

Multi-stakeholder design to change water quality at catchment level

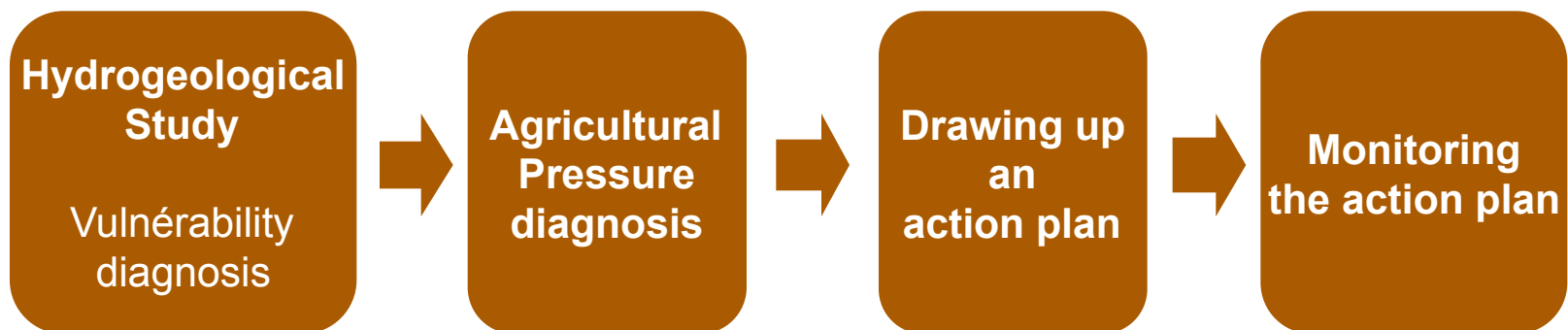
 Raymond REAU, INRA, France



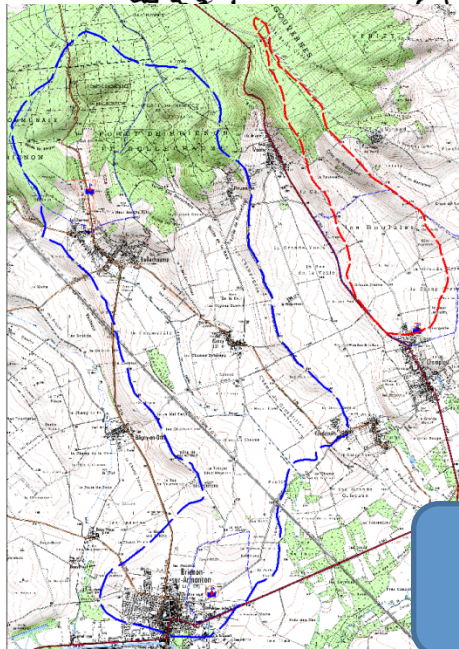
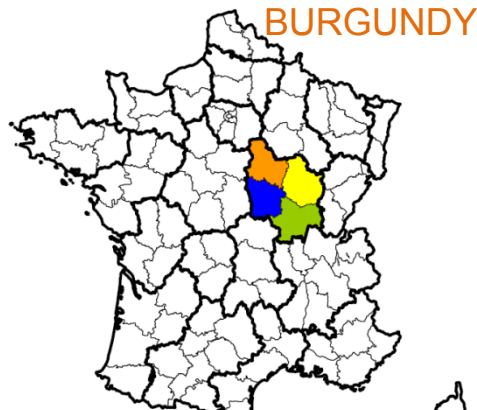
Quality of drinking water from catchment areas

Inventory of the french situation

- Between 1998 and 2008, 1958 catchments were abandoned because of quality problems, 878 of them due to pollution from agricultural sources (SE Santé, 2012).
 - Tomorrow, water quality must be improved in 2500 catchments (Water Framework Directive)
- A failure of advices based on diffusion of single agricultural good practices. Need for change of the agricultural systems, thinking out of the box, and need for change of the organisation of the projects



