The potential of OTSM and Classical TRIZ as a framework method for modern regional, integrated energy planning and modeling

The Fifth TRIZ Symposium

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Overview of Presentation

- Regional Integrated Energy Planning
- OTSM-TRIZ & sustainable development
- The mission of OTSM-TRIZ for RIEP
  & some using instruments
- Modeling
- Implementation and some results
- OTSM-TRIZ & MCDA
- Conclusion

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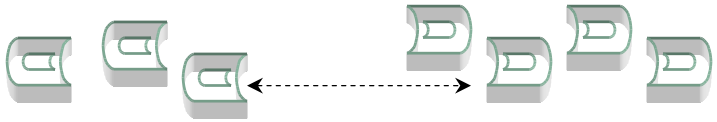
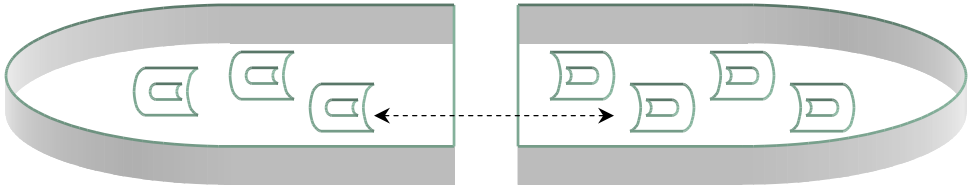
Energy and environment related planning
Different levels of focus

