EU Global System Dynamics and Policy and European Climate Forum's
Workshop on
System Dynamic Models of Coupled Natural-Social Systems
Bekkjarvik, 22-26 June 2009
Bergen, Norway

Participatory modelling for climate change adaptation
at the interface between research and policy/decision making

Carlo Giupponi
Università Ca' Foscari di Venezia, DSE-CEEM
PhD Programme on Science and Management of Climate Change
Euro-Mediterranean Centre for Climate Change

Doctoral School ChanGeS Global Change Science and Policy

CMCC Centro Euro-Mediterraneo per i Cambiamenti Climatici

Fondazione Eni Enrico Mattei

Preamble

- **Researchers** have their own networks, communication systems, languages, priorities, tools,…
- **Policy makers** have their own networks, communication systems, languages, priorities, time scales,…
- **Stakeholders** have their own networks, communication systems, languages, priorities, preferences,…
- *Research in support to policy/decision making should – at least attempt to – bridge the gaps between the different communities*
- *This is the case of planning for Climate Change Adaptation*

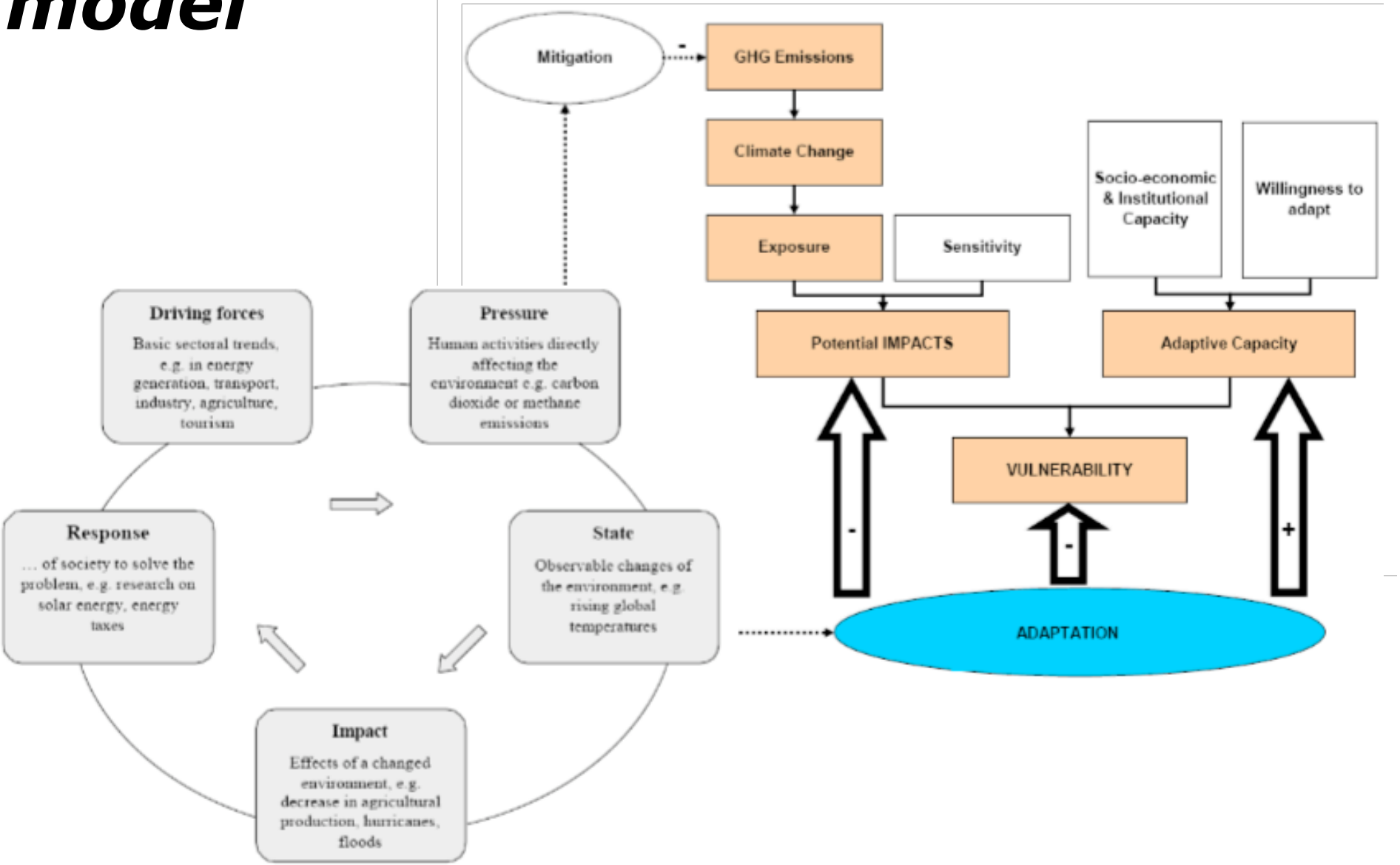
Objectives

- To explore approaches for bridging the gap between conceptual models adopted by policy makers and models developed by the research community
- To present the ongoing activities of the BrahmaTWinn Project in the field of participatory modelling
- To propose an operational approach for integrating multiple sources of knowledge within common interfaces and simple system dynamics modelling routines for scenario analysis

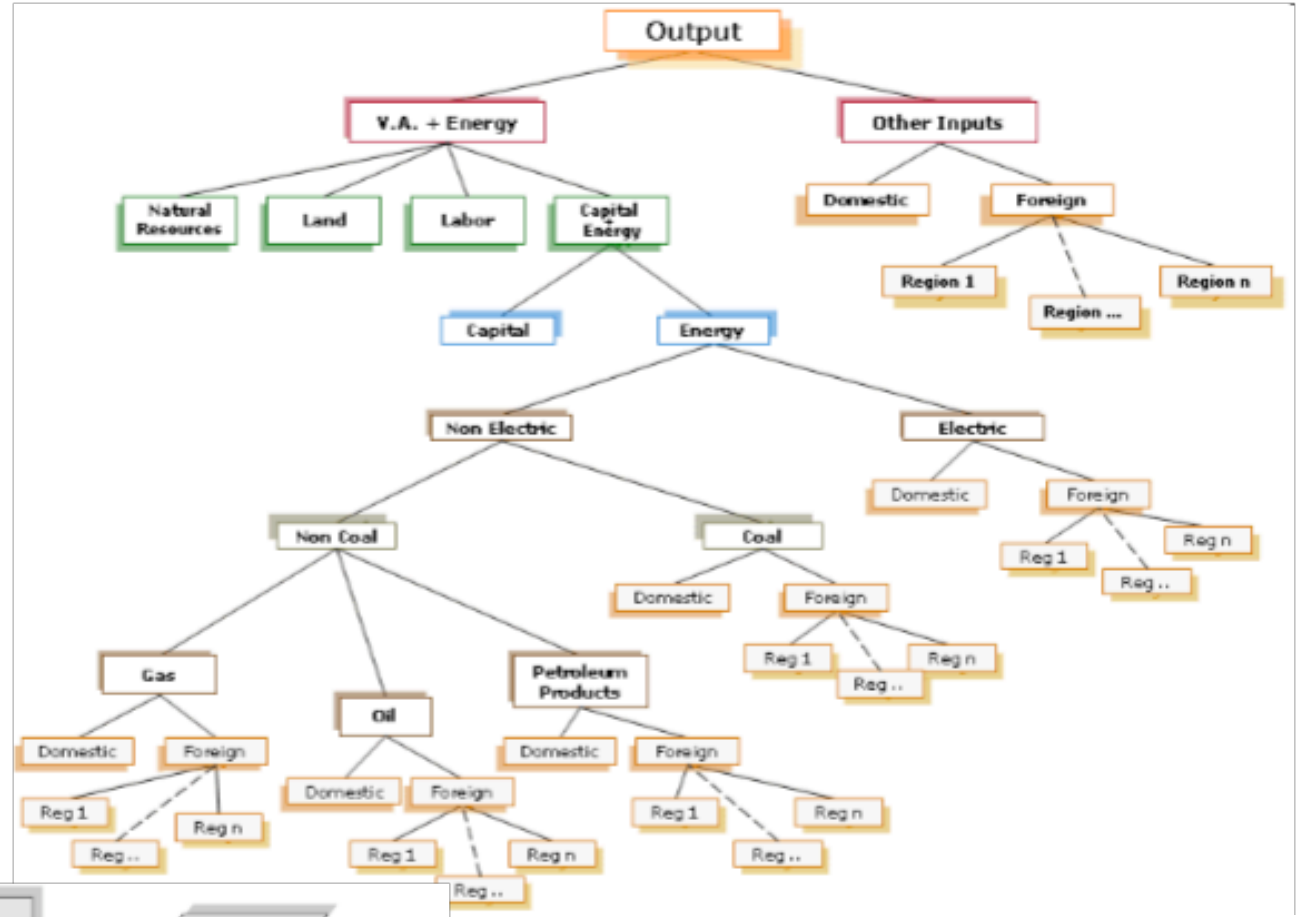
Policy making: conceptual model

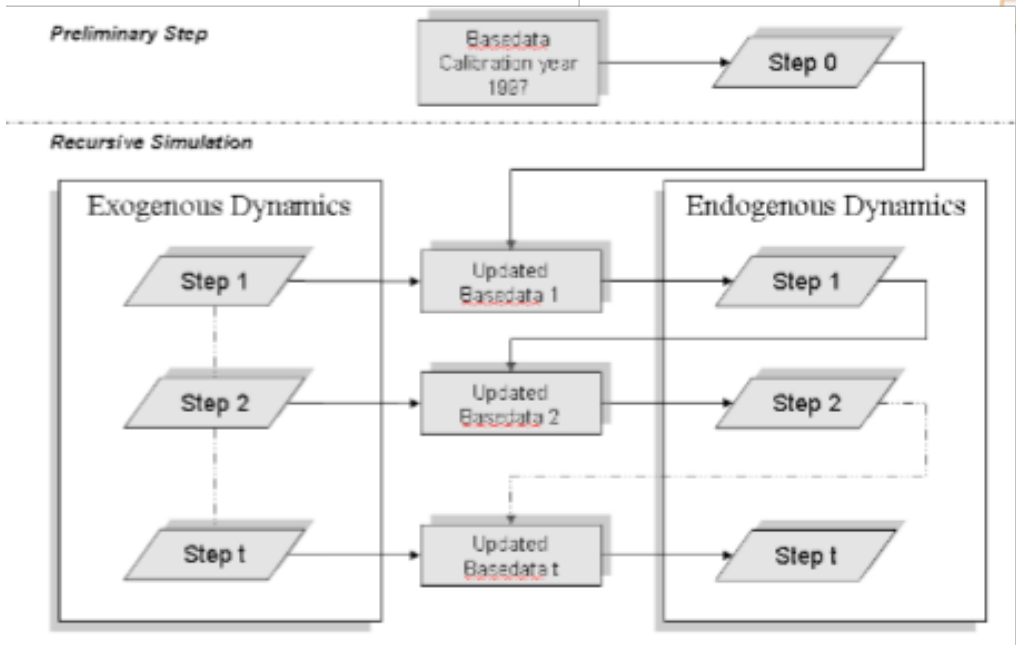
COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels,
SEC(2009) 387/2



