Advantages and limitations of real-time simulations of concerted approaches in ski resorts

Géogouvernance in silico for managing ski resort

Jean-Christophe Loubier

Some information about the ski economy

Source: bornskiers.com

4200 ski resorts in the world

In the Alps,

- about 660 ski resorts
- € 50 billion
- 10-12% of jobs

Short time / long time

when working on the development of ski resorts, we see that there are two axes of conflict

Objectives in short time = create wealth and maintain a viable socio-economic potential

Objectives in long time = make sustainable development mainly in the environment and biodiversity

Fundamental contradiction

We must show that this contradiction is ideological and it prevents the ski economy to consider viable alternative models

We can help stations to move towards sustainable development by inserting an intermediate step that could be called "the integrated ski economy"

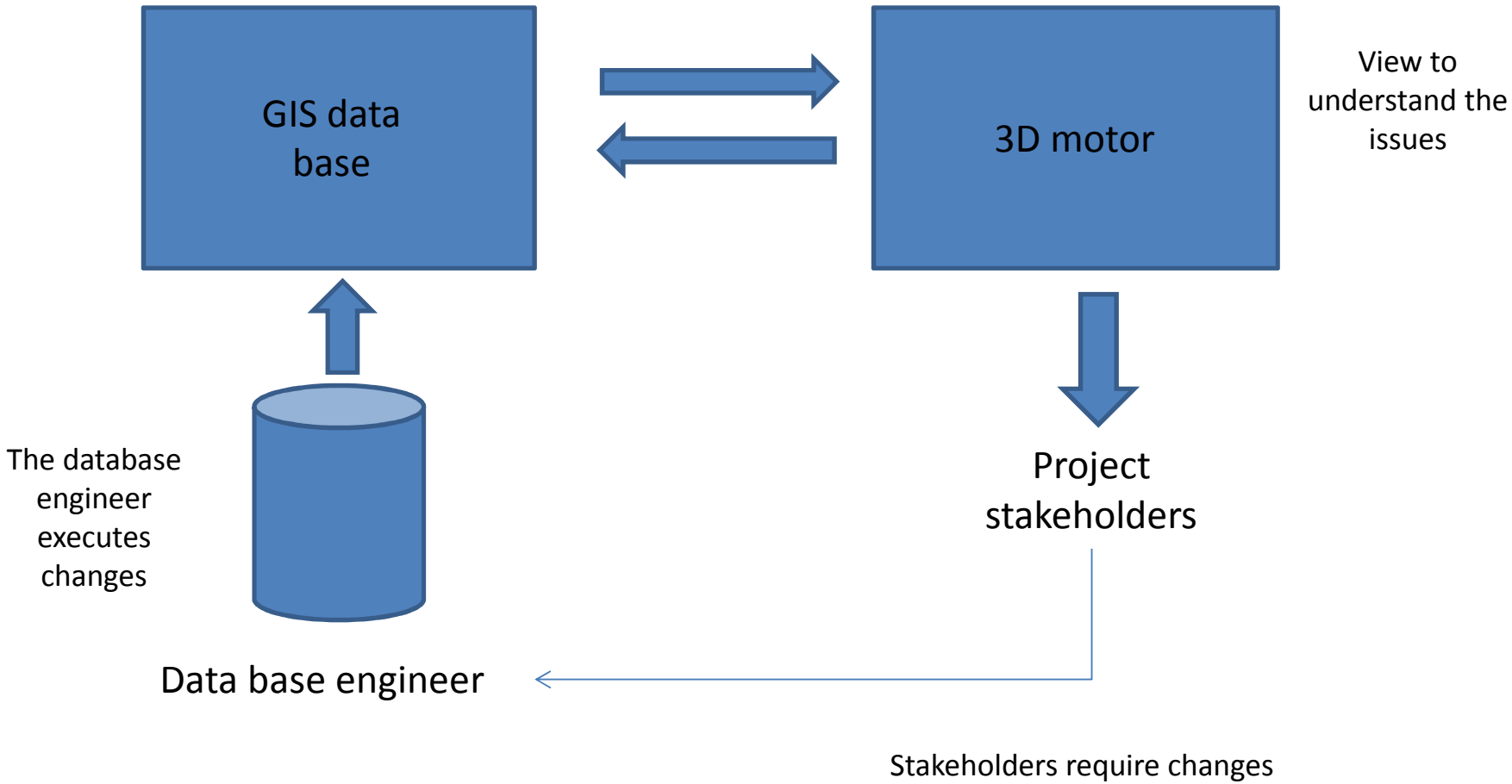
3D real-time simulation

For this project, it is possible to use massive simulation in 3D real time

- The tools exist
  - In GIS
  - In 3D modeling
  - In spatial analysis
  - In management database
  - In capacity to conduct consultation meetings

