RISK-UNCERTAINTY-COLLABORATION AGRICULTURE PRODUCTION SYSTEMS

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How to support decision making processes in agribusiness through the GRUS system

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Facilitate and Support Group Decision

- Group Decision Support System developed for:
  - Supporting a group engaged in a decision making process
  - Facilitating the problem solving
  - Avoiding conflict

- One paradigm:
  - MCDA
  - MCDM

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Group Decision Support Systems

- "… mix of devices, software, persons, processes, allowing collaboration among group of persons." *(Sprague and Carlson, 1982)*
- …mix of computers, communications, technologies of decision working together to support problems identification, formulating and generating solutions during work meetings." *(DeSanctis and Gallupe, 1987)*

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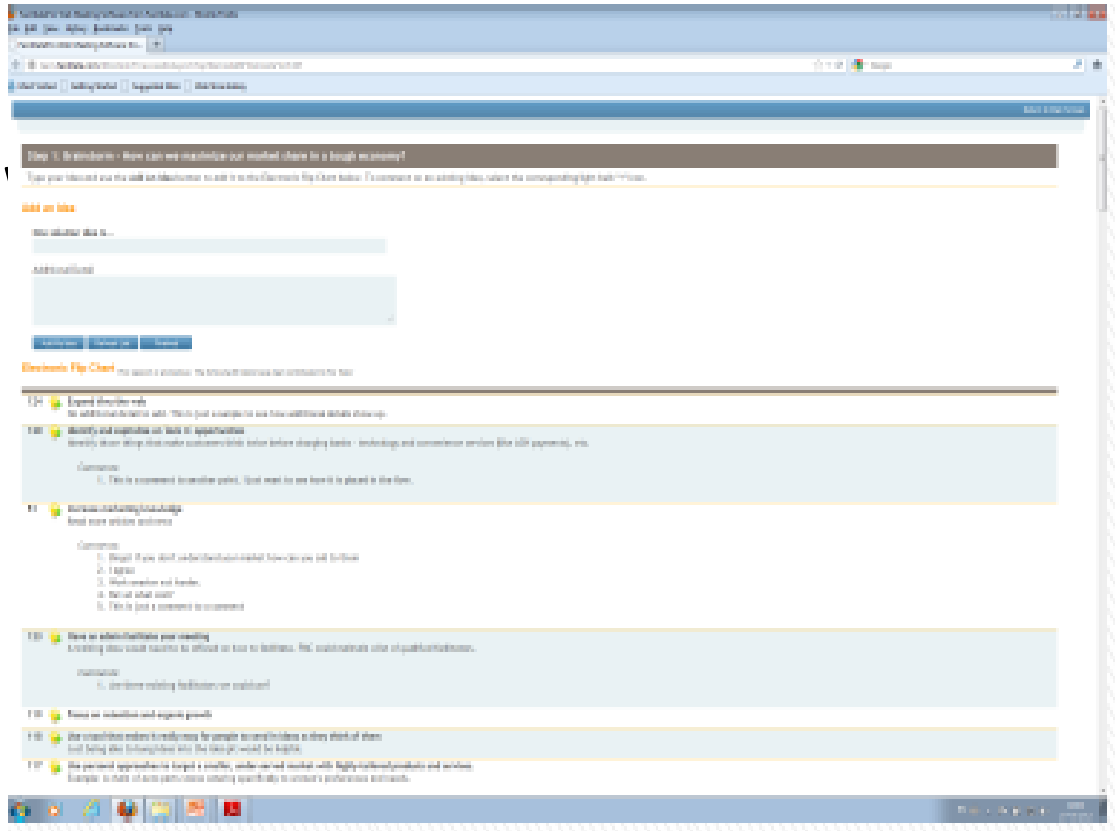
GDSS Advantages

- Improve groups efficiency
- Tangible
  - Time reduction
  - Increasing the number of good ideas
- Intangible (difficult to quantify)
  - Improve group cohesion
  - Improve problem definition
  - Good group commitment

Kinds of GDSS



Facilitation - Definitions

- Important impact on the group outputs and productivity
- "…activities done, before, during and after a collective decision meeting to support the group to reach their objectives defined during the decision process." *(Bostrom, Anson and Clawson, 1993)*
- "… defined as a process through which an external person of the group, non concerned by the decision, officially recognized and accepted by the group, is employed to support a group engaged in a decision making process." *(Adla, 2010)*