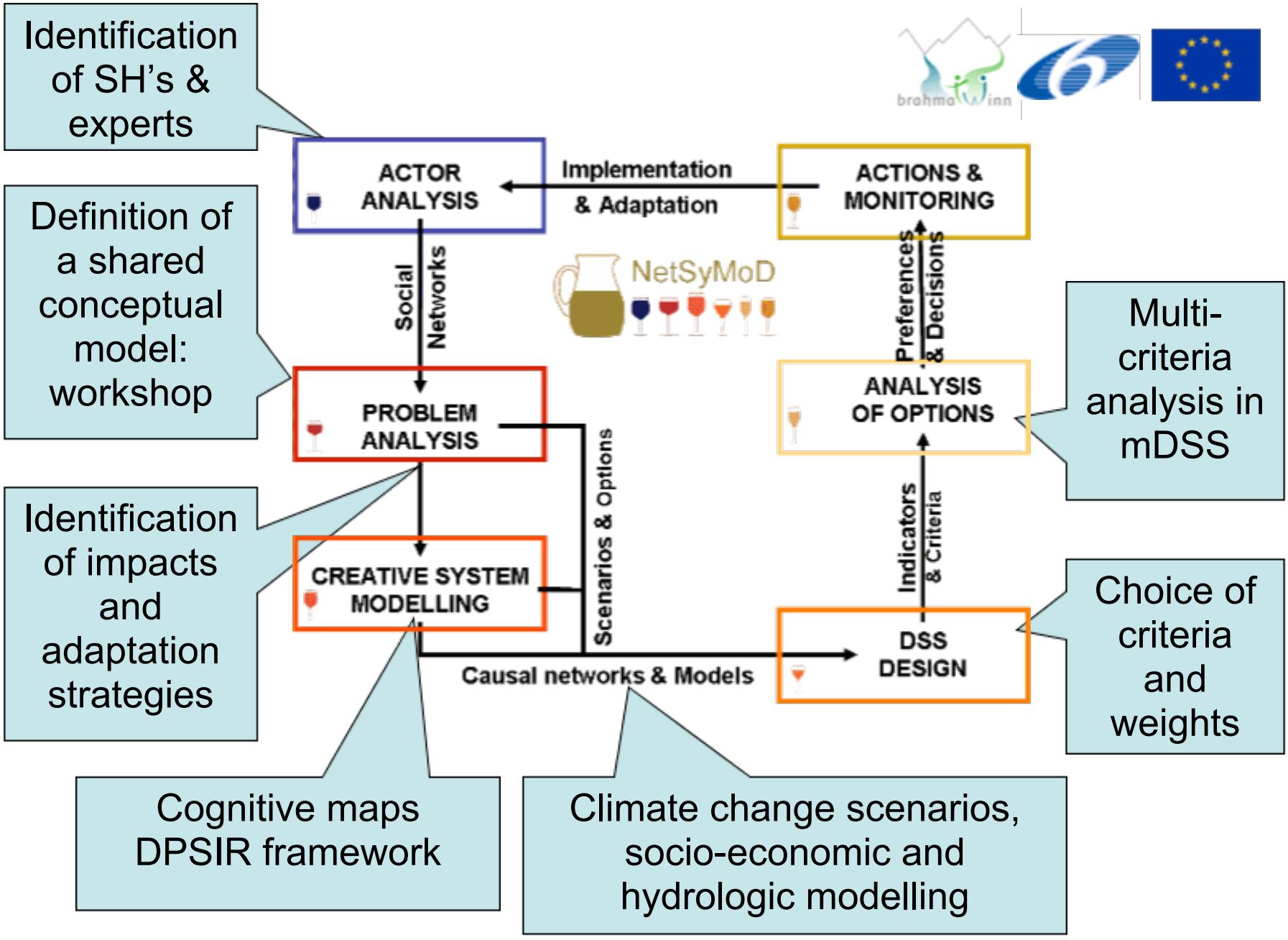
Reseach: e.g. CGE model





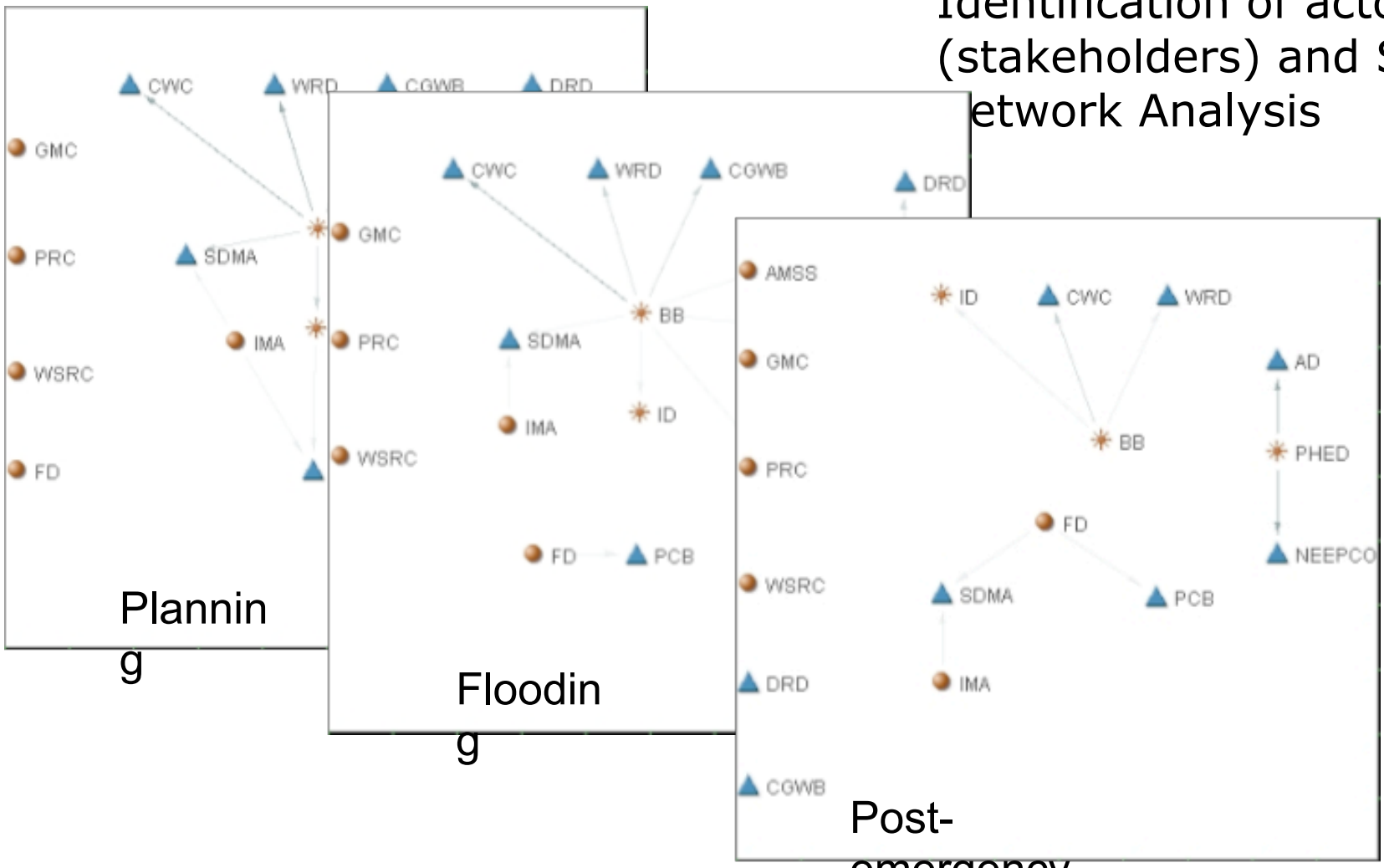
ices
Intertemporal Computable Equilibrium System