If you are able to bring these skills then you have access to mechanisms of geogovernance through interactive simulation of 3D models and real-time via the concept of landscape consultation

The computer system generating landscape consultation



The concertation with 3d real time mockup

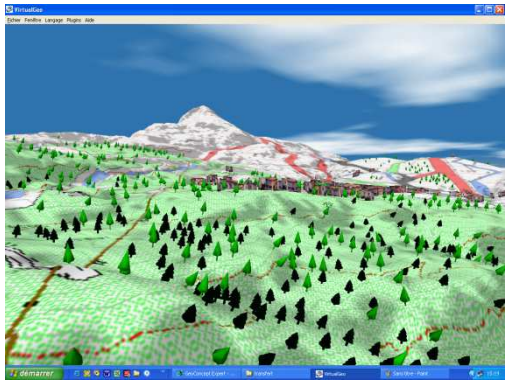
Concertation is different from the decision.

Decision making	Concertation
analytical approach	synthetic approach
operational research	Collective and systemic
Mathematical Decision	qualitative field
Provide a solution	To do emerge a solution

The concertation with 3d real time mockup

The mock up allows immediate interaction of stakeholders with a virtual model of the territory allows simulation of the effects of their choices

This model can be modified in real time (without the need to recalculate the 3D) by natural events or decisions related to project stakeholders.



convergence is the time when nobody make anything on the computer model

This massive computational approach facilitates cognitive perception of the views of all stakeholders and it creates a convergence towards a landscape "in silico" to be accepted by all.

Explain the mechanism of convergence by landscape of concertation: why it works

to understand how it works, we use Dynamic epistemic logic approach

We consider:

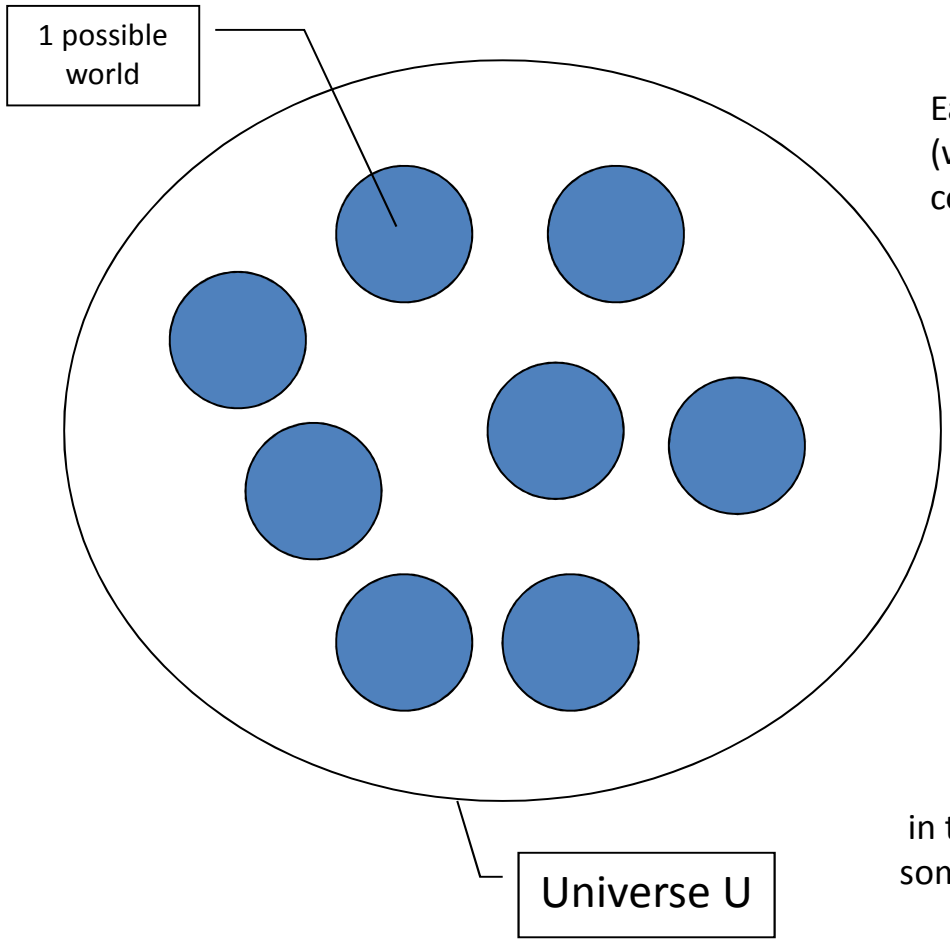
- the agents who use these maps are rational
- They operate in a world completely characterizing the problem
- They have and ignore information-beliefs-
- They can revise their beliefs