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Kinds of Facilitation

- Technical
  - Assist stakeholders with the technology use
- Process
  - Moderate the stakeholders and their interactions in the tasks achievement in order to make arising the meeting objectives, and to guide the participants
- Content
  - Imply to directly deal with the problem to solve

Tools for Facilitation

- Content oriented
  - Dynamical Text Guide in a Multi-Criteria GDSS *(Limayen, De Sanctis, 2000)*
  - Cooperative Knowledge Based System *(Adla, 2011)*
  - Automatic ideas clustering *(Yuan, 2008)*
- Process oriented
  - Agent Based System *(Nunamaker at al., 2002)*
  - Group activity analysis (indicators analysis) *(Nunamaker et al., 2002; Vivacqua et al., 2011)*
  - Facilitation Process *(Adla, 2010)*
- Difficulties to agree on common criteria used for Decision Making

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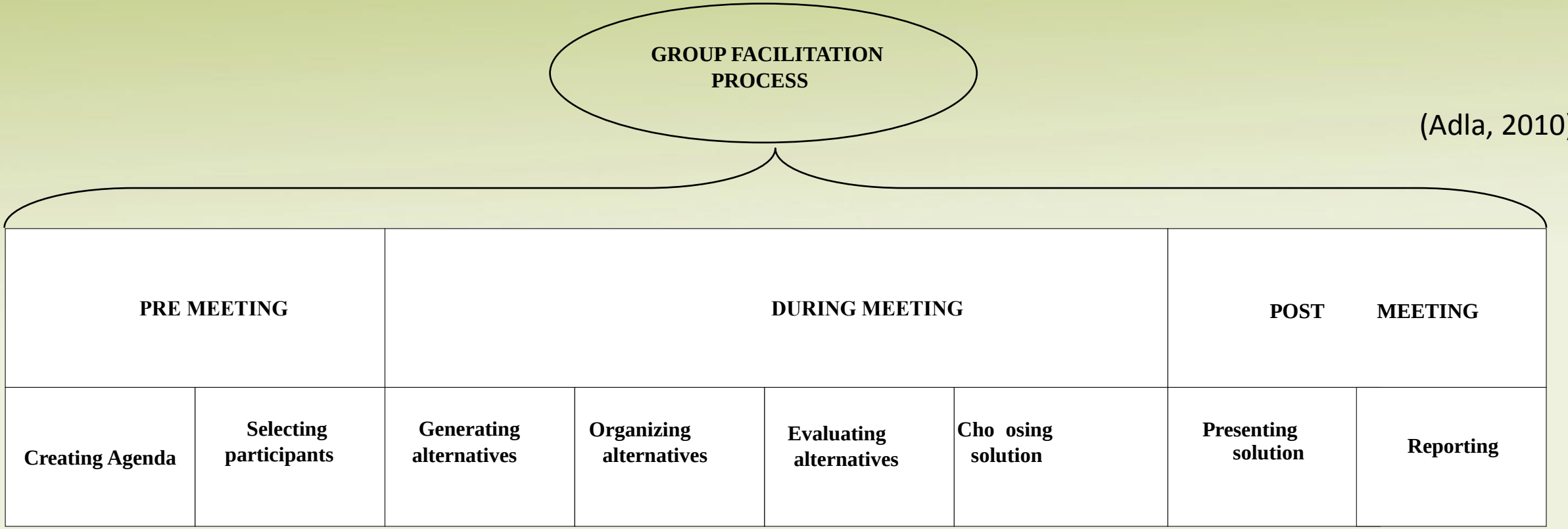
Facilitation Process



(Adla, 2010)

Fig. 1 Group facilitation process

MCDM Group Decision Making

- Macharis et al. (2018)
  - GDSS: Promethee
  - Decision Makers
    - Individual Preferences
      - Private Criteria
      - One performance matrix by Decision Maker
  - Global aggregation for the group ➔ Weighted Sum
- MAMCA
- Advantage: Sensitive Analysis among Stakeholders
- Limit: No Collaboration, No Co-Decision, No Common Share

GRoUp System (GRUS)