Brahmatwinn Project: CC adaptation in upper river basins



Social Network analysis 1/2

Identification of actors (stakeholders) and Social etwork Analysis



Plannin g

Floodin g

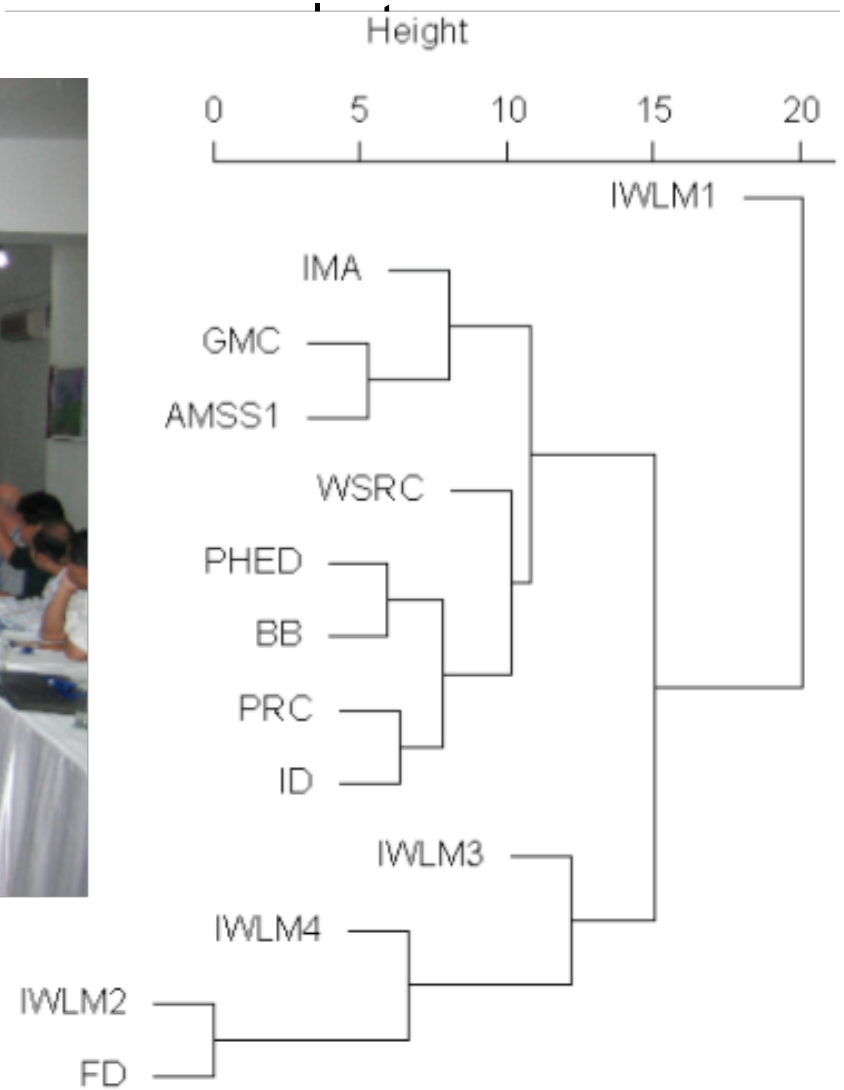
Post-emergency

elling

Social Network analysis 2/2

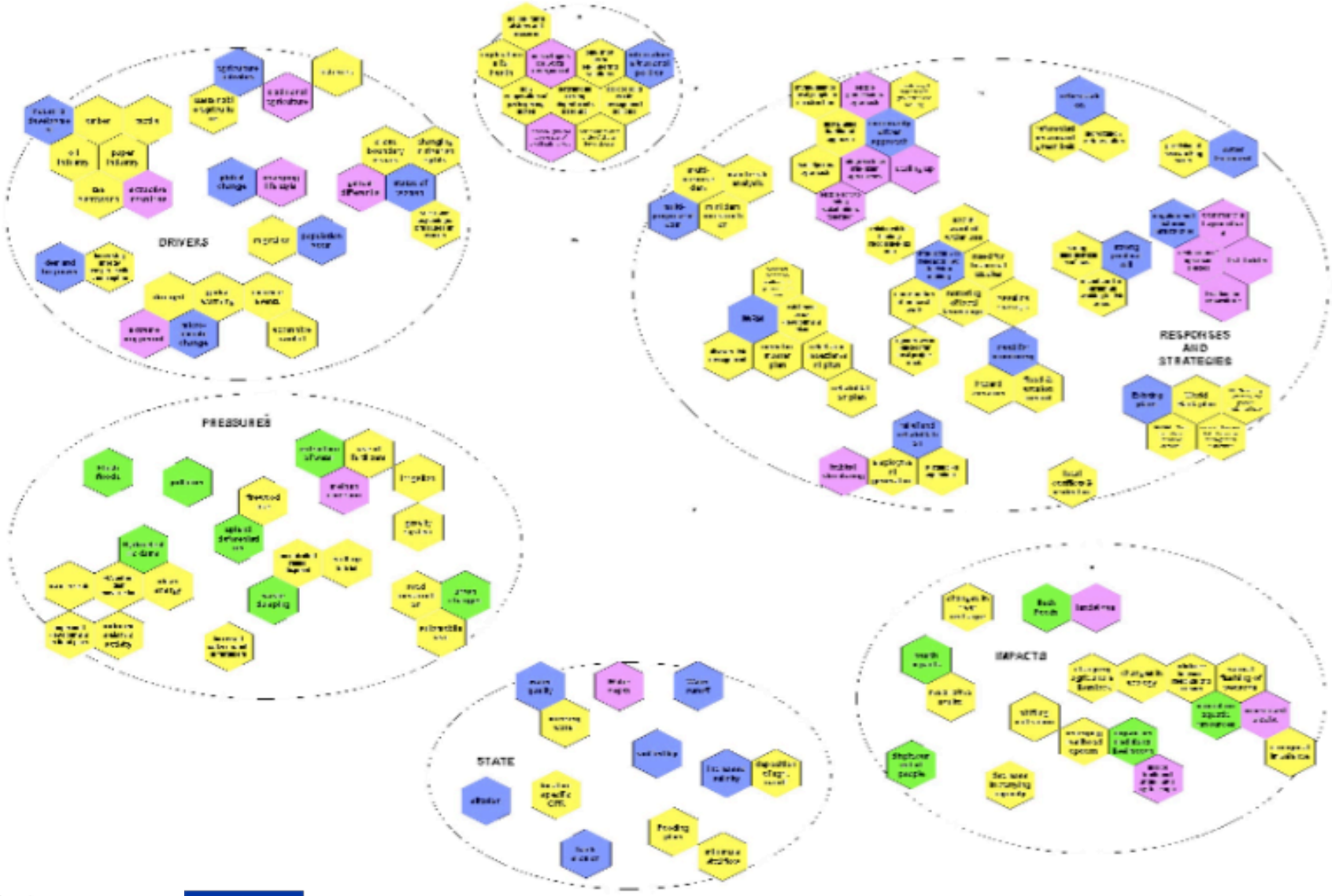
Stakeholders' workshops

Social



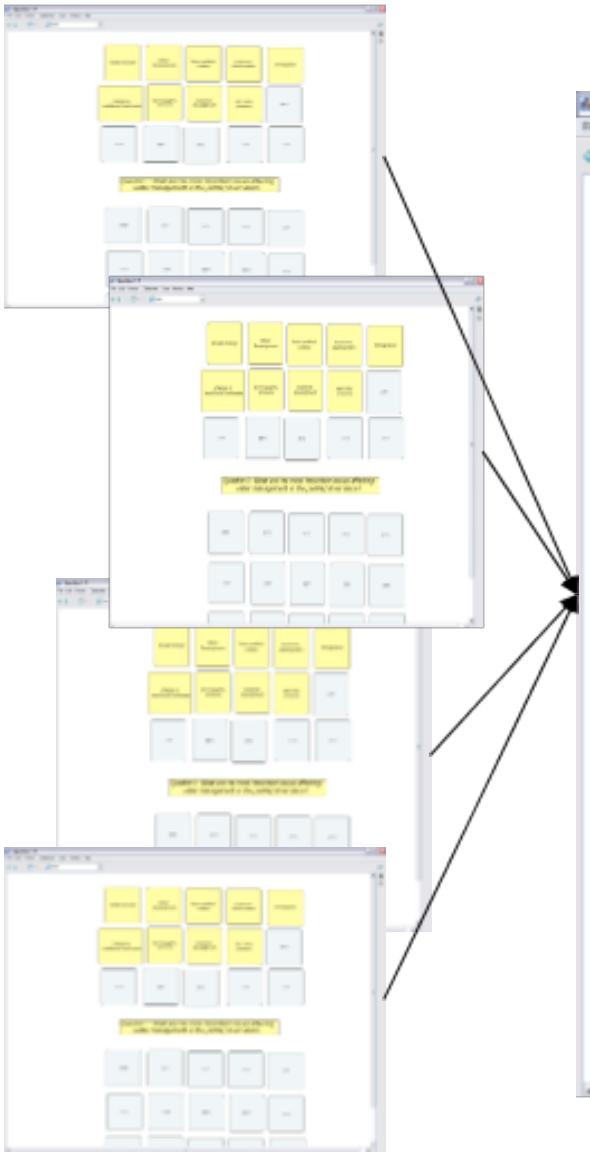
elling

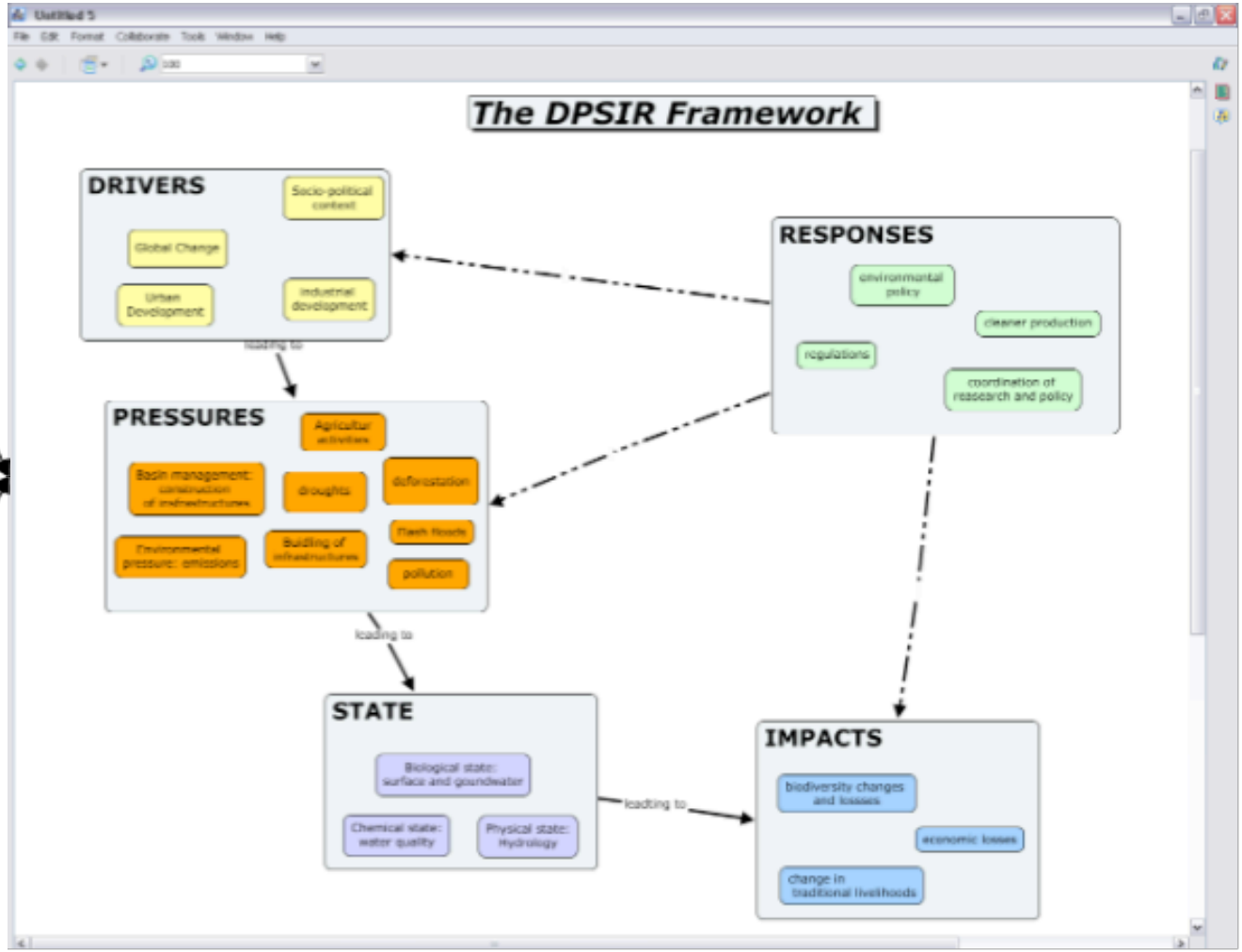
Creative System Modelling 1/9



Brainstormin
g

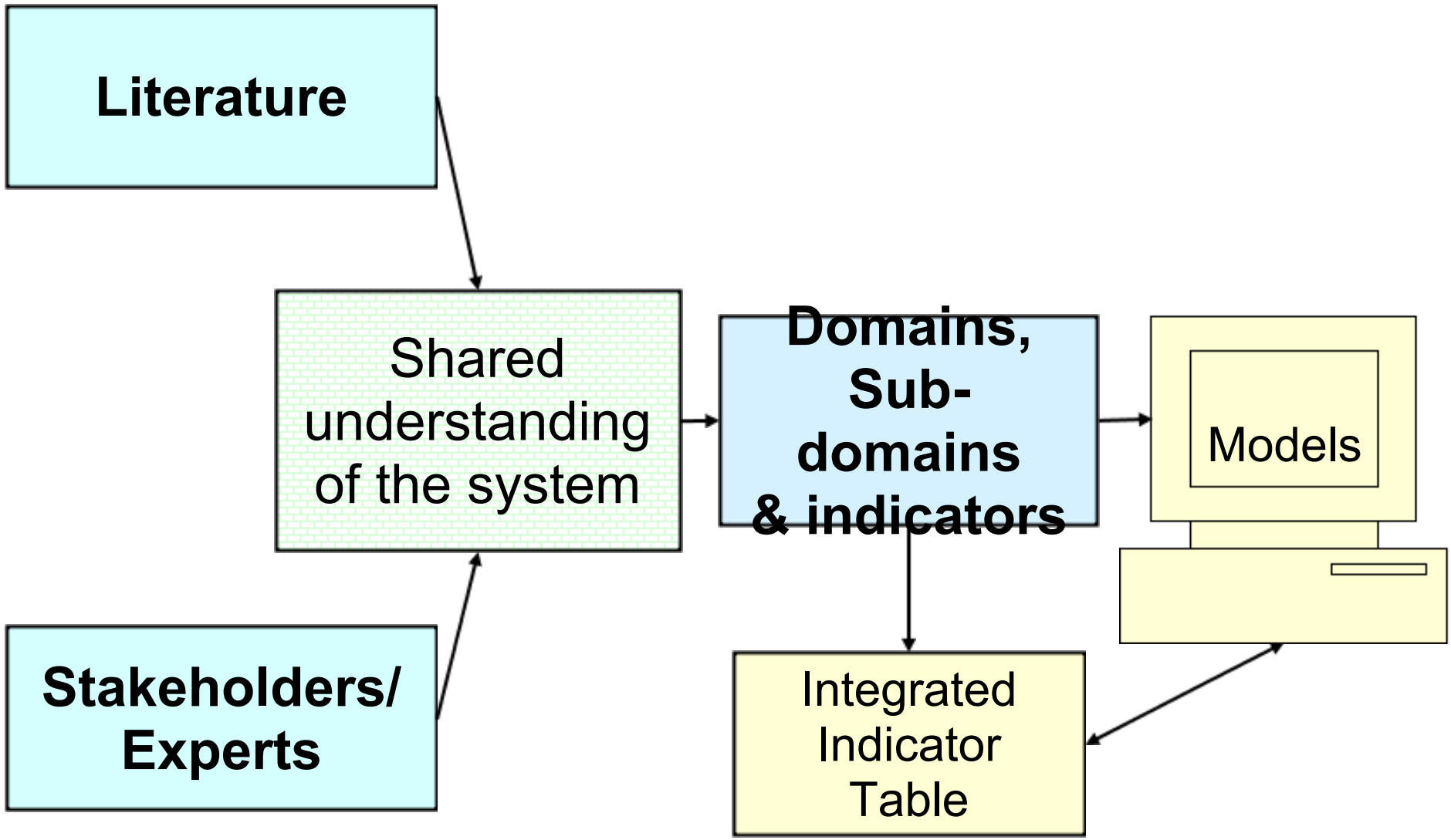
Creative System Modelling 2/9





Clustering in the DPSIR Framework

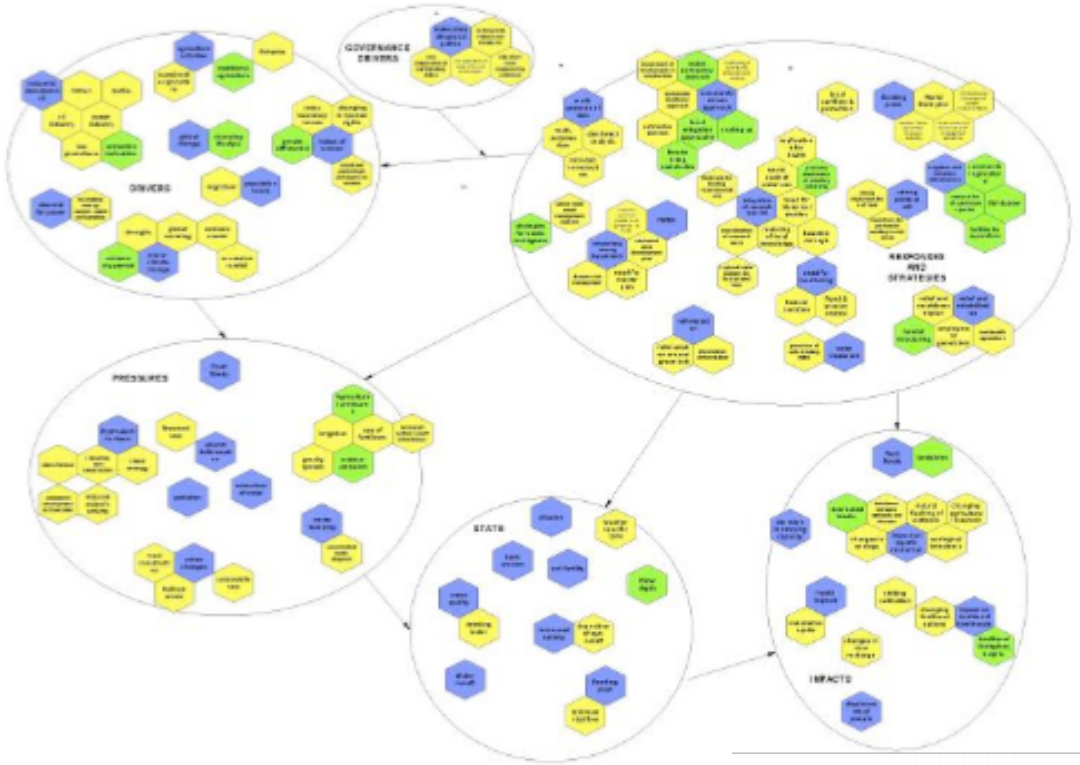
Creative System Modelling 3/9



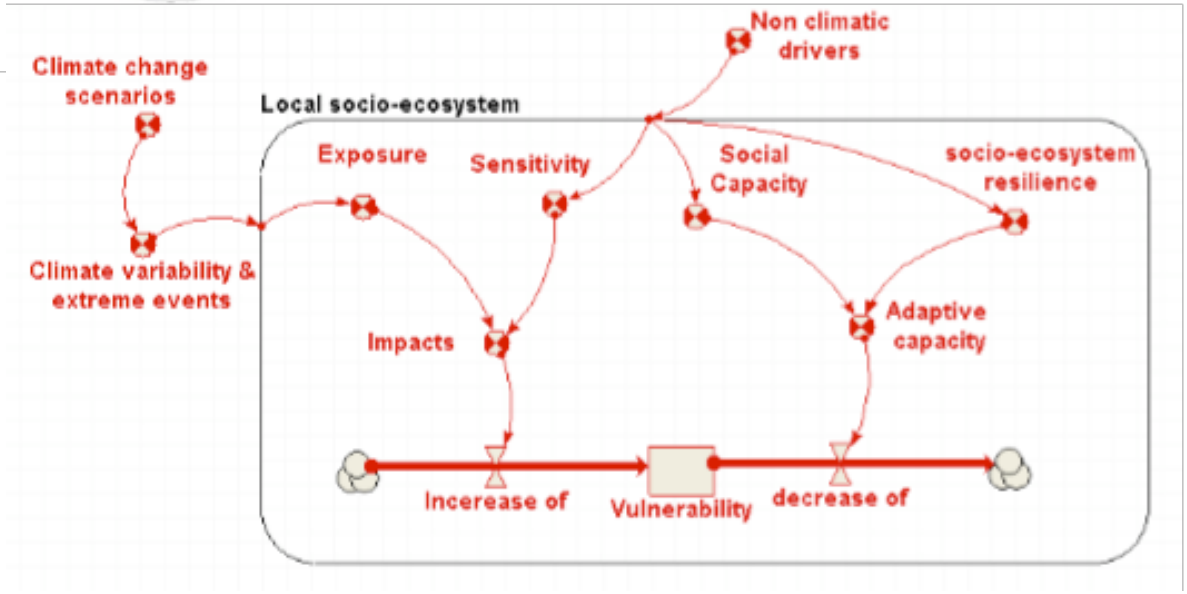
Creative System Modelling 4/9

Integrated Indicators Table

Creative System Modelling 5/9



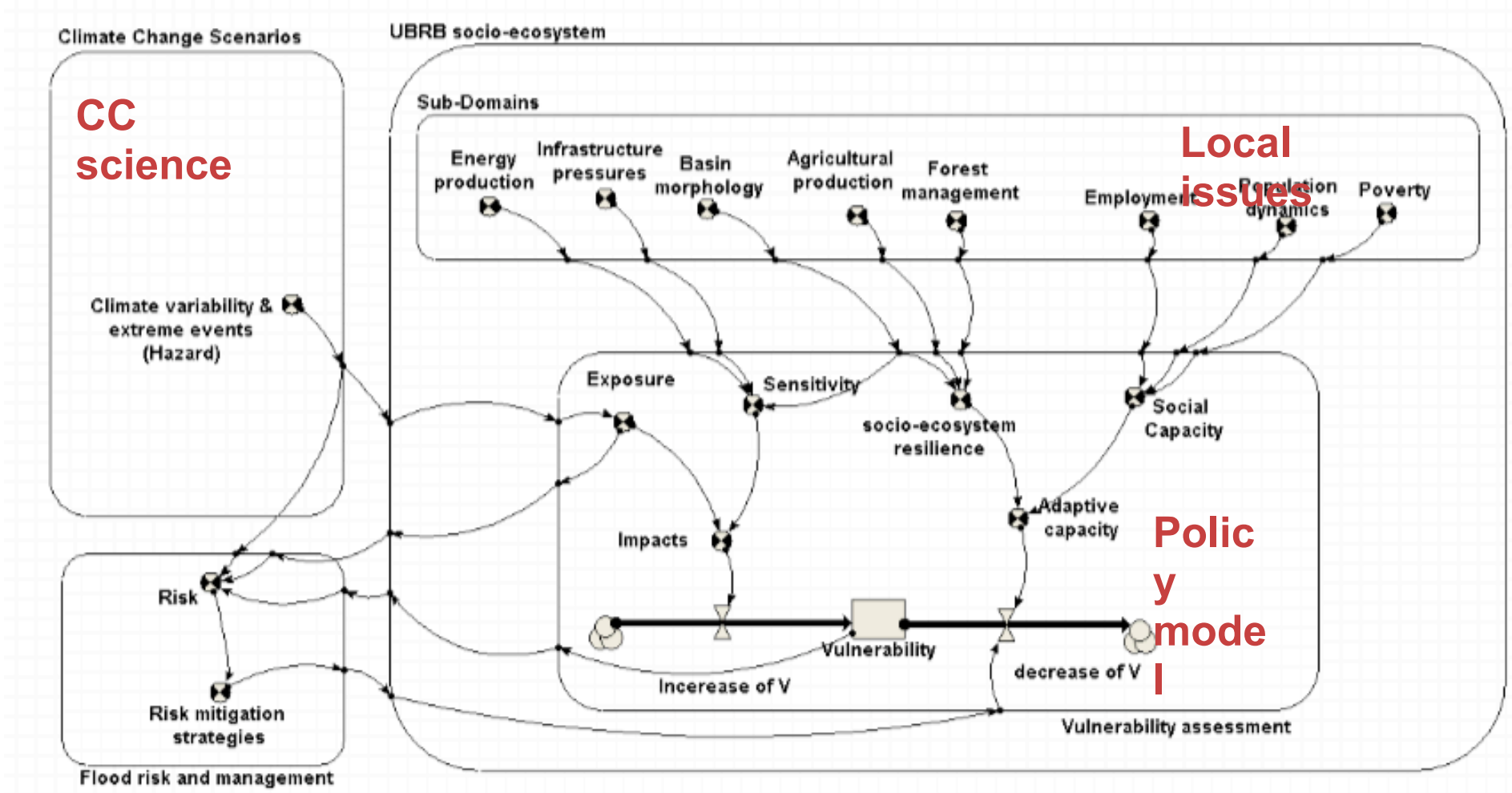
Cognitive map framed in the DPSIR model



Generic conceptual vulnerability assessment model

elling

Creative System Modelling 6/9



Policy making

