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Transi'Sols

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The 'Dashboard' as a tool for monitoring the improvement of soil fertility and supporting agroecological transitions

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Outline

- Context, aim and approach (= why, how and what of the dashboard)
- Results (= 1 example of design and use of a dashboard)
- Discussion & conclusion (link between dashboard and soil fertility)

Context, aim and approach

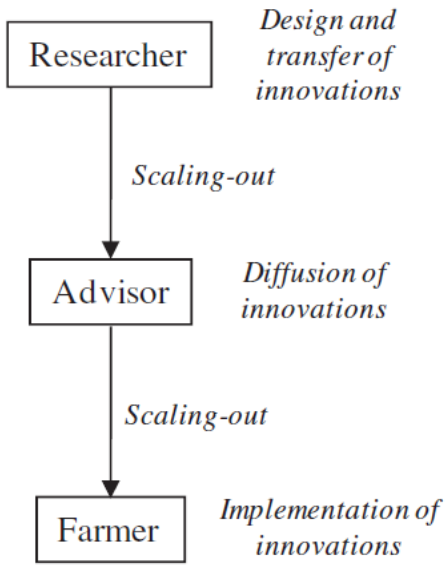
The necessary agroecological transition

- Agroecological transition is necessary to reconcile agricultural productions and the environment (Zhang *et al.* 1997)
- Soil fertility is one of the key ecosystem services necessary to agroecological systems (Duru *et al.* 2015)
- Complex to address soil fertility and agroecological transitions due to biological interactions & the need for systemic approaches…

=> New approaches and tools are needed

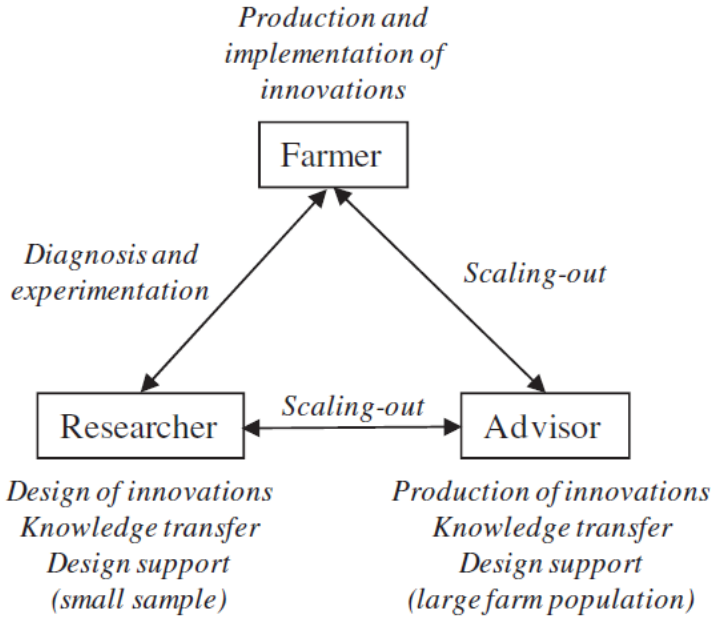
What approach and tools are needed?

Historical <-



a. Linear and diffusionist paradigm of innovation process

-> More adapted to support transitions



b. Interactive and participative paradigm of innovation process

Le Gall *et al.* 2010

✓ Generative experiments rather than controlled experiments (according to Ansell & Bartenberger 2016)

✓ **Design support tools** rather than decision-making tools to empower farmers to design their own cropping systems step by step