» Web Application : ToolBox

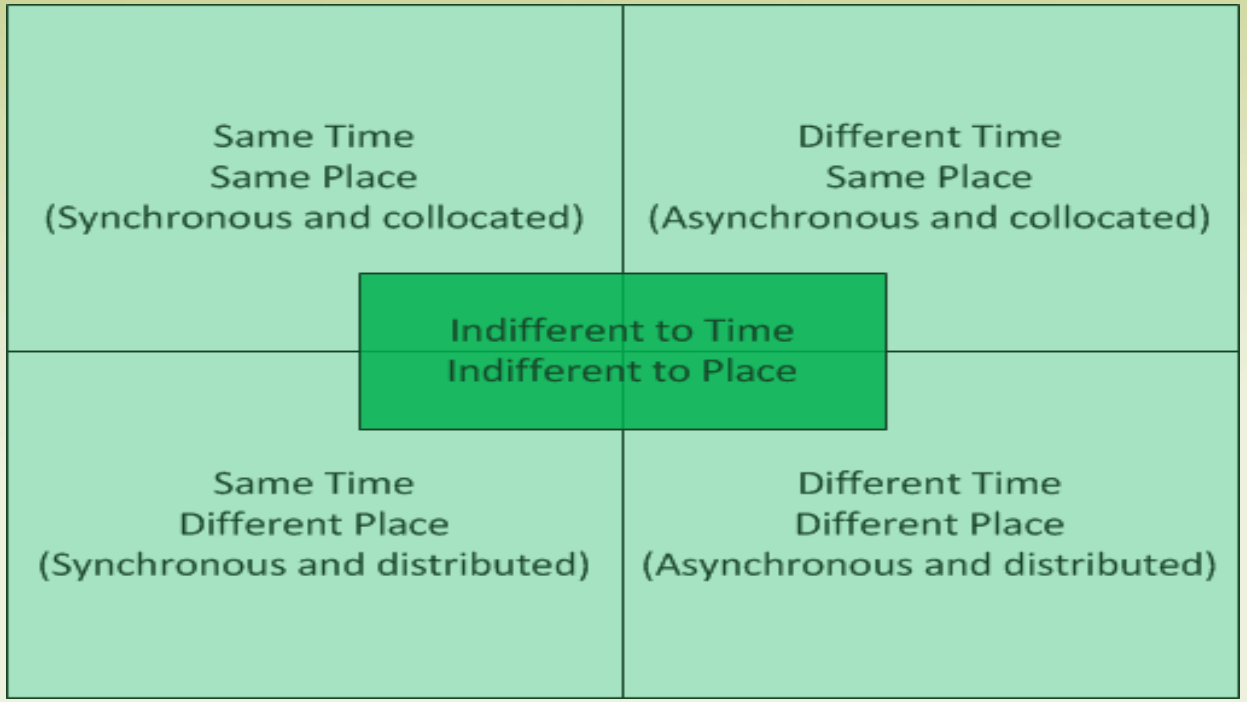
» Based on Grails web application framework

> Open Source Framework

» GRUS is a fully open source system : available upon request

GRUS Features 1/2

» Can be used in several situations



» In GDSS, 2 roles of user

> One facilitator (meeting manager)

> Several Participants (meeting contributors)

GRUS Features 2/2

- 2 kinds of meetings are available
  - Public meetings
    - All registered users in GRUS system can participate
  - Private meetings
    - Only invited users can participate to a private meeting
- Some collaborative tools are available
  - Electronic Brainstorming
  - Categorizer
  - Vote
  - Agenda
  - Report…
- User with the role of facilitator can for her/his meeting
  - Define the meeting type
    - Group process (sequence of collaborative tools)
  - Invite users
  - Manage the group process (stop, add, delete,…) tools