Landscapes 3D simulation provide convergence by:

- the ability to facilitate exchanges information between all agents
- the common perception at every moment of a statement of comprehensive belief (the 3d real time scene)

Explain the mechanism of convergence by landscape of concertation: why it works

We use the notion of possible worlds in a universe of problem



U corresponds to questioning

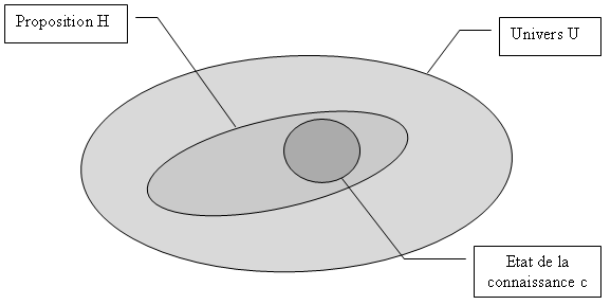
Each possible world is a state of belief in the universe U (we can not know them all but we know they are contained in U)

in this universe we must admit that every proposals satisfy some properties of the universe of the problem.

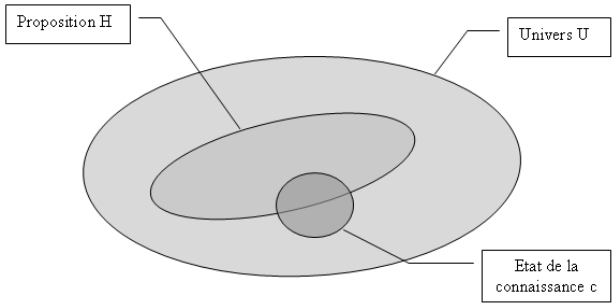
Explain the mechanism of convergence by landscape of concertation: why it works

Faced with a proposal H, there are only three possible attitudes for an stakeholder

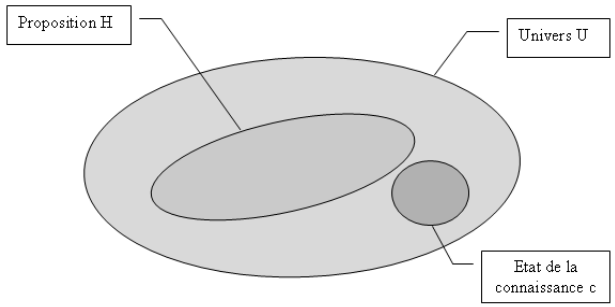
acceptance



uncertainty



reject



Explain the mechanism of convergence by landscape of concertation: why it works

The ignorance is the way you can go in possible worlds :

1. The creative element of possible worlds
2. A way of access to the world (the knowledge exerts the opposite effect. it prohibits access to possible worlds

For this to work, we need to clarify the question:

- the necessary
- the contingent
- possible
- the impossible

Explain the mechanism of convergence by landscape of concertation: why it works

3D model can handle two aspects of information exchange

The notion of public knowledge

Correction / update beliefs

The notion of common knowledge corresponds to the notion of universality of order 2

The information held by each agent and each agent knows they are known by other agents

→ Unit of space and time = virtual model of the territory

Explain the mechanism of convergence by landscape of concertation: why it works

The notion of public knowledge

Correction / update beliefs

Correction / update involves the notions of possible and impossible by stakeholders

→ The 3D model corresponds to the possible world who include all the beliefs of the agents at the time where the scene is built

→ new message → Process of confrontation between the message and the initial belief of the stakeholders about a situation that is not supposed to different