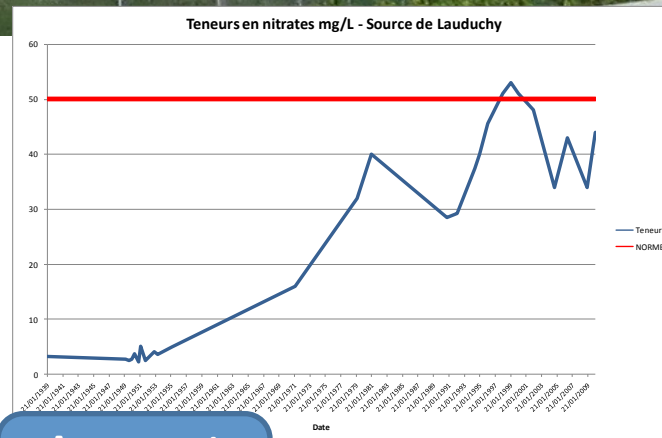
BURGUNDY



Groundwater catchment area of Brienon (89)

A nitrate problem
Agricultural area : 1700 ha

Main crop.system : **OSR-W Wheat – W Barley**



Agricultural pressure
DIAGNOSIS

Choice of the water quality target

Agreement on the Action plan



2010



2011



2012

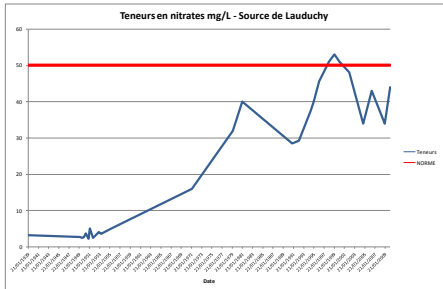


2013

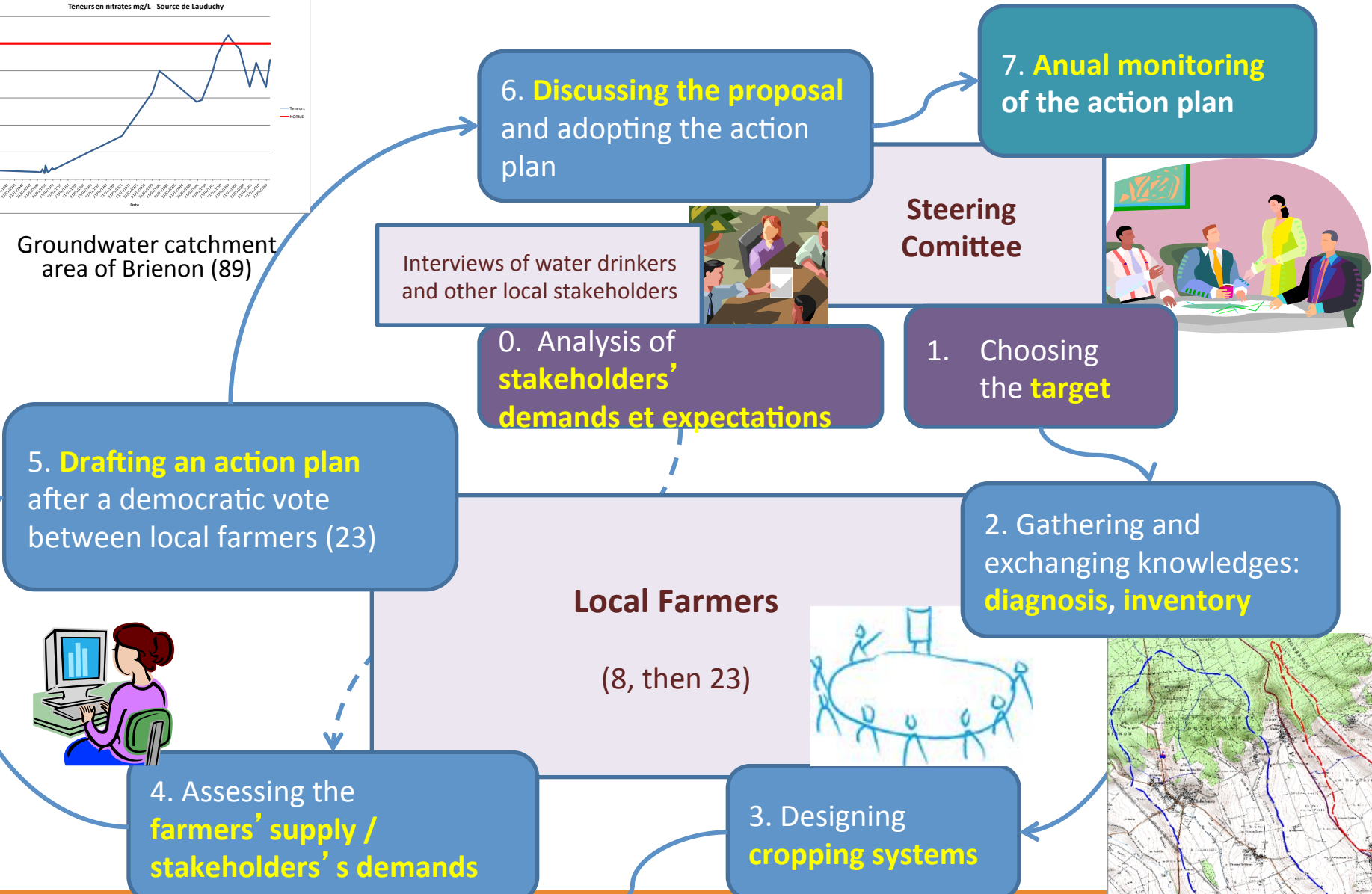
DESIGN WORKSHOP

First Potentially leachable soil Nitrogen

START



Groundwater catchment area of Briennon (89)





Choosing the target
Creating a vision

Drafting
an action plan

Annual monitoring
and evaluation

Creating and sharing a vision of the water quality

« Shift in thinking » into the Steering Committee

- A future for mid and long term
- Criteria : nitrate concentration ...
- **Negotiation of thresholds** : Nitrate 37 mg/l ...

« Shifting of thinking » among the farmers

- **Negotiation of agricultural thresholds**
Nitrate losses < 30 kg N/ha, Indigo Iphy > 8
Involving all the agricultural area + all the farmers
- **Gathering and exchanging knowledges**
Complex links between practices and water quality
Water friendly practices of actual cropping systems

Thinking out of the box : *de novo* design

(Meynard, Bos et Dedieu., 2012)

Who : 8 farmers + 3 agronomists

4 steps from nov. to dec. 2011

1. Diagnosis of the actual cropping systems into the area
2. Proposal of innovative cropping systems (**farmers**)
3. Ex ante assessment of sustainability (**agronomists**)
4. Tuning and improvement of the innovative cropping systems

Output : new cropping systems

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Interactive conception (C)

Managing
nitrogen (N) ?

