that are built in the most common and accessible knowledge within a domain…(a knowledge that) spontaneously comes to mind* » (Cassotti et al, 2015)

General principles to overpass fixation effects

- Adopt a disruptive target, prioritizing a formulation based more on the expected results than on the means
- Choose diverse and open-minded participants
- Share disruptive knowledge before designing
- Facilitate the exploration of new properties of the object to be designed: stating a property contrary to that usually known
- Making explicit, for each proposed option, the underlying knowledge, and encourage new explorations based on this knowledge

OUPUTS AND OUTCOMES OF THE DESIGN WORKSHOP

- Targets achieved on the whole +
  - mobilize actors to change their practices
  - promote the learning of new technical levers
  - prioritize the knowledge to be produced
- Prototypes designed shared after the workshop
- In situ test of the cropping systems prototypes and test of the Decision support tools by users

Conclusion: methodological lessons and points to watch out

Steps		Lessons	Warning points
Preparation	**Formulation of the design target**	The target clarifies the design objective; it is usually formulated to be ambitious, challenging and prospective.	It is essential that all participants share the proposed target.
	Choice of the participants	The choice of participants is decisive for the success of the workshop. Favour open-minded participants with diversified knowledge.	Hierarchical relationships between participants, or top-down postures inherited from the linear R&D model, are generally not conducive to the exploration of novel solutions.
	Choice of knowledge to be initially shared	The challenge of initial knowledge sharing is twofold: to share the same vocabulary, and a common knowledge base between participants, intended to stimulate exploration.	The objective of knowledge sharing must be clear to participants. Trying to exhaustively inventory the existing solutions to meet the target may increase fixation effects.
	Sequencing of the meetings	The design workshop can be made up of several meetings, making it possible to successively explore different contexts, or to offer a time for knowledge production between two meetings.	Meetings too far apart in time can demotivate, with the risk of losing participants in the process.
Implementation	**Broad exploration vs deepening of some paths**	The exploration phase aims to identify a diversity of solutions, disruptive compared to what already exists, or to refine a small number of ideas to produce an operational prototype in a short lapse of time.	The balance between diversity of ideas and refinement of some of them is managed according to the objective of the design workshop and is decided during the preparation phase.
	Design of systemic objects	Splitting complex objects into subsystems is a way of simplifying design without losing sight of the systemic aspect.	The systemic coherence of the finally designed object is achieved only if the facilitator organizes constant dialogue between the successively designed subsystems.
	Intermediate objects	Intermediate objects are facilitation tools that help to organize discussions, enhance direct interactions between participants, enable everyone to get involved, capitalize on, combine and assess ideas, and make it easier to grasp the systemic dimension of the artefact.	The mobilization of intermediate objects is thought out during the preparation of the design workshops.
	Facilitation	Facilitation consists in challenging the participants, guiding them in exploring and/or deepening the ideas suggested, and maintaining the collective dynamics with benevolence.	The success of a design workshop largely depends on its facilitation. The design workshop can begin by sharing rules for the collective work: listening, benevolence, openness, respect.
The design workshop follow-up		Capitalizing on what has been produced and on the knowledge gaps identified makes it possible to value and continue the work beyond the design workshop, and to possibly reconsider the choices, in the event of unsatisfactory evaluation of the prototype.	The prototype can be finalised in a smaller committee, after the design workshop, before testing it with various potential users. It is essential to inform all the participants of the outputs and outcomes of the design workshop.

Thank you for your attention!

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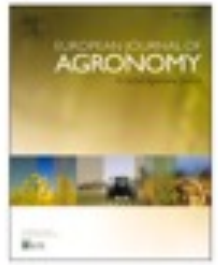

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