Participatory modelling

Creative System Modelling 7/9

elling

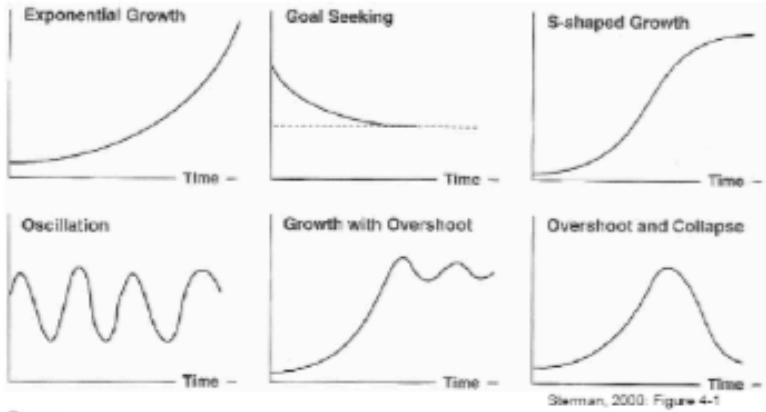
BRAHMATWINN MEETING, 4-5 MAY 2009, MUNICH

Partner: _____

Sub-domains selected by stakeholders for the UBRB:

- basin morphology
- forest management
- vulnerability
- poverty
- population dynamics
- infrastructure pressures
- energy production
- agricultural production
- employment

Examples of curves:



Sterman, 2000: Figure 4-1

Steps:

1. choose type of curve (some examples are shown above)
2. define values at each time step
3. graph curve

Consider the following time steps: 1980 – 2000 – 2020 – 2040

Consider the present state of each Sub-domain to be equal to 0.5

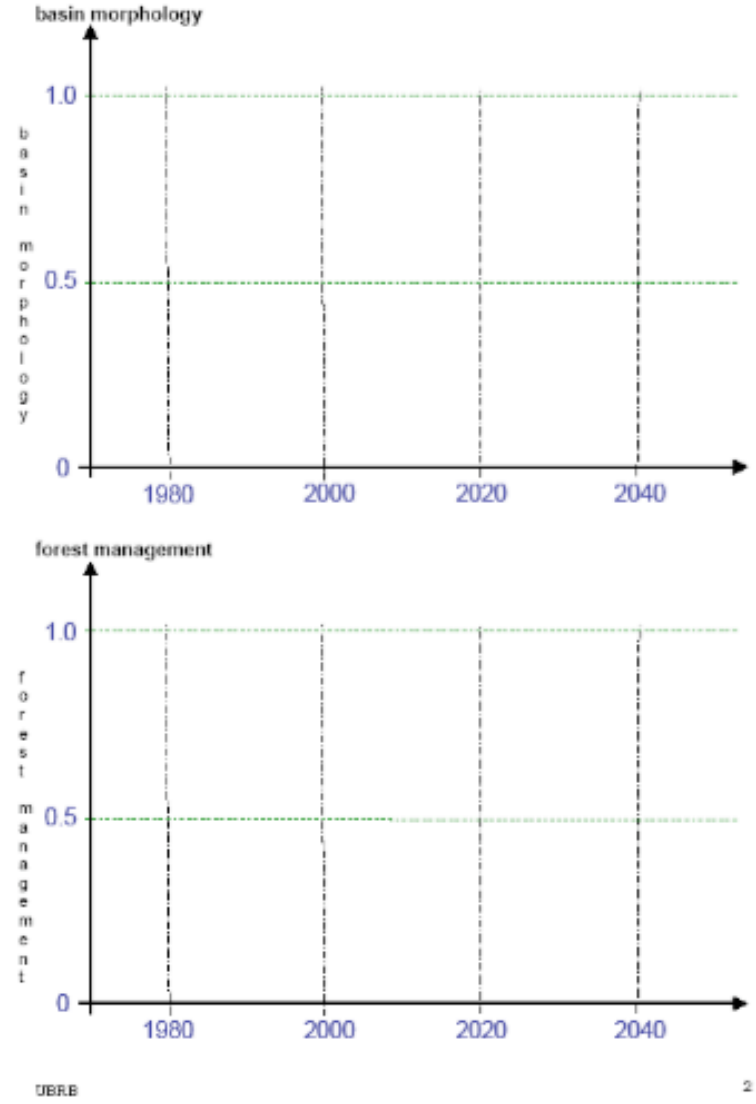
- values higher than 0.5 represent an improvement of the state
- values lower than 0.5 represent a worsening of the state

Please sketch the possible trajectory considering:

- the climate change scenario shown
- no response strategy is implemented

UBRB 1

WHAT TREND WILL THE SUB-DOMAIN HAVE?