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GRUS Objectives

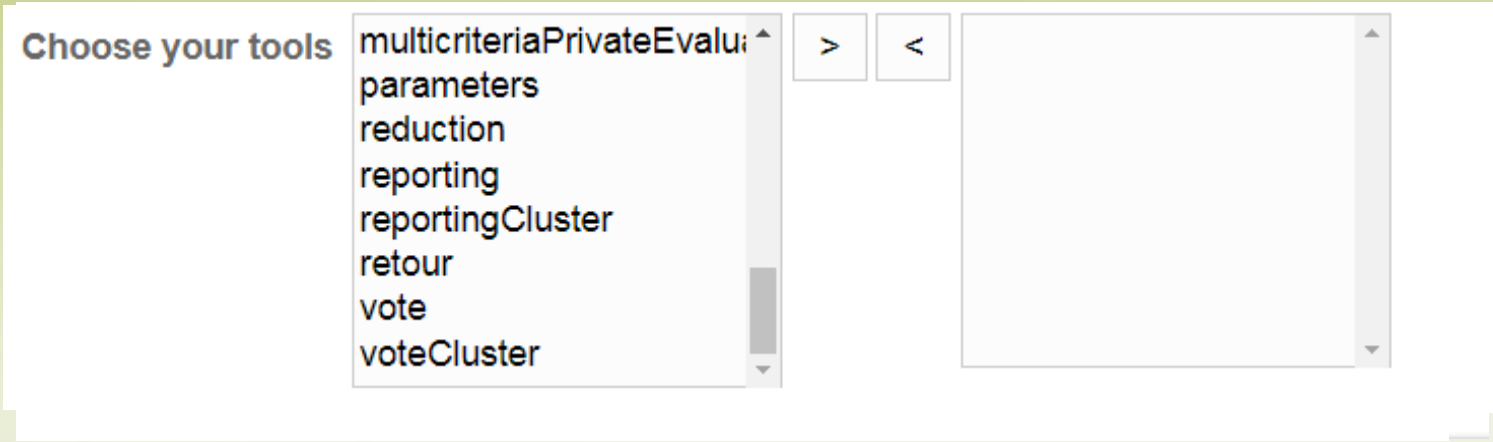
- Open System for
  - Sharing collaborative tools
  - Sharing group processes