Explain the mechanism of convergence by landscape of concertation: why it works

The notion of public knowledge

Correction / update beliefs

new message

if the message is in contradiction with the initial belief of an agent, it will have to restore the consistency of his belief

Union operation

a belief (A) corresponding to a set of possible worlds is rectified. Ie that all possible world of A is replaced by a new set of possible worlds which is the intersection of all worlds checking the message M AND all worlds satisfying the belief A (A * M)

Explain the mechanism of convergence by landscape of concertation: why it works

The notion of public knowledge

Correction / update beliefs

new message → belief corrected

The stakeholder has a goal to preserve its most rooted beliefs [Quine 1951]

Faced with conflicting messages M with belief A, the most plausible possible world chosen will be one that minimizes the distance between M and A and satisfies the relation (A * M)

ie the process of taking into account the views of other stakeholders in the project by viewing issues

Explain the mechanism of convergence by landscape of concertation: why it doesn't works good (yet)

There is a sociological shock when this approach is put into action

Two observations:
The simulation approach real time through models ALWAYS gives power to one who is the weakest in the room

- Whoever IS NOT technician or political
- Puts everyone on an equal footing and really makes a collective decision and horizontal eliminating the notion of head

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This is a break with society as it is organized today and initially by the second industrial revolution

1. A top down authority (the chief decides and collaborators apply)
2. Place head is the result of considerable work (technical or political) and they intend to reap the benefits from the exercise of authority

Thank you

Usage de la notion pour éclairer l'objet de la recherche

La voie statistique

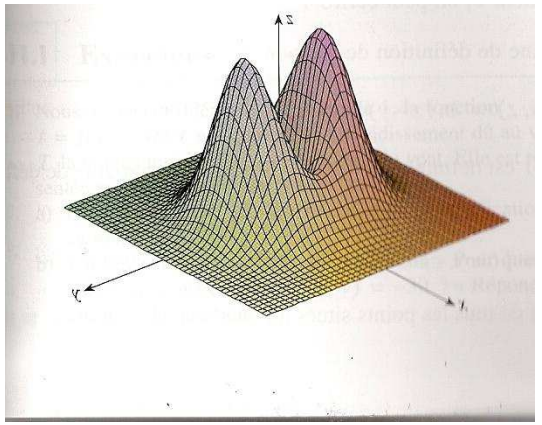
La loi normale est l'expression d'une limite

Habituelle dans le domaine de la simulation (méthodes Monte Carlo)