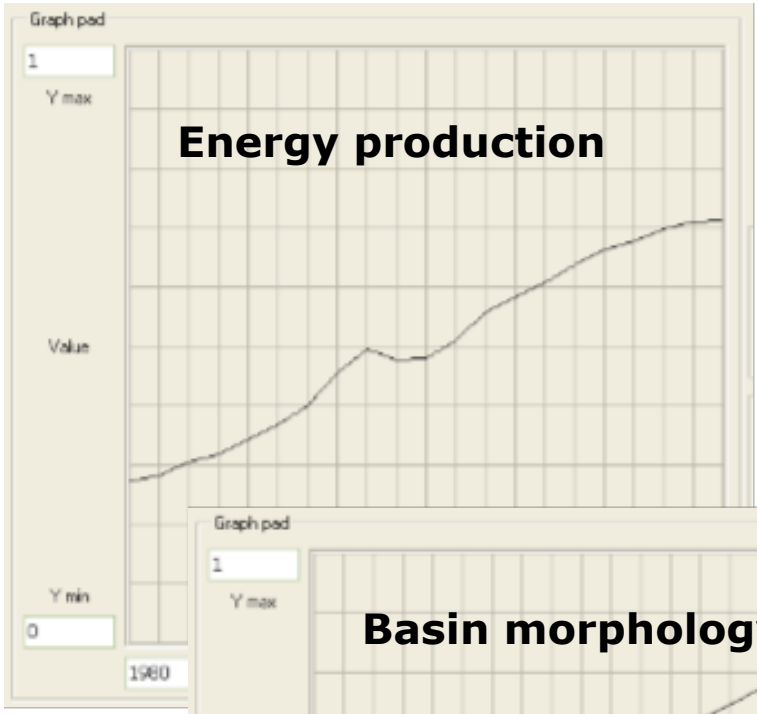


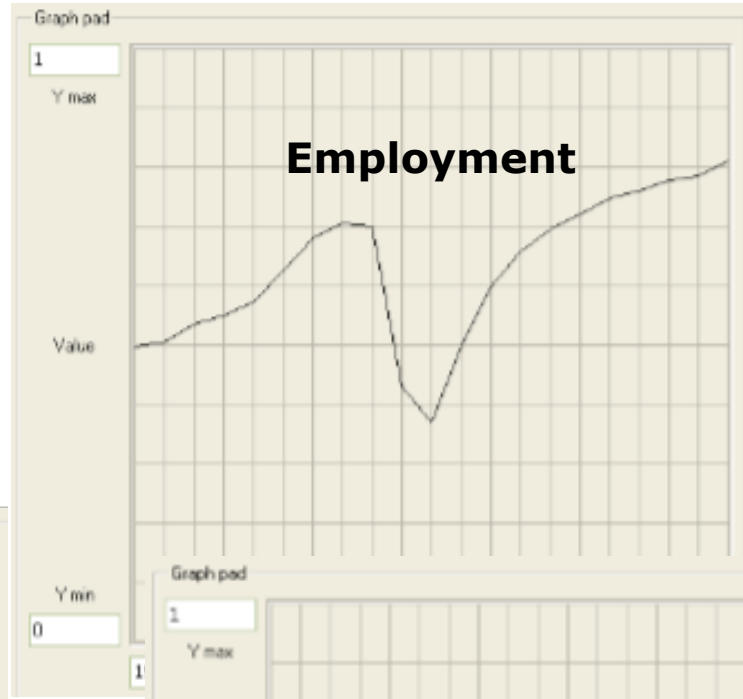
UBRB 2

Expert knowledge elicitation

Creative System Modelling 8/9

elling

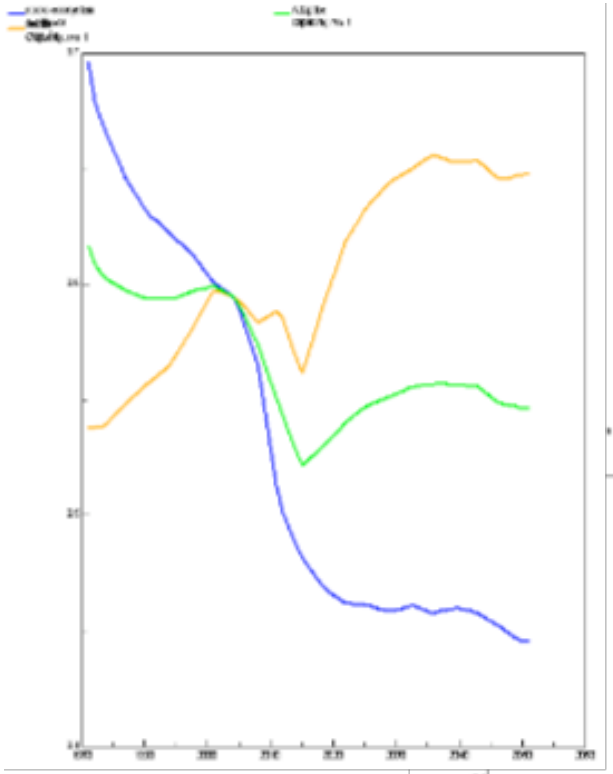




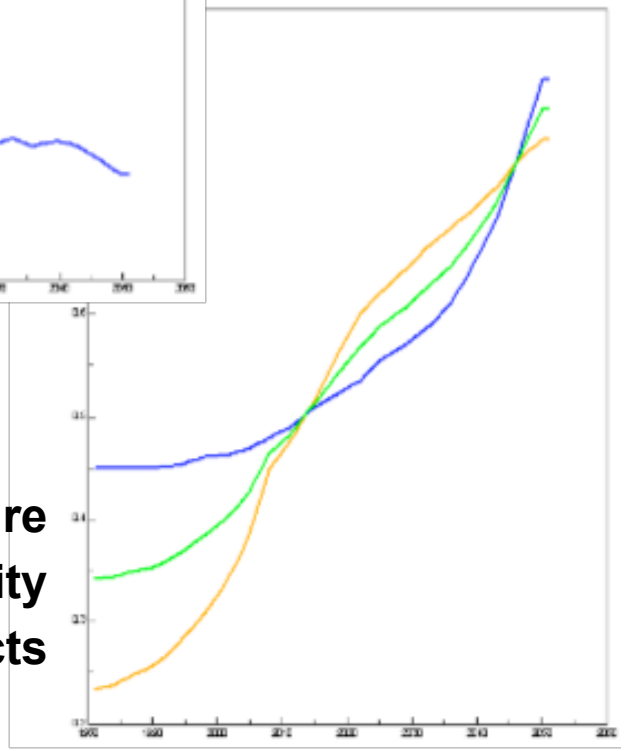
Expert knowledge elicitation for participatory

Creative System Modelling 9/9

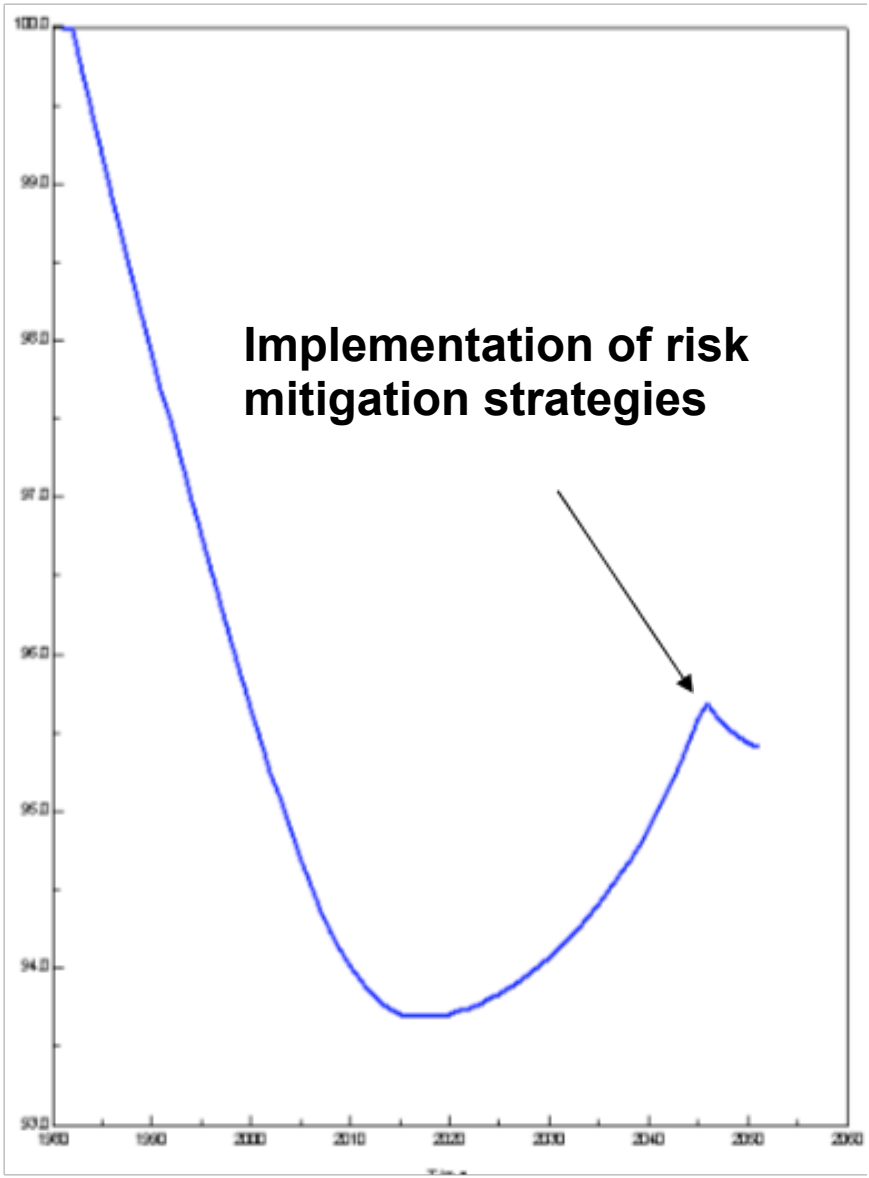
elling



Resilience
Coping capacity
Adaptive capacity



Exposure
Sensitivity
Potential impacts



Vulnerabiit
y

Future research plans

- Experimental design for participatory modelling of CC vulnerability and adaptation strategies:

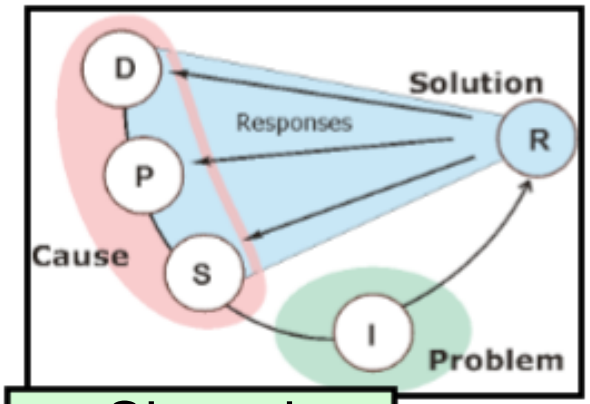
1. Single expert curves supported by literature references and data bases (deterministic)
2. Multiple experts curves for uncertainty analysis (stochastic)
3. Partial/complete substitution of empirical curves with model outputs