- Promote the use of GDSS in organizations

- Improve the efficiency of group work

GRUS as a Tool-Box

- Several tools
- Combine them
- Flexible process



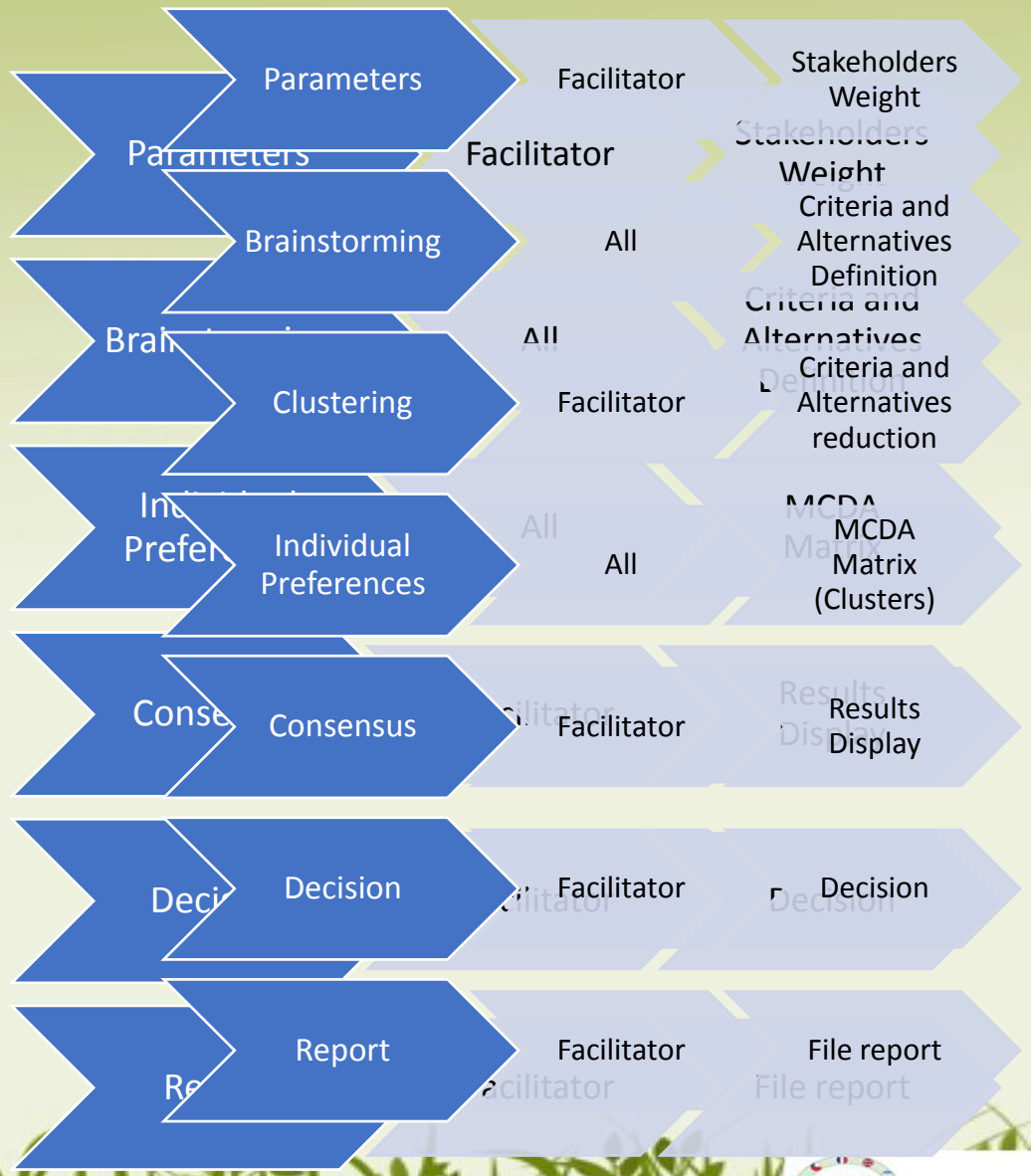
GRUS : Process oriented

- Process
  - Several steps
  - Several tools

step3	► parameters ► criteriaAlternativesGeneration ► criteriaReduction ► alternativesReduction ► multicriteriaClusterEvaluation ► directChoiceCluster ► reportingCluster
test	► parameters ► retour
test01	► parameters ► brainstorming ► vote
test2	► parameters ► criteriaAlternativesGeneration ► multicriteriaEvaluation ► directChoice ► retour ► reporting
testttt	► parameters ► criteriaAlternativesGeneration ► vote
testttttttttt	► parameters ► criteriaAlternativesGeneration ► vote ► consensusB
test_argentine	► parameters ► criteriaAlternativesGeneration ► multicriteriaEvaluation ► vote ► feedback ► reporting
Tomato_Schedule	► parameters ► criteriaAlternativesGeneration ► alternativesPrivateReduction ► alternativesReduction ► criteriaReduction ► criteriaPrivateReduction ► multicriteriaClusterPrivateEvaluation ► multicriteriaClusterEvaluation ► directChoiceCluster ► feedback ► conclusion ► reportingCluster
Vote - Etape 1 - ER	► consensusB