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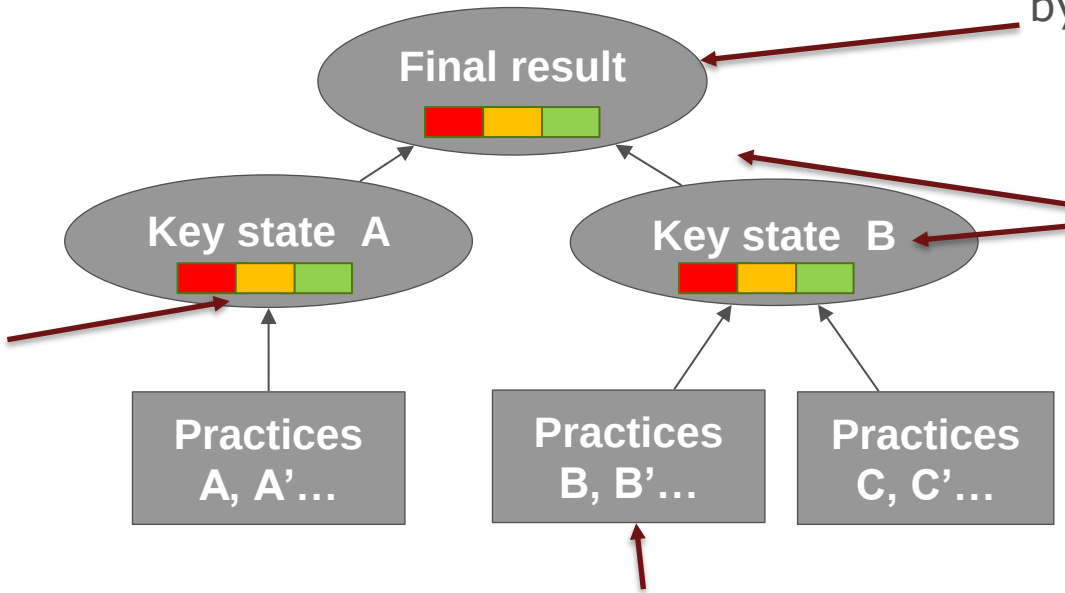
The Dashboard to facilitate transitions

- It has already proved its value by enabling the step-by-step change of practices to improve water quality in a catchment area (Prost *et al.* 2018) or winter oilseed rape robustness (Cadoux *et al.* 2018)
- Schematic example of **design**:

1- It focuses on a **benefit expected** by a (group of) farmer(s)



2- It sheds light on the ways to achieve the expected result by highlighting **key soil/crop states** and causal relationships

3- It contains **indicators and thresholds** to clarify expectations and objectify the evaluation

4- It **encourages the identification of possible practices to implement**

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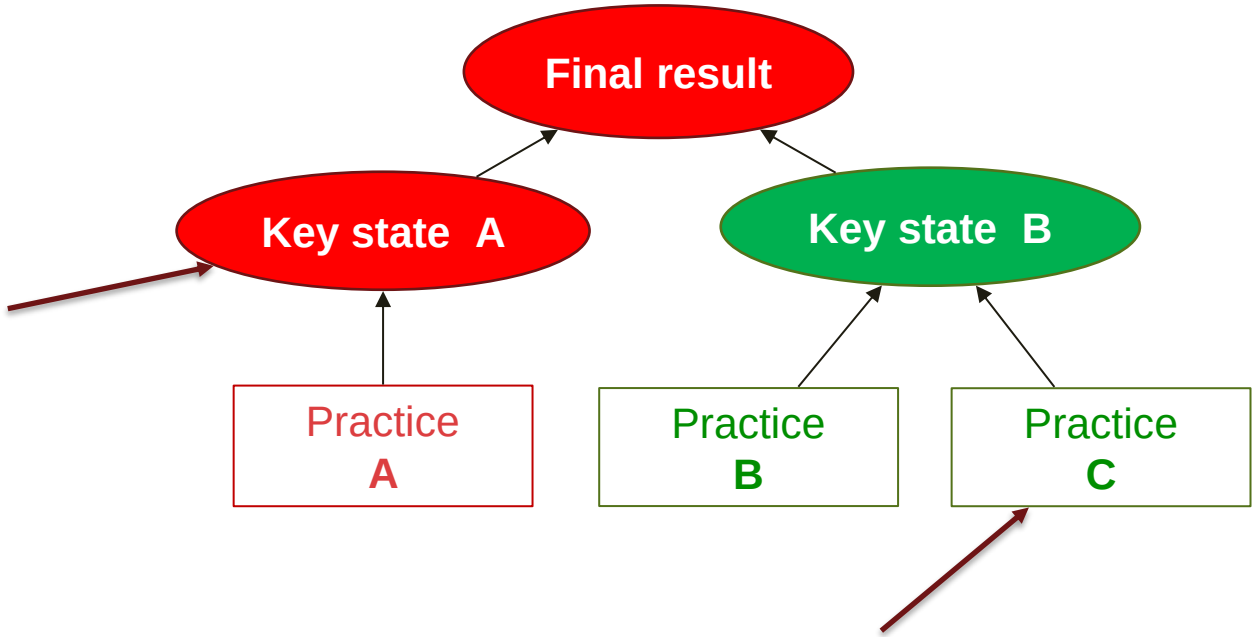
The Dashboard to facilitate transitions

- Schematic example of **use**:



2- **Monitoring** to record values of indicators and define satisfaction levels

3- **Analyzing the result** to identify the bottleneck: here improving key state A by reviewing practice A to achieve the final expected result