- Dynamic Multi-Criteria Analysis of alternative strategies

1. …

Decision Support 1/2

Local Experts



Sub-domains & indicators

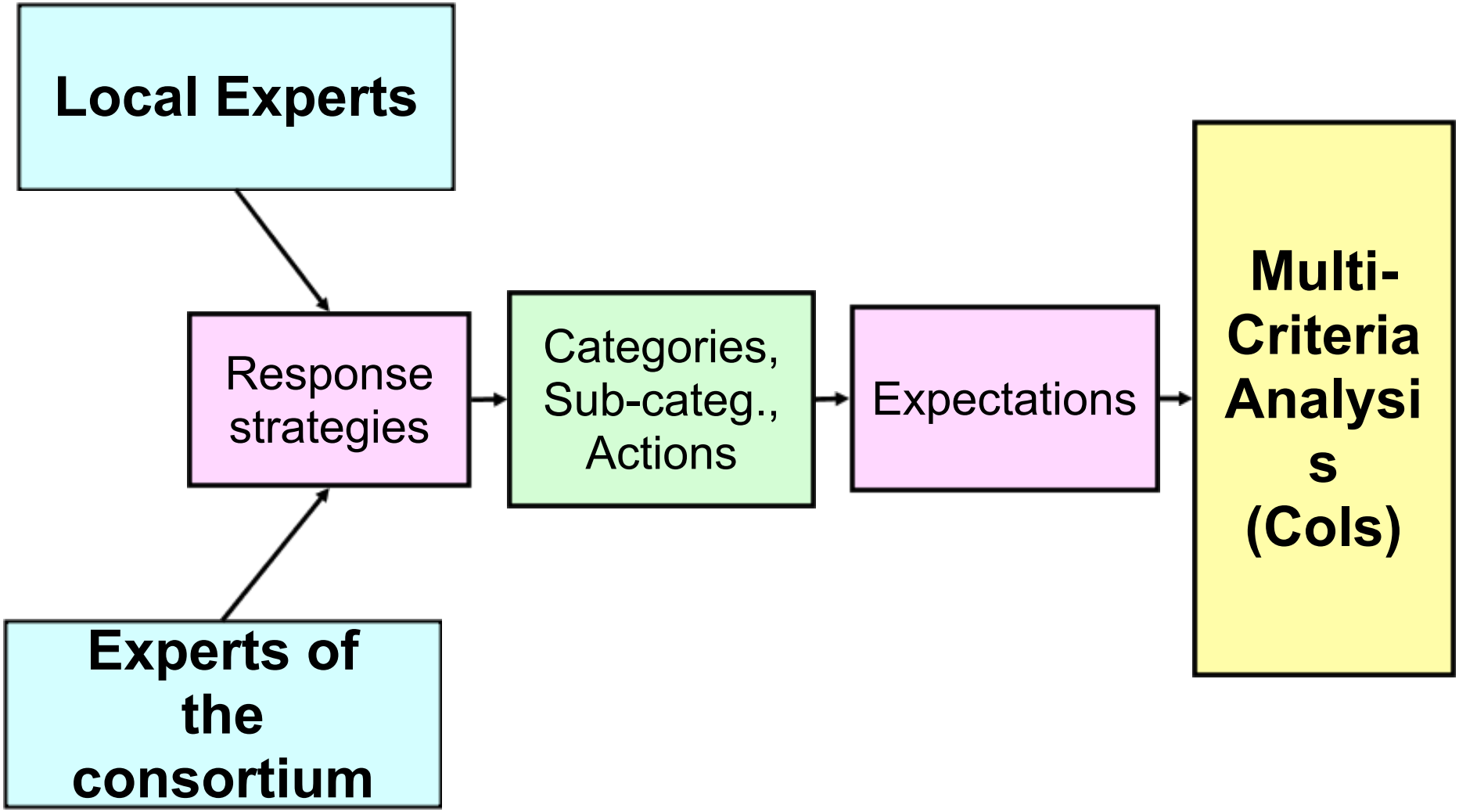
Shared understanding and metrics

Selected criteria

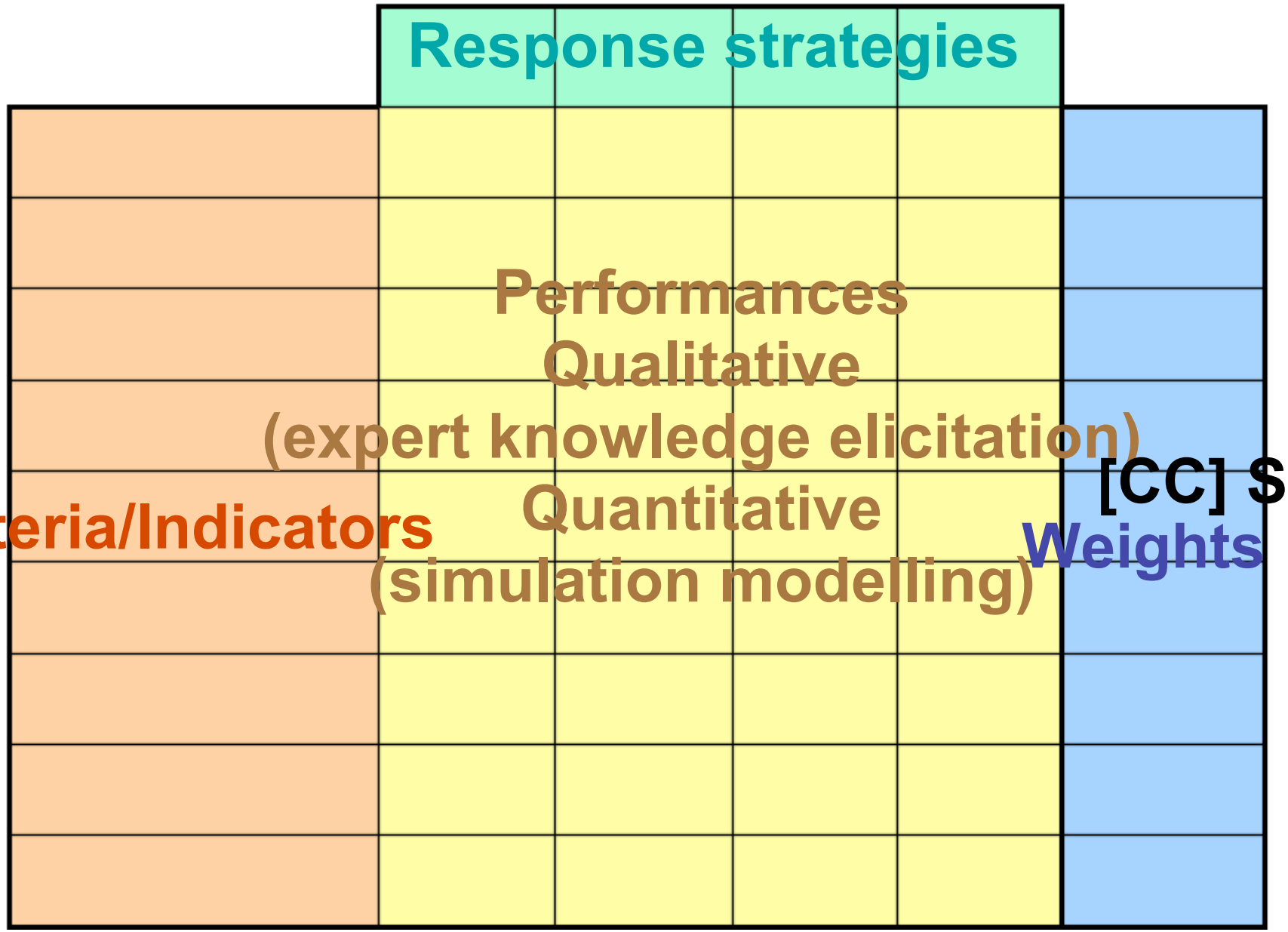
Multi-Criteria Analysis (Rows)

Experts of the consortium

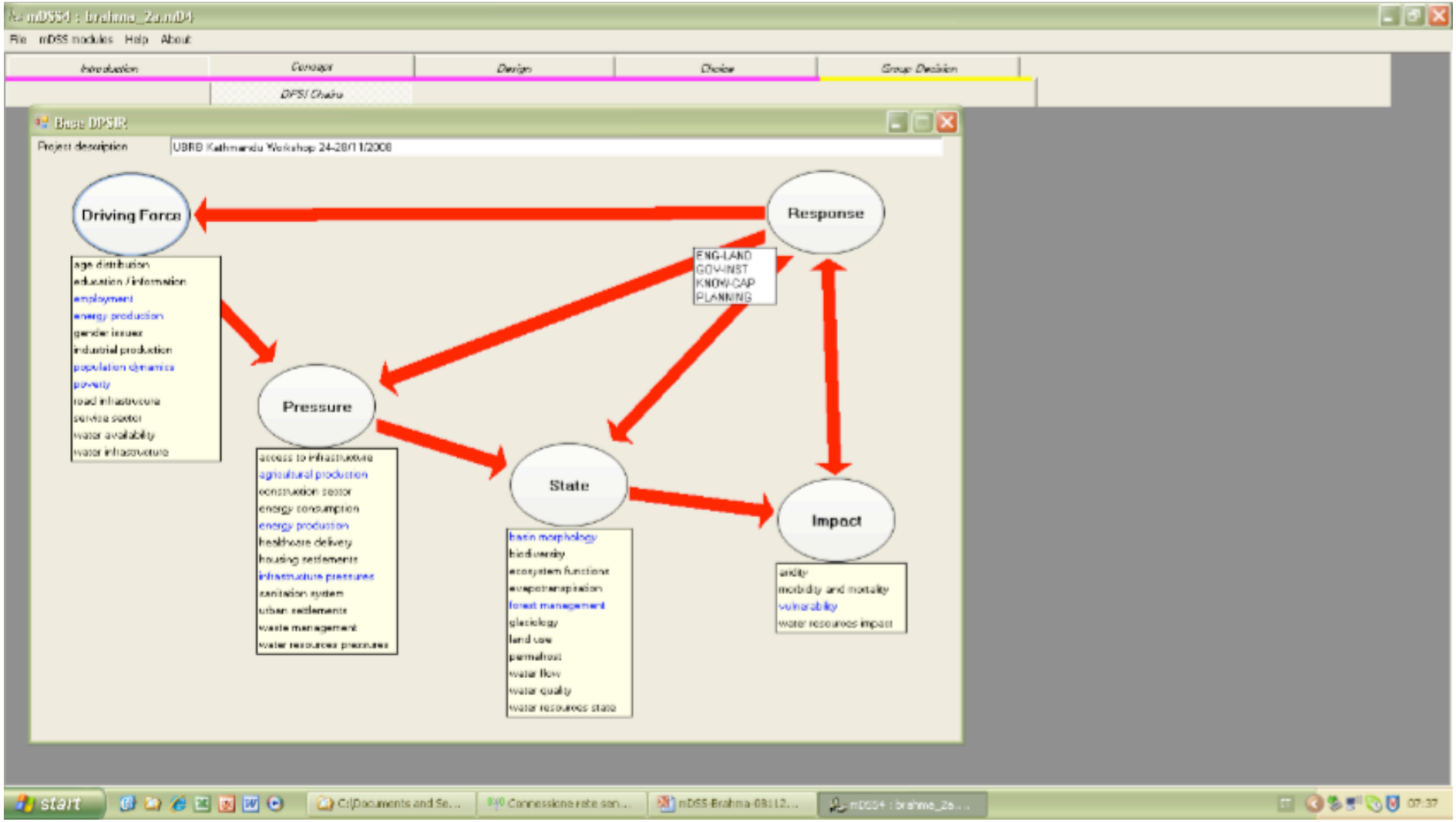
Decision Support 2/2



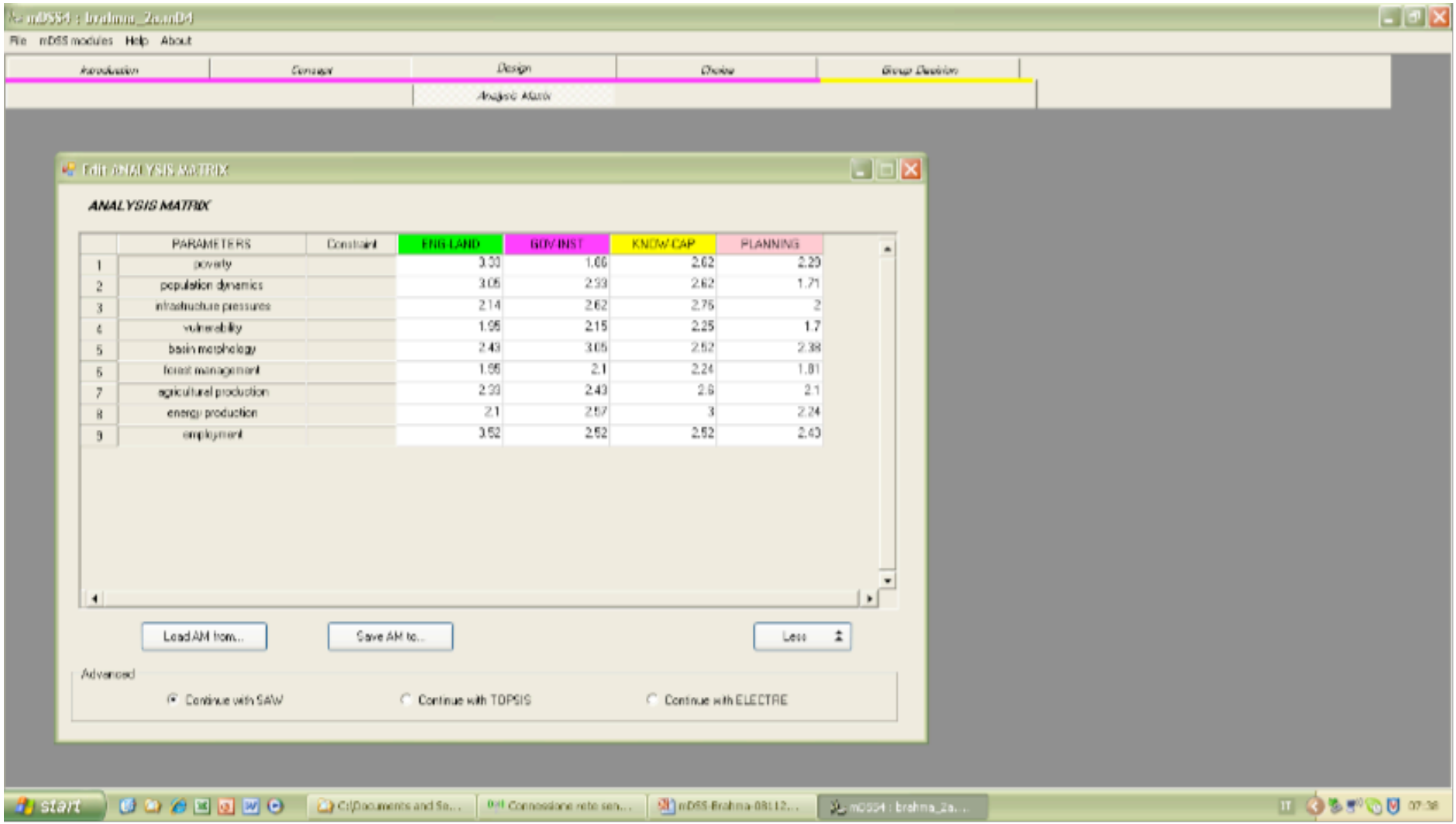
Responses, criteria, performances, weights, scenarios