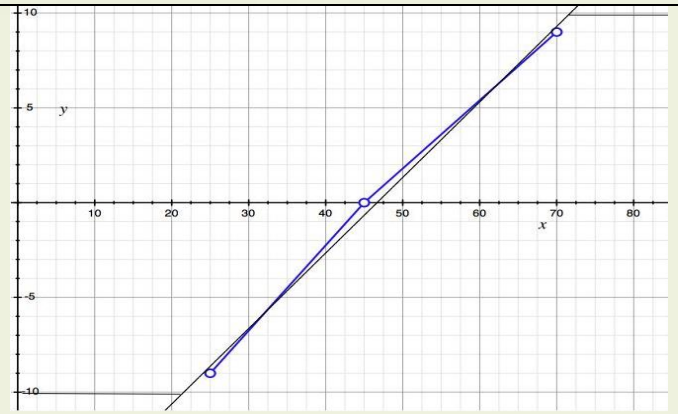
MCDM Processes

Weighted Sum
Choquet Integral

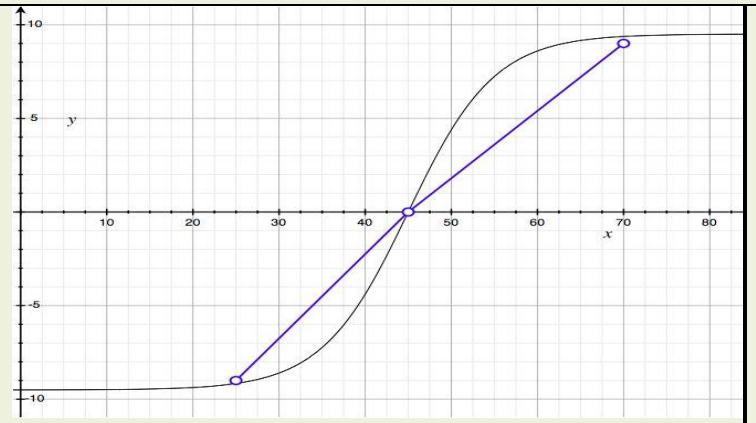


Criteria

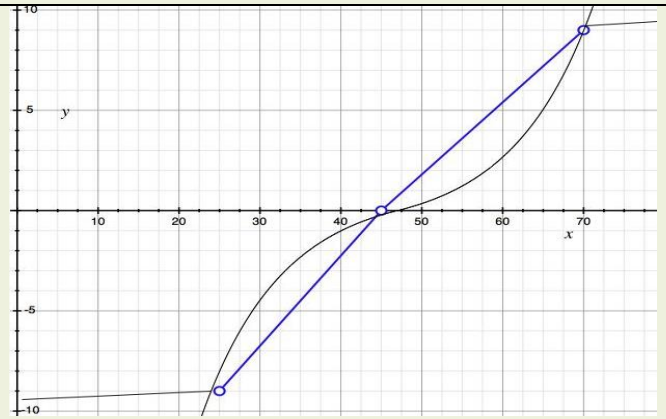
- Suitability Function
  - Scoring Scale
  - Indifference Score
  - Reject Score
  - Shape of Interpolation
  - Shapley Indice (Bi-Capacity)