IN ORDER
to deal with N
alimentation

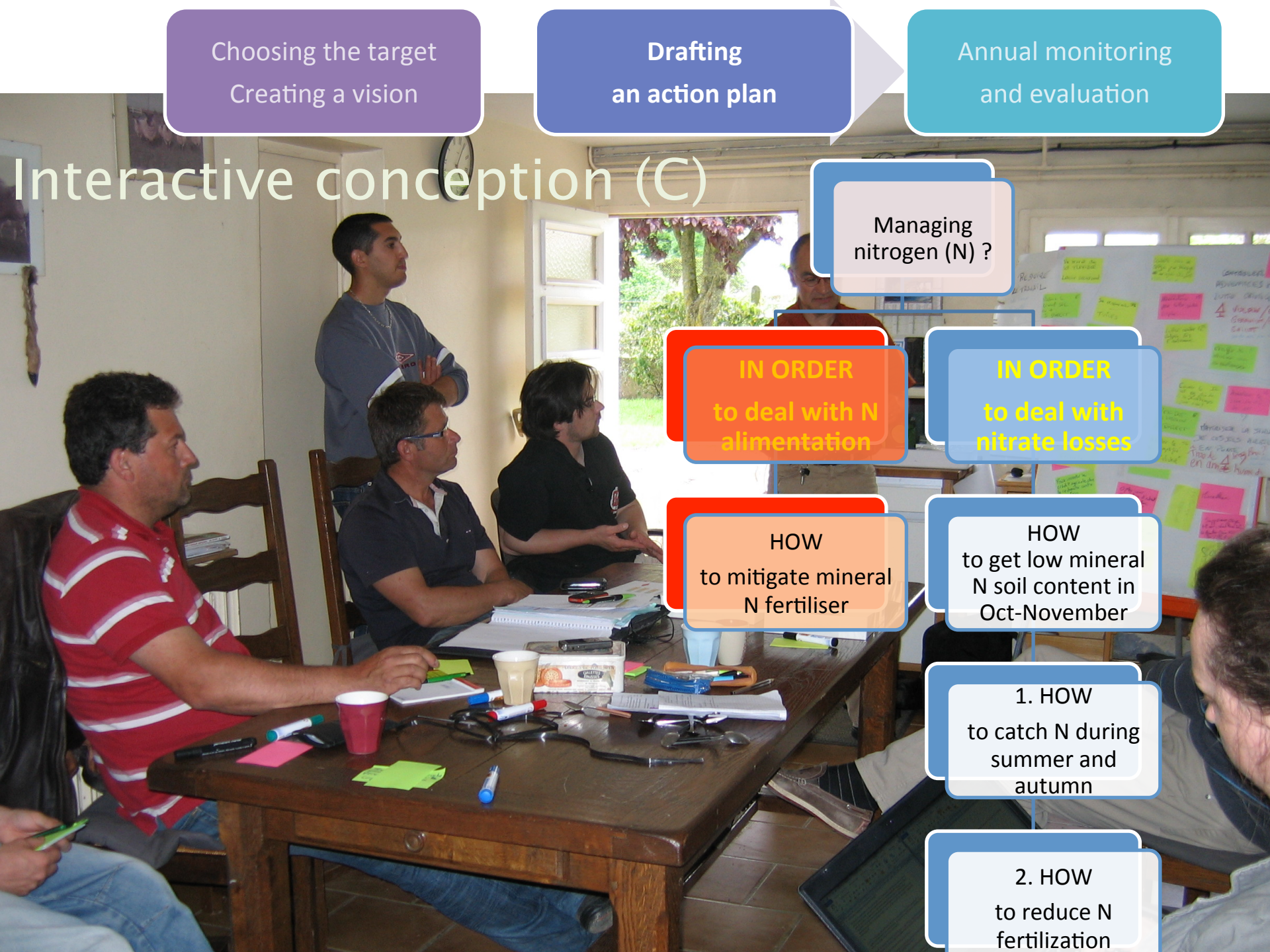
IN ORDER
to deal with
nitrate losses

HOW
to mitigate mineral
N fertiliser

HOW
to get low mineral
N soil content in
Oct-November

1. **HOW**
to catch N during
summer and
autumn

2. **HOW**
to reduce N
fertilization



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Designing cropping systems with local farmers Choosing a scenario able to reach the target

De novo design of 24 different cropping systems, before their assessment

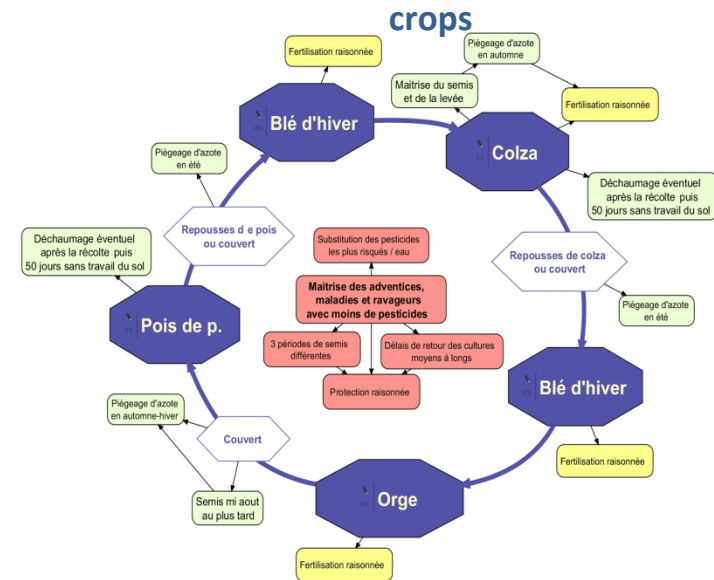
- Need for forgoing the actual cropping system
- *De novo design and assessment of ambitious cropping systems*
- Tuning a generic cropping system to different farms