1- **Choosing practices** to implement

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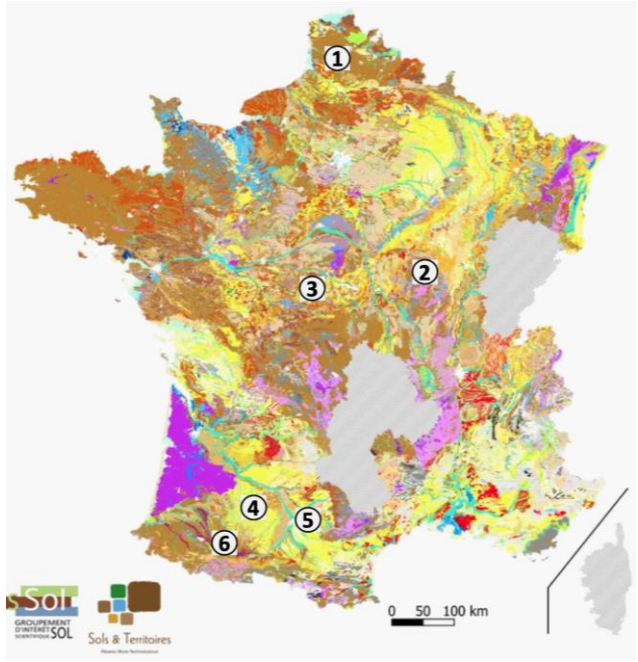
Aim and approach

- Aim: to design and implement dashboards for different benefits expected from soil fertility by farmers

- Approach:
  - ✓ Co-design dashboards with researchers and farmers/advisors of 6 farmers' groups in France
  - ✓ Continuous improvement of dashboards and farmer's practices through implementation (monitoring and analyses) in farmers' fields

- Focus on 3 expected benefits:
  - ✓ Soils providing good nitrogen nutrition to crops (clayey soils with low N mineralization rate)
  - ✓ Soils with good workability & trafficability in wet conditions (loamy soils)
  - ✓ Low erosion (slopy clayey soils)



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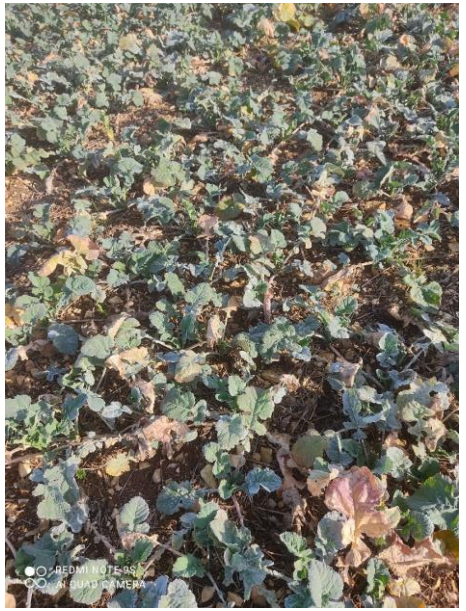
Results



Example of the nitrogen nutrition dashboard

Context of clay-limestone soils with low N mineralization rate leading to high fertilization requirements and/or risk of crop nitrogen deficiency