(a) linear improvement of the suitability

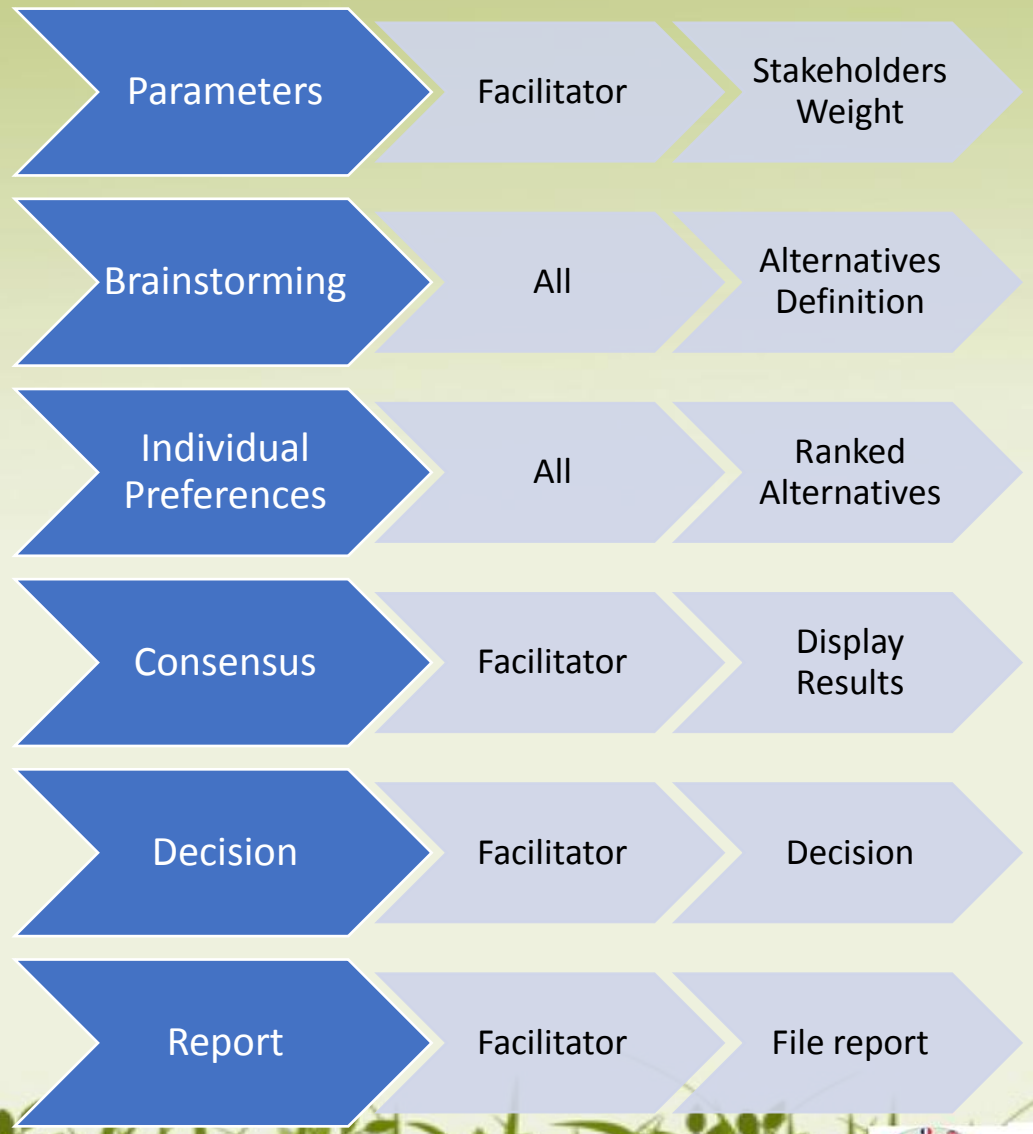


(b) sigmoide improvement of the suitability



(c) plateau improvement of the suitability

Vote Processes

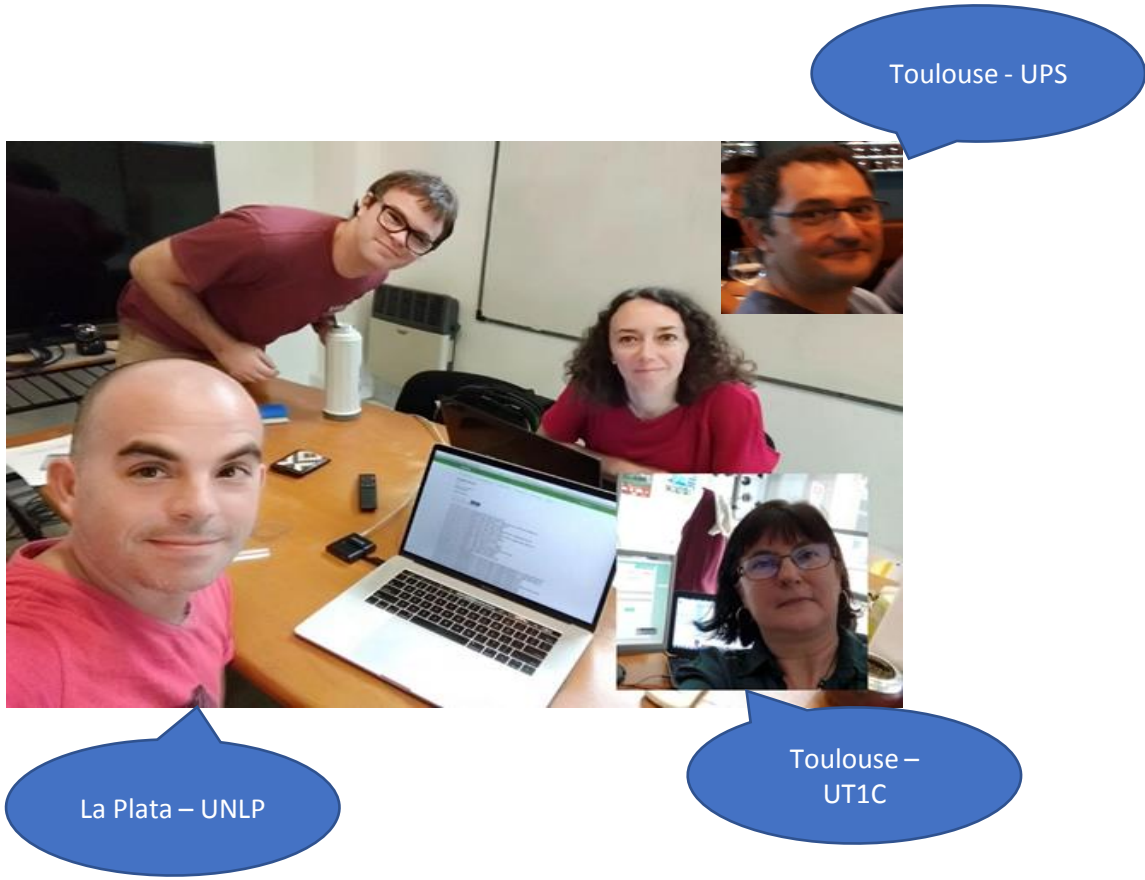


Borda
Condorcet

Experiments

- Synchronous / Distributed
- 15 Experiments
  - Non Academics / Academics
- Process
  - Parameters
  - Brainstorming
  - MultiCriteria Evaluation
  - Discussion
  - Report

Simplify



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Conclusions

- Scenarios have been defined
  - Tomata production:
    - How to increase production ?
    - How many stems do we keep in greenhouses ?
- Experimentations allow to:
  - Test usability of the system
  - Improve software requierement step of designing the GDSS

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Perspectives

- Simplify use of the system
  - Hide some parts during some steps
- Test other processes
  - Vote

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Thank you !!!

Questions !!!!