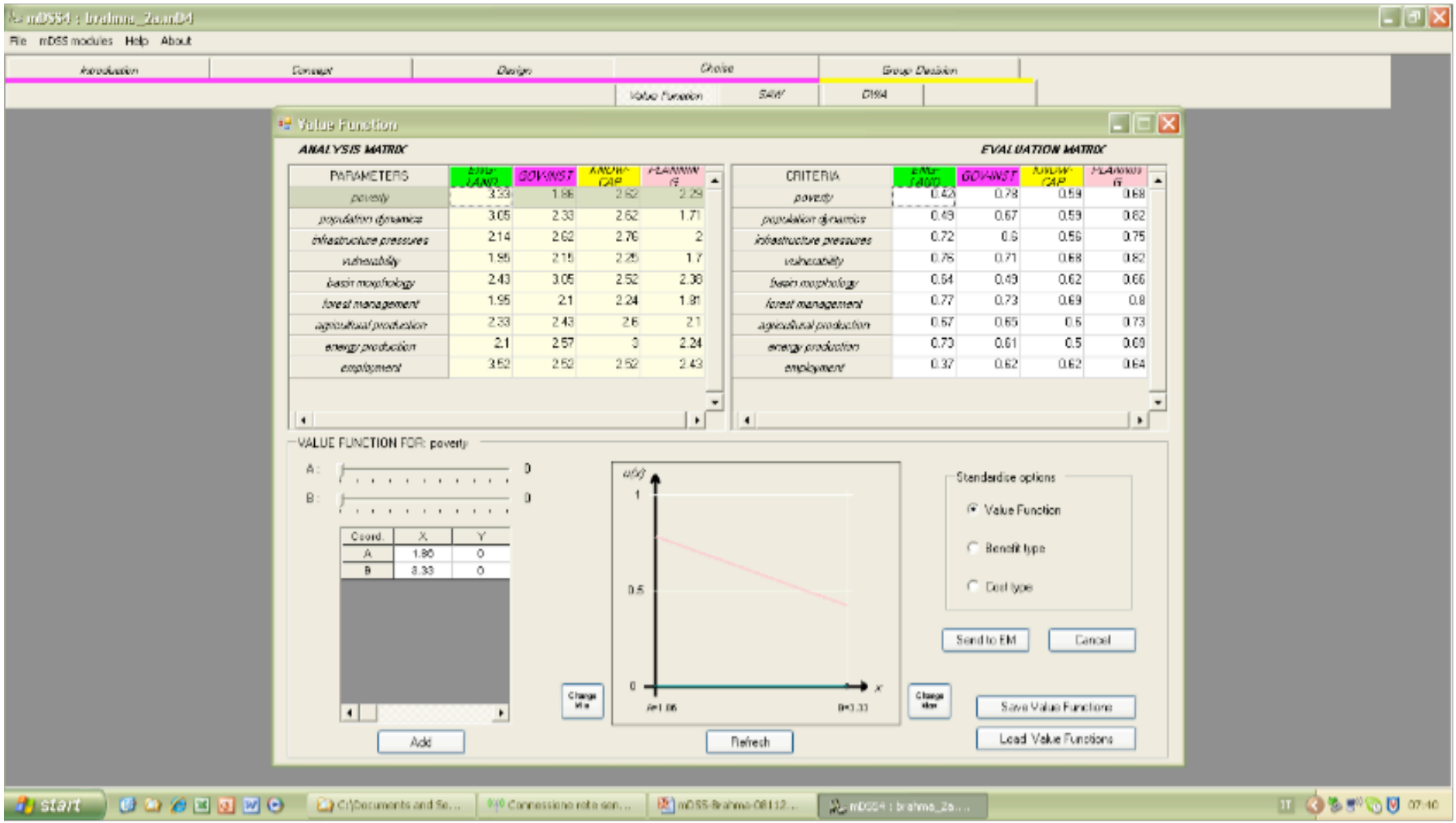
Dpsir framework: selection of criteria (sub-domains)