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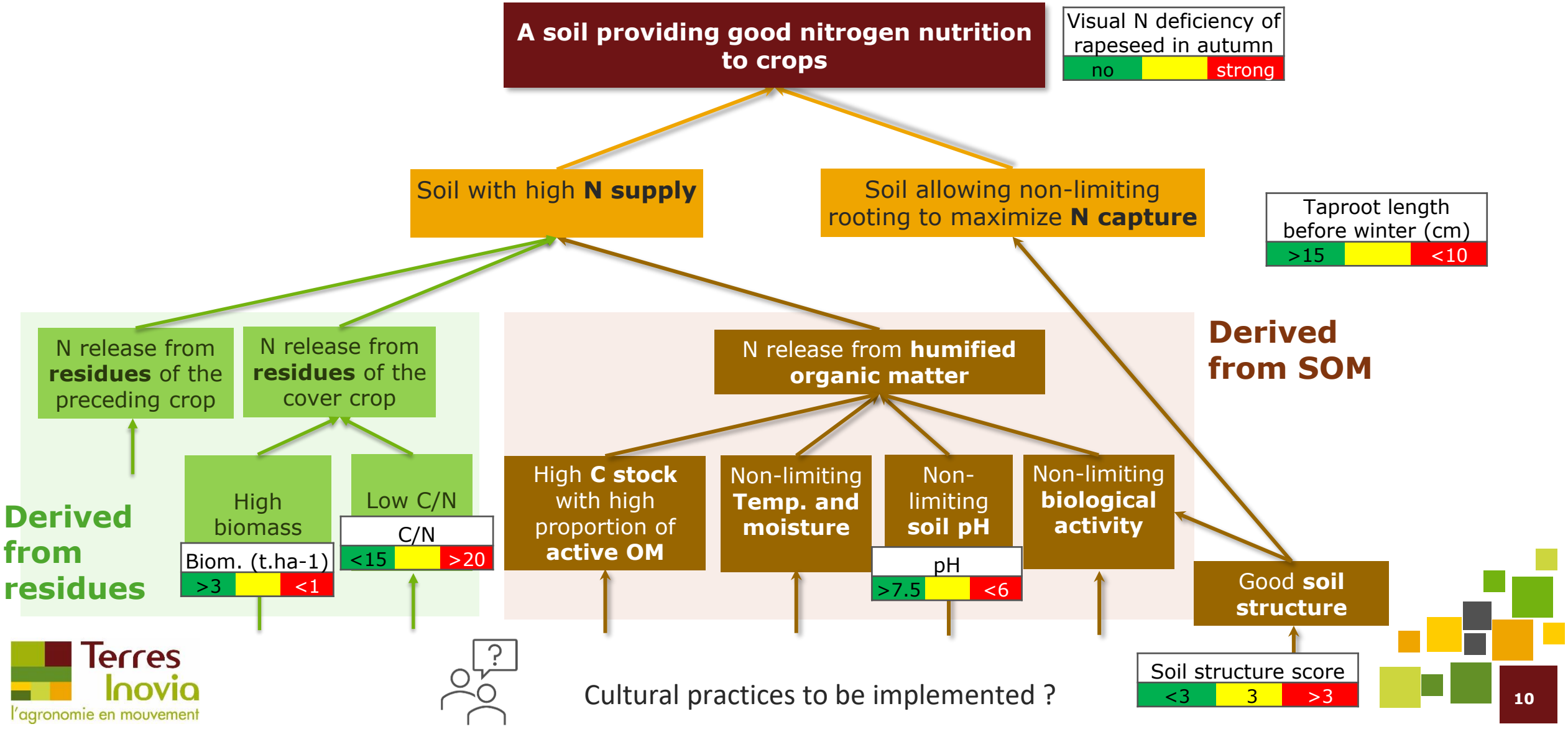
Nitrogen nutrition dashboard



Example of implementation

- Berry farmer's network: how to **promote winter oilseed rape robustness** through a **soil that facilitates the crop's mineral nutrition**?

Test of innovative cultural practices (here direct drilling and intercropping with legumes)

Visits to farmers' fields to discuss cropping practices tested and results obtained

Soil measurements (here soil structure assessment)

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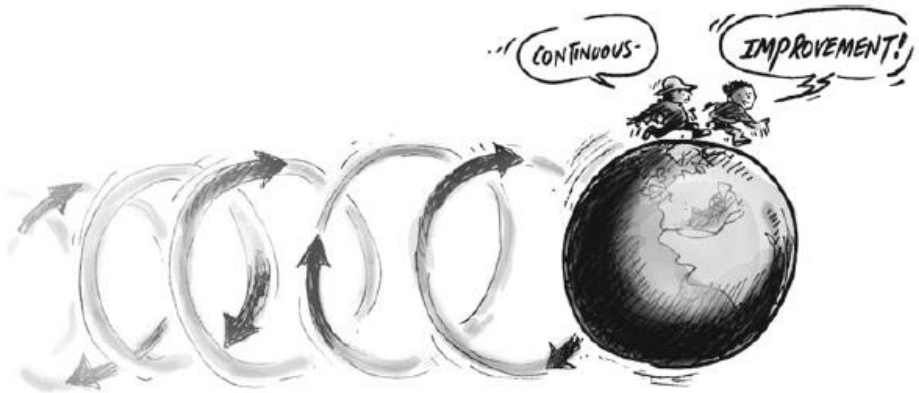
Discussion and conclusion

Dashboard & soil fertility

- The dashboard is a strategic tool that supports step by step innovation design
- Successful alignment with farmers' soil fertility objectives
- It is an effective way to help farmers manage and improve the fertility of their soils by:
  - ✓ Focusing on benefits expected by farmers (rather than good cultural practices or improving the result of soil indicators)
  - ✓ Shedding light on processes and simplifying complex interactions
  - ✓ Proposing simple and accurate observation methods
  - ✓ Encouraging iterative and adaptative management



Meynard *et al.* 2012

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Thank you for your attention

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