An timetable of practices' changes open to future developments

Output : spatio-temporal scenarios for the area

Presentation of the project to 23 local farmers
Vote : 22 YES/23 , 1 NO/23

Diversifying the crop sequences, Performing successful catch crops



Choosing the target
Creating a vision

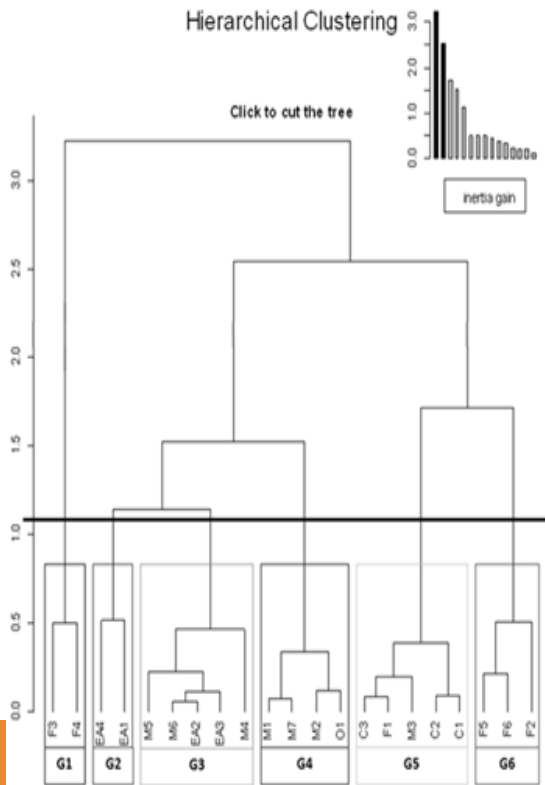
Drafting
an action plan

Annual monitoring
and evaluation

How farmers' supply could satisfy the stakeholders' s demand ?

An original method to share sustainability' s visions
enabling tensions among stakeholders to be eased

Ex ante assessment of 6 groups of stakeholders' satisfaction



GROUP Crop. systems	N° 5	N° 1	N° 6	N° 4	N° 3	N° 2
Actual 0	++	++	++	+	+	+
Actual 1	++	++	++	+	+	+
B1 S.Barley	++	++	++	+	+	+
B2 S.Barley	++	++	++	+	+	+
B1 S.Pea	++	++	++	++	++	++
B2 S.Pea	++	++	++	++	++	++
B1 Sunflower	++	++	++	++	++	++
B2 Sunflower	++	++	++	++	++	++

First socio-technical innovation's results

one year after beginning of the action plan

First success

- A first societal anchorage with stakeholders' demand analysis
- Learning activity with farmers
- Farmers' vote : YES 22/23
- Agreement of the Steering Committee
- High increase of the catch crops realisation and success (50% with volunteers after OSR)
- Dynamic reflexive activity of field analysis of Potentially Leachable Nitrogen

CONCLUSION

Strengths

- Learning through interaction between people is useful for acquisition of knowledge, knowhow and skill (Brunet, 1994)
- Knowledge (K) is useful to define step by step unknown objects (Concept C) (Hatchuel, Le masson, Weill, 2012) inside the **design activity**
- Co-design of scenarios based on **local stakeholders** rather than their representatives, through a territorial dialogue
- An original method in order to realize **multicriteria and multiactor assessment** enabling tensions to be eased (Ravier at al., accepted)

Weaknesses

- How to work in a larger area ?
- What to do, when the sustainability performances of the farmers' proposals are not sufficient : new co-design, or system generation or optimisation ?
- Lack of knowledges, uncertainty about pesticides impacts
- Need for new competencies & skills among the territory managers

*Thank you
for your attention !*

Steps and roles during a design workshop



Reau et al., 2012

Need for covered soils

at the end of summer & beginning of autumn, by volunteers & catch crops

After OSR



Before

FUTURE

Before
spring crops



Apprentissage des acteurs

Types d' apprentissage (Daré et al., 2010)	Comité de pilotage	Buveurs d' eau	Agriculteurs	Conseillers et animateurs
Enjeu	Coûts de la mauvaise qualité de l' eau pour la commune de Briennon		Coûts de la mauvaise qualité de l' eau (pour la commune de Briennon)	
Connaissances techniques	Diversité des façons de produire existantes	Impacts des SC	Mécanismes de pertes d' N Impacts des SC SC à promouvoir N lessivable mesuré au champ	Mécanismes de pertes d' azote Impacts des SC SC à promouvoir
Méthodes	Révéler la diversité et de la représentativité des pratiques Tableau de bord		Tour de plaine en interculture Tableau de bord	Différentes postures du diagnostic Tableau de bord
Connaissances des autres	Exigences en matière de qualité de l' eau Attention à l' image de marque des agriculteurs		Autres façons de produire Degrés de liberté, opportunités de changement	
Connaissances des organisations	<p>Entre Agence de l' eau et DDT</p> <p>Entre GABiologique et représentants de la Chambre d' agriculture</p> <p>Entre Agriculteurs du bassin et Agence de l' eau</p>			