La voie de l'analyse

Calcul différentiel et intégral

Etudier le comportement d'une fonction



Habituelle dans le domaine de l'optimisation spatiale

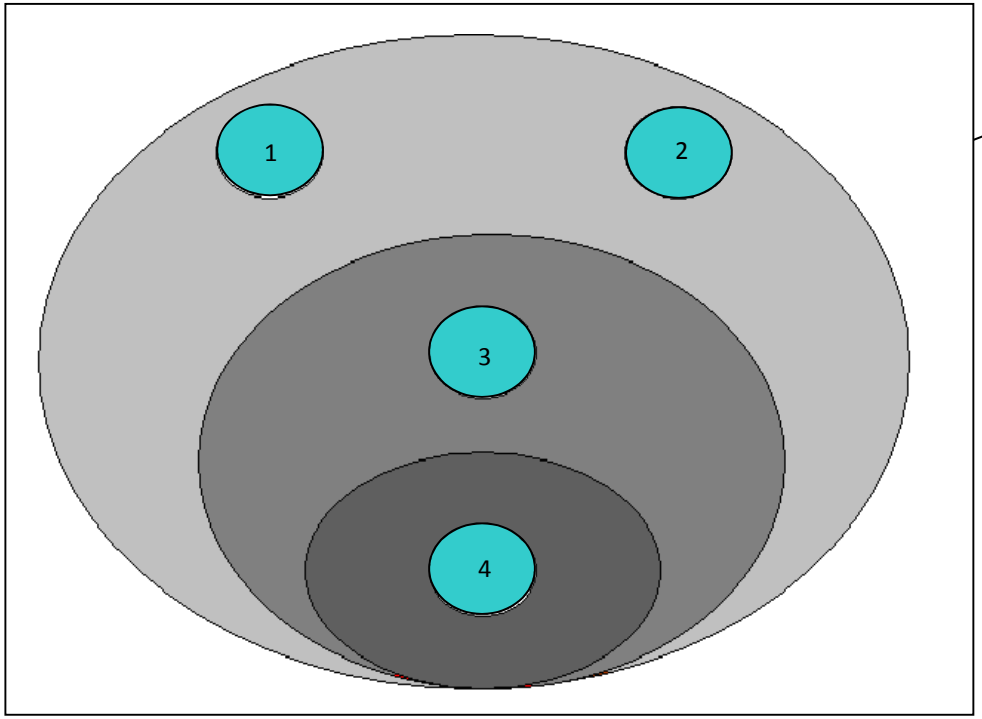
La voie de l'information

En théorie des jeux, l'équilibre de Nash est une limite

En logique épistémique, le monde possible final est une limite

Expliquer le mécanisme de la convergence vers le paysage de concertation: pourquoi cela fonctionne

Exemple pour un agent unique qui reçoit de l'information



Univers U

Mondes possibles	état de la connaissance	
	Fribourg	Unifr
1	FAUX	FAUX
2	FAUX	VRAI
3	VRAI	FAUX
4	VRAI	VRAI

Proposition 1: Fribourg existe (H1) Les mondes possibles M3 et M4 sont inclus dans H1

Proposition 2: Unifr existe (H2) Seul le monde M4 est inclus dans H2

Le problème modélisé : un étudiant apprend l'existence de l'Université de Fribourg et de la ville de Fribourg (en Suisse)

Règles pour le comportement des agents face à la révision des croyances– Approche Floue

2 données pour l'exemple : Niveau de falsification et écart aux croyance les plus enracinées

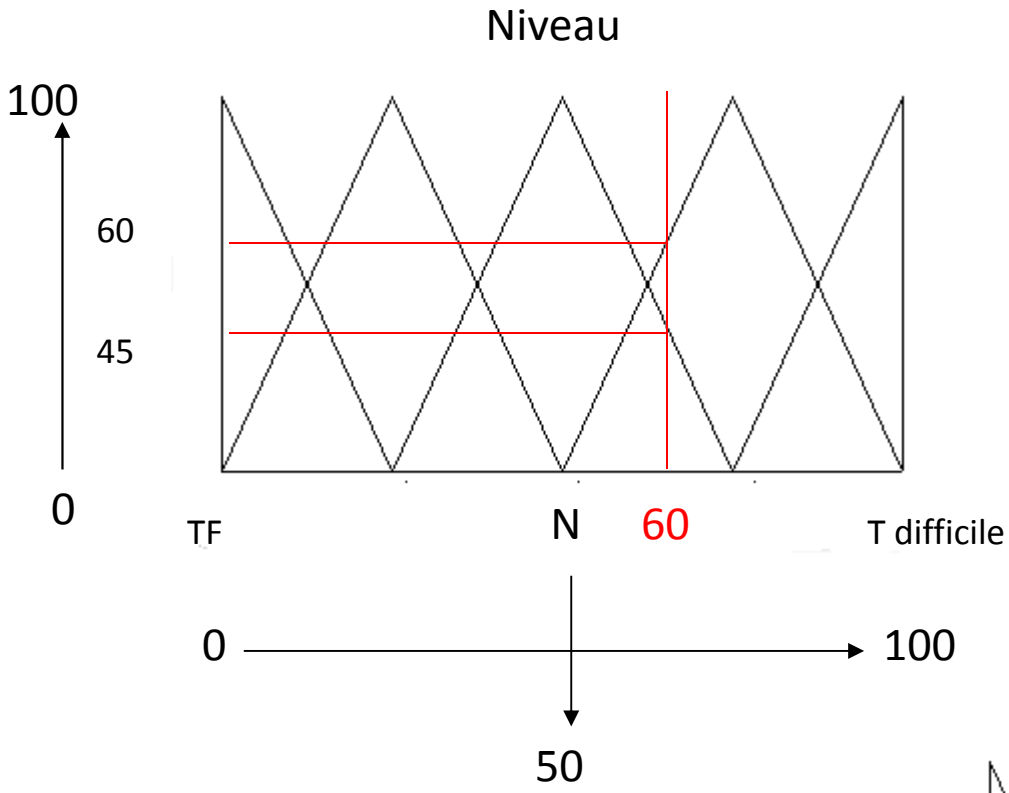
Actions possibles de l'agent

Action	Code
Rejet	R
Neutre	N
Accepté	A

Ecart			Niveau		
	Très Fort	**Fort**	**Moyen**	**Faible**	**Très faible**
Très forte	A	A	A	N	R
Forte	A	A	N	N	R
Moyenne	A	A	N	N	R
Faible	R	N	R	R	R
Très faible	R	R	R	R	R