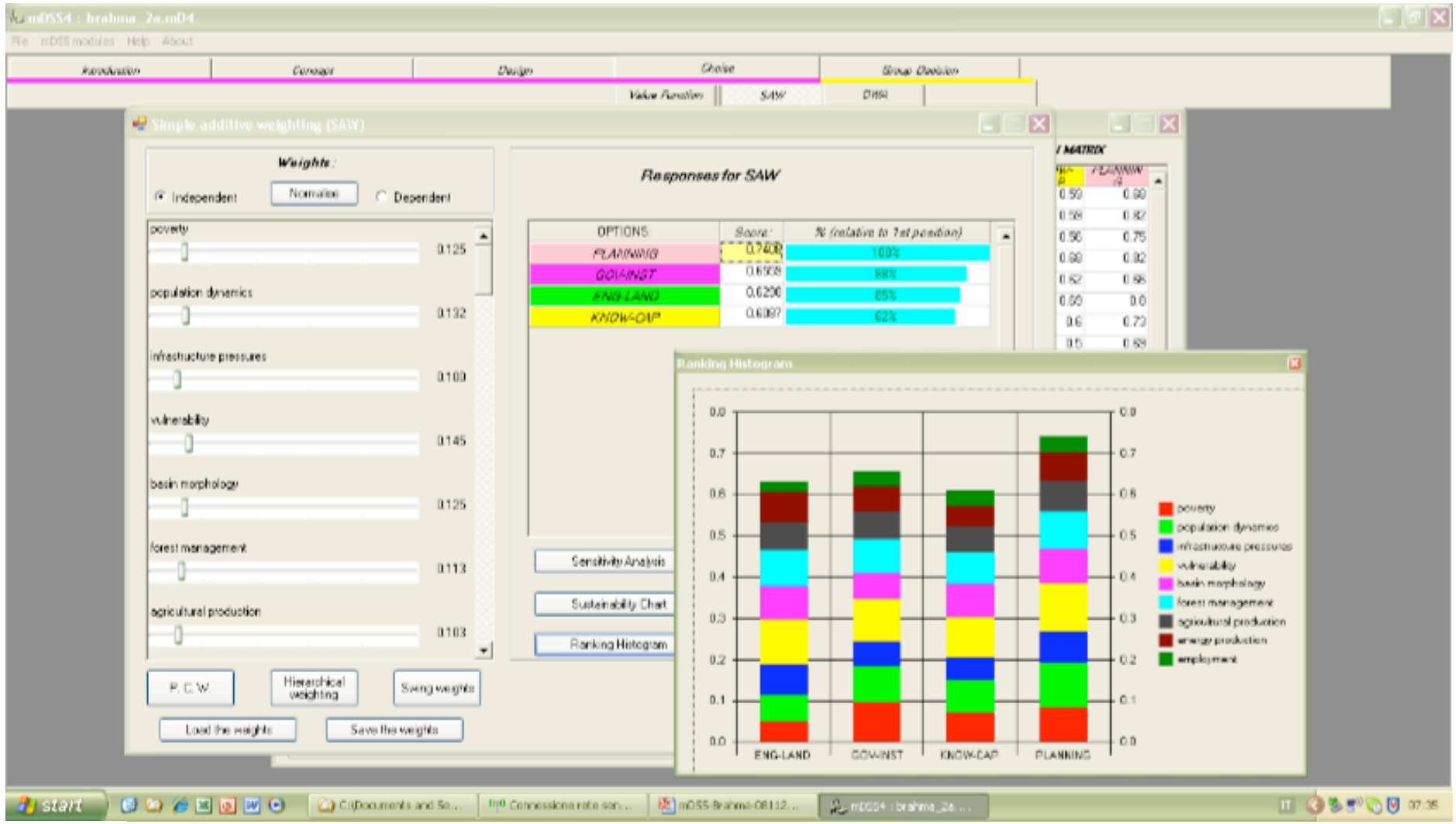
Analysis matrix



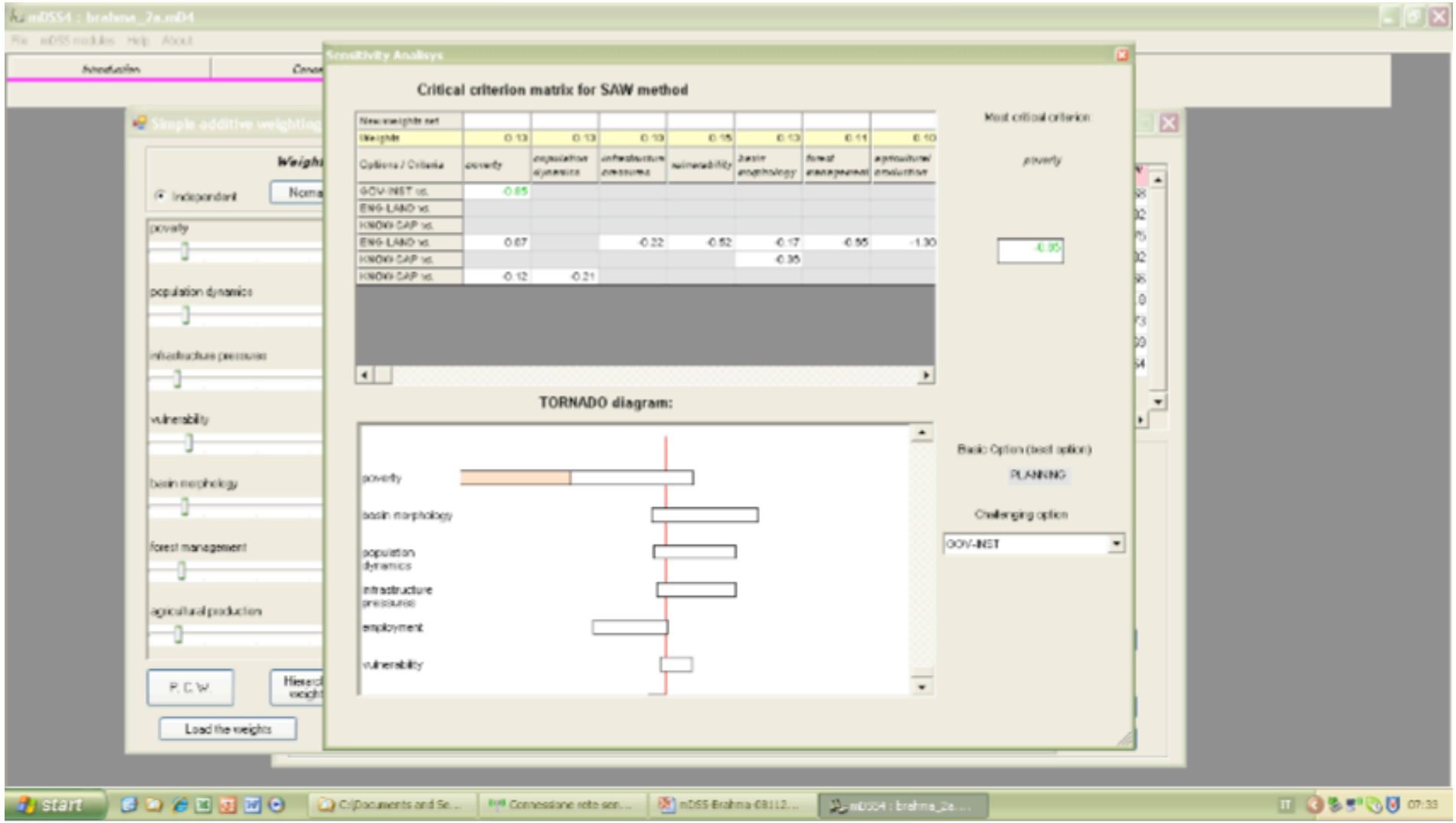
Normalization



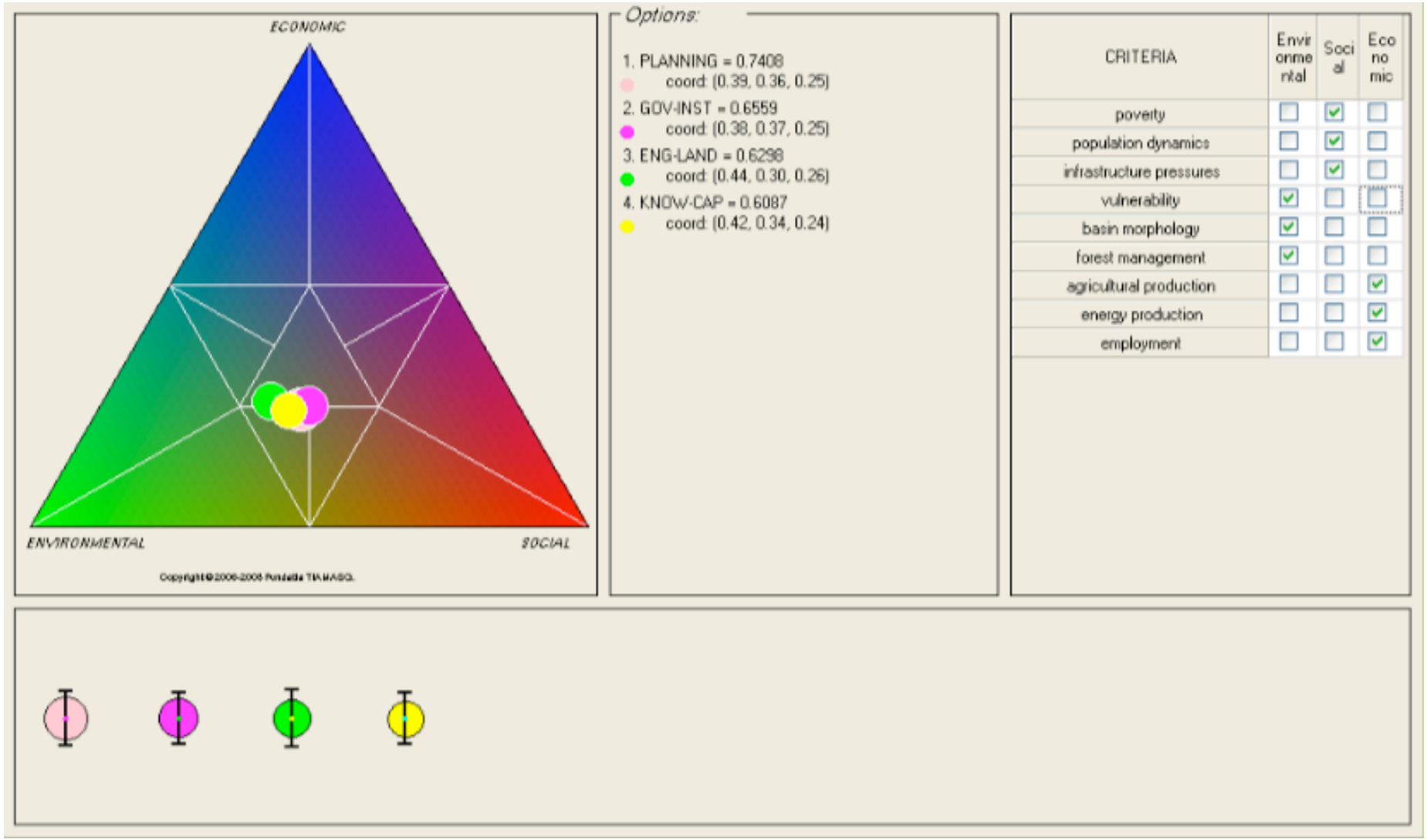
Ranking of strategies



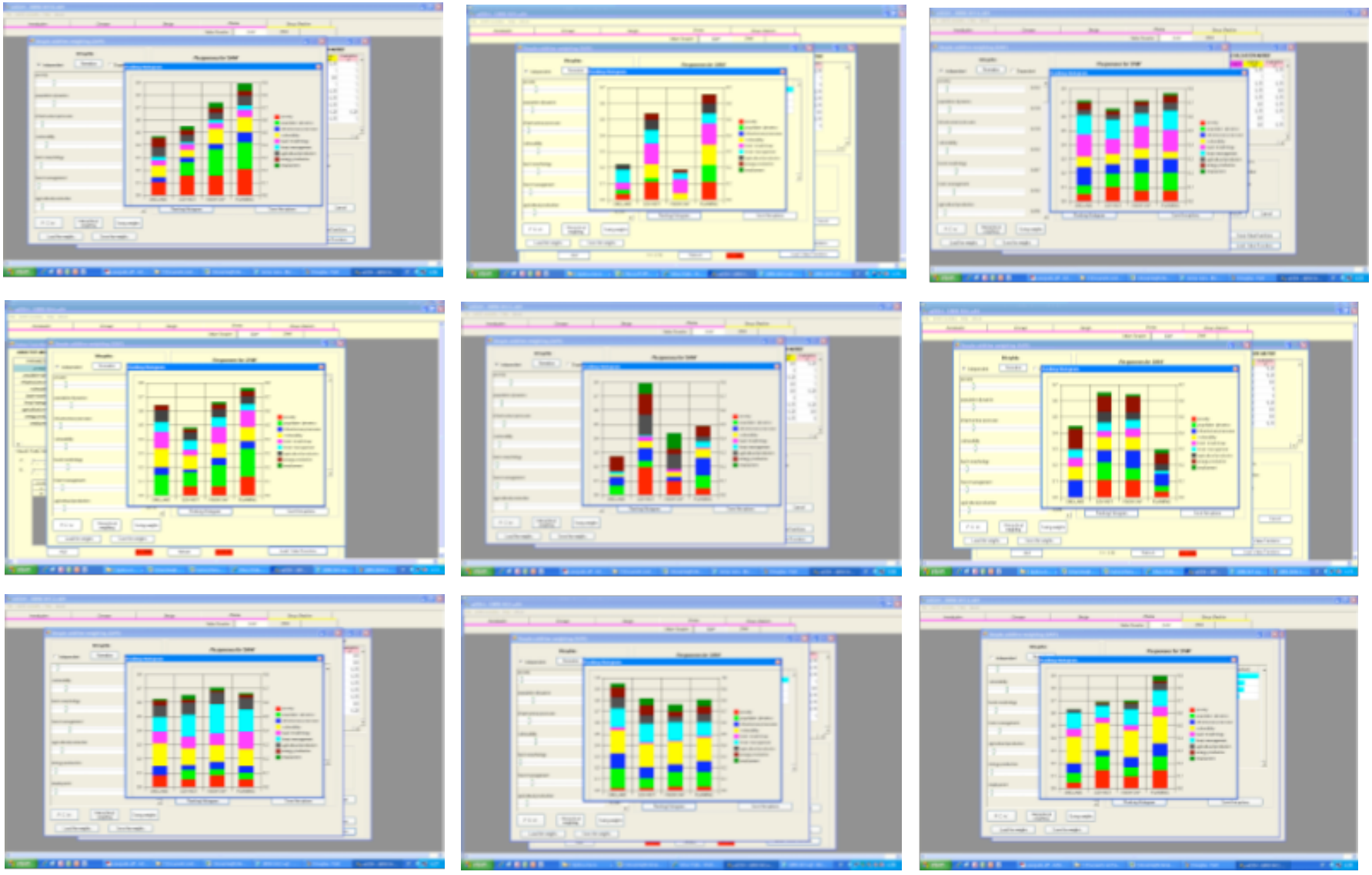
Sensitivity analysis



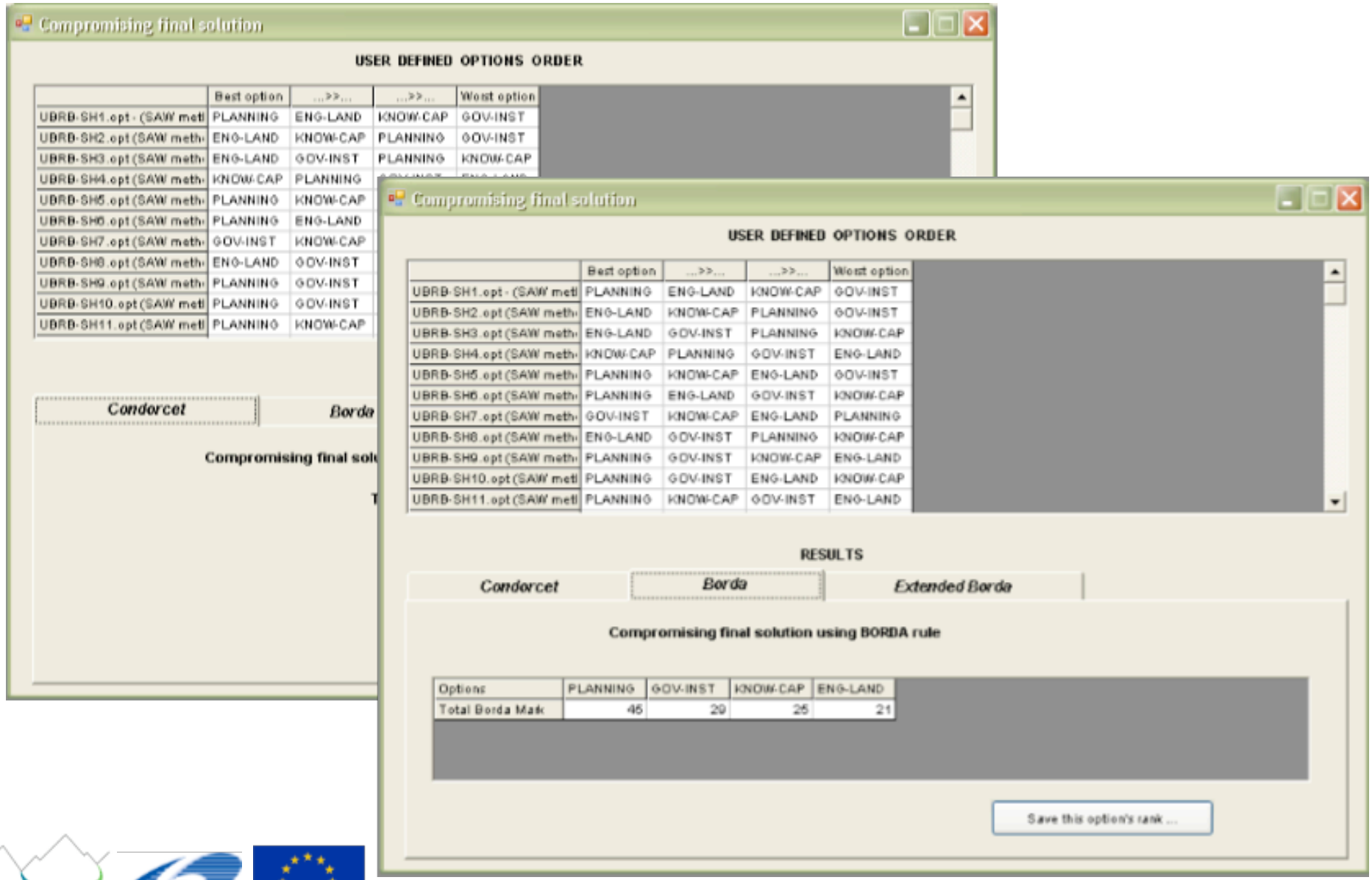
Sustainability analysis



Diversity of preferences



Group decision making



Lessons learned

- The combination of **qualitative models developed by stakeholders** and more **complex simulation models** within the same conceptual and decision framework may contribute to the uptake of research products by the competent administrations and thus to the **quality of decision/policy making process;**
- **Models and DSS** tools should be seen as the **ICT component** of a structured, modular and flexible approach for supporting decision **processes**, with a fundamental role played by a trained **task force** including **facilitators of PP;**
- **Training and capacity building** activities carefully embedded in the **local institutional and social contexts** are needed for effective implementations given the system complexity, the number of tools,…;