Modèle expert des décisions possibles

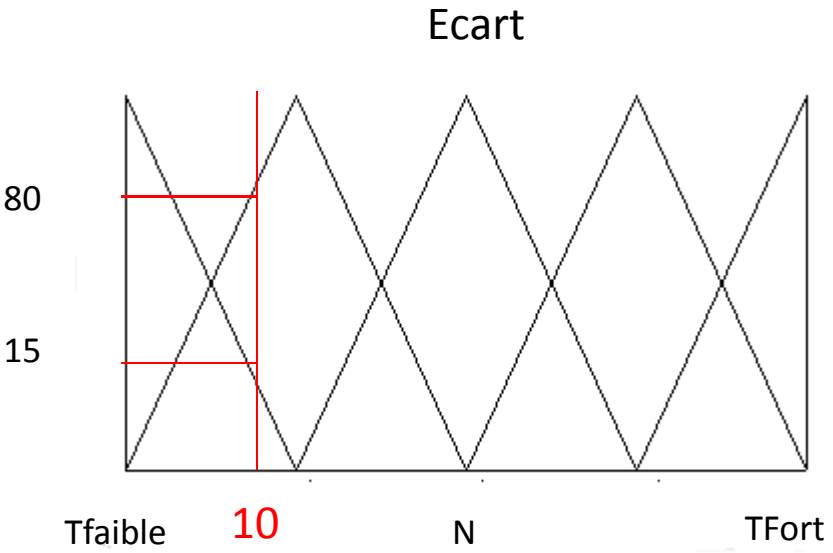
Fuzzification des données



Un exemple :

Ecart faible (valeur 10)

Niveau assez Fort (60)



Détermination du comportement du skieur

60 45

80

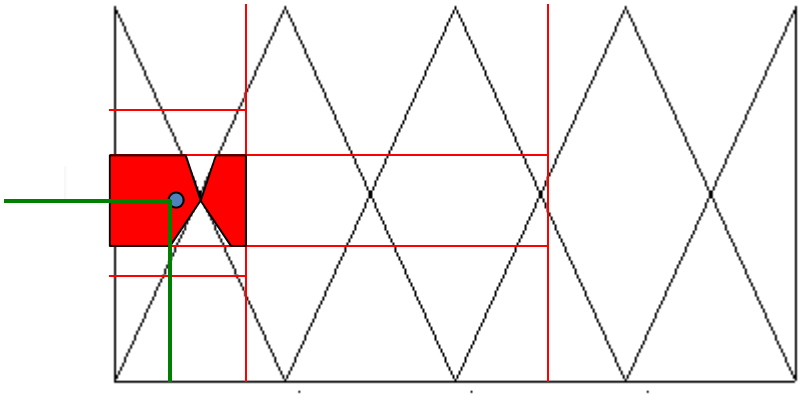
15

Ecart			Niveau		
	Très Fort	**Fort**	**Moyen**	**Faible**	**Très faible**
Très forte	A	A	A	N	R
Forte	A	A	N	N	R
Moyenne	A	A	N	N	R
Faible	R	N	R	R	R
Très faible	R	R	R	R	R

Les actions possibles pour l'agent

Le sous ensemble flou des solutions

Calcul du barycentre



La solution (Niveau 50 et écart 15)

Ecart			Niveau		
	Très Fort	**Fort**	**Moyen**	**Faible**	**Très faible**
Très forte	A	A	A	N	R
Forte	A	A	N	N	R
Moyenne	A	A	N	N	R
Faible	R	N	R	R	R
Très faible	R	R	R	R	R

Tentative pour expliquer le mécanisme de la convergence vers le paysage de concertation

Conclusion

On peut formaliser rigoureusement le processus cognitif en action lors de la concertation par la voie de la logique épistémique dynamique

Cela peut (peut être) permettre dans l'avenir:

- développer des moyens d'observation du processus en action lors de l'interaction des agents dans un processus participatif…et alimenter le débat dans le domaine théorique