Technological subsystem planning

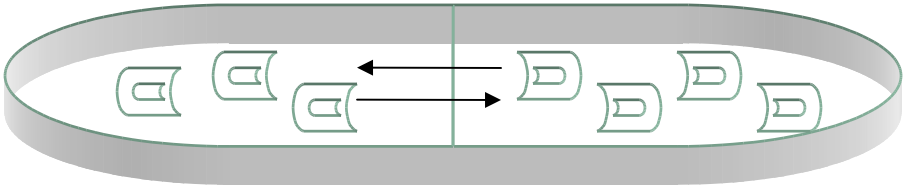
Certain sectoral planning



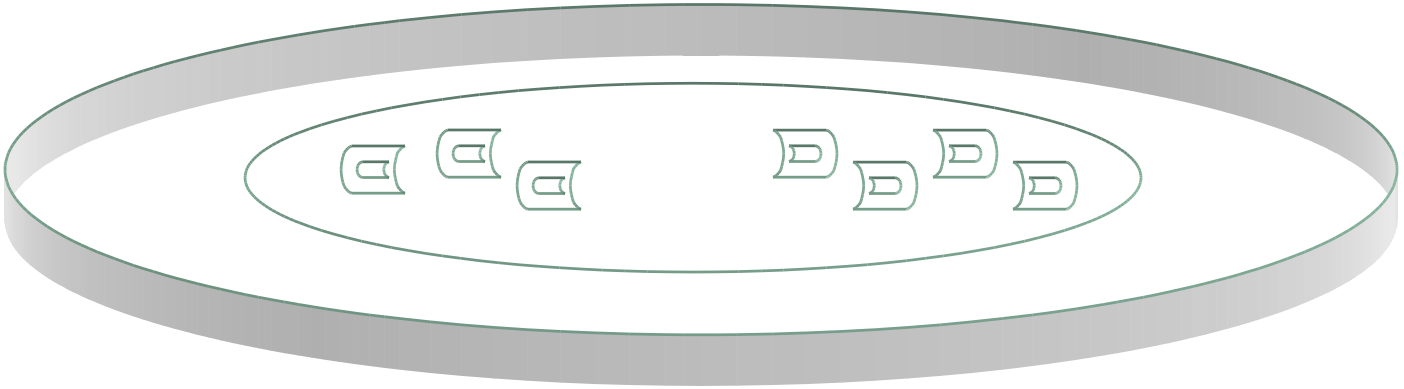
Demand or supply side planning



Integrated energy planning



Regional metabolism



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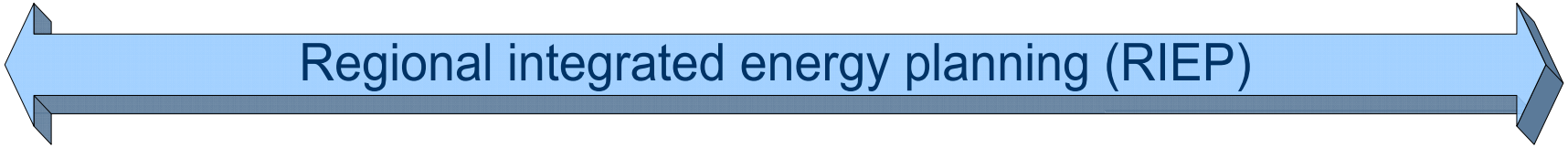
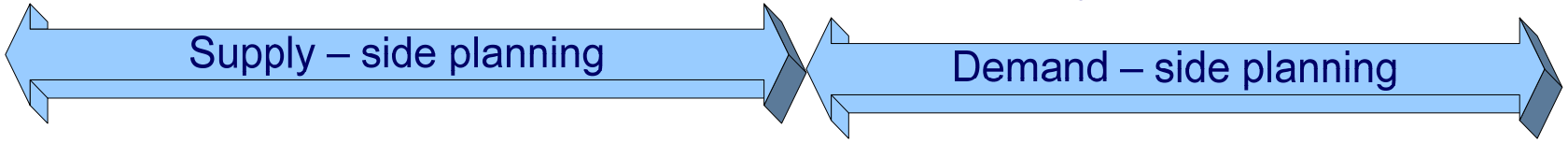
Regional integrated energy planning (RIEP)

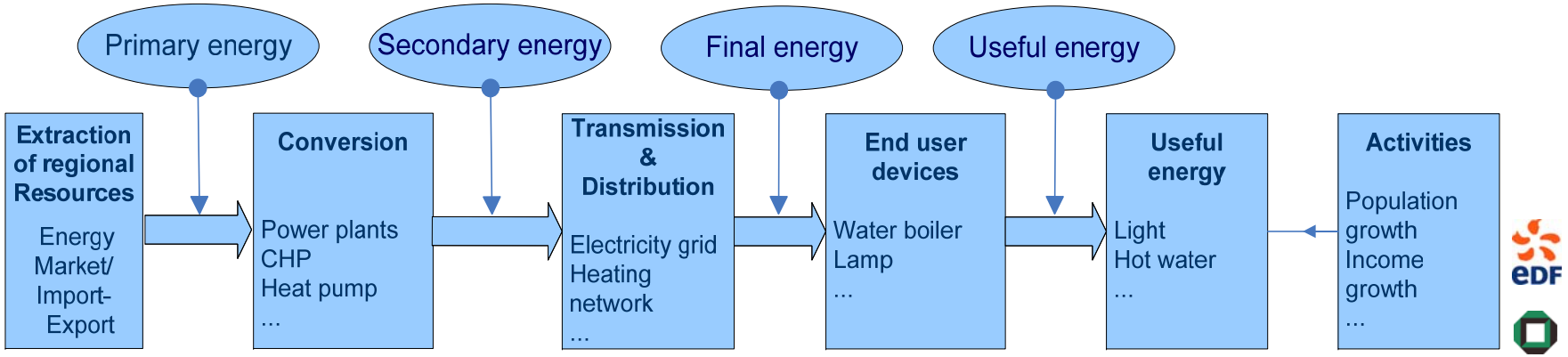


Regional integrated energy planning is a concept to find environmentally friendly, technical reliable institutionaly sound, socially acceptable and cost-effective solutions to the best mix of energy supply and demand options for a defined region in order to support long-term regional sustainable development.

It provides an opportunity

- for energy planners to present complex, uncertain issues in a structured, holistic and transparent way
- for interested parties to review, understand and provide input to planning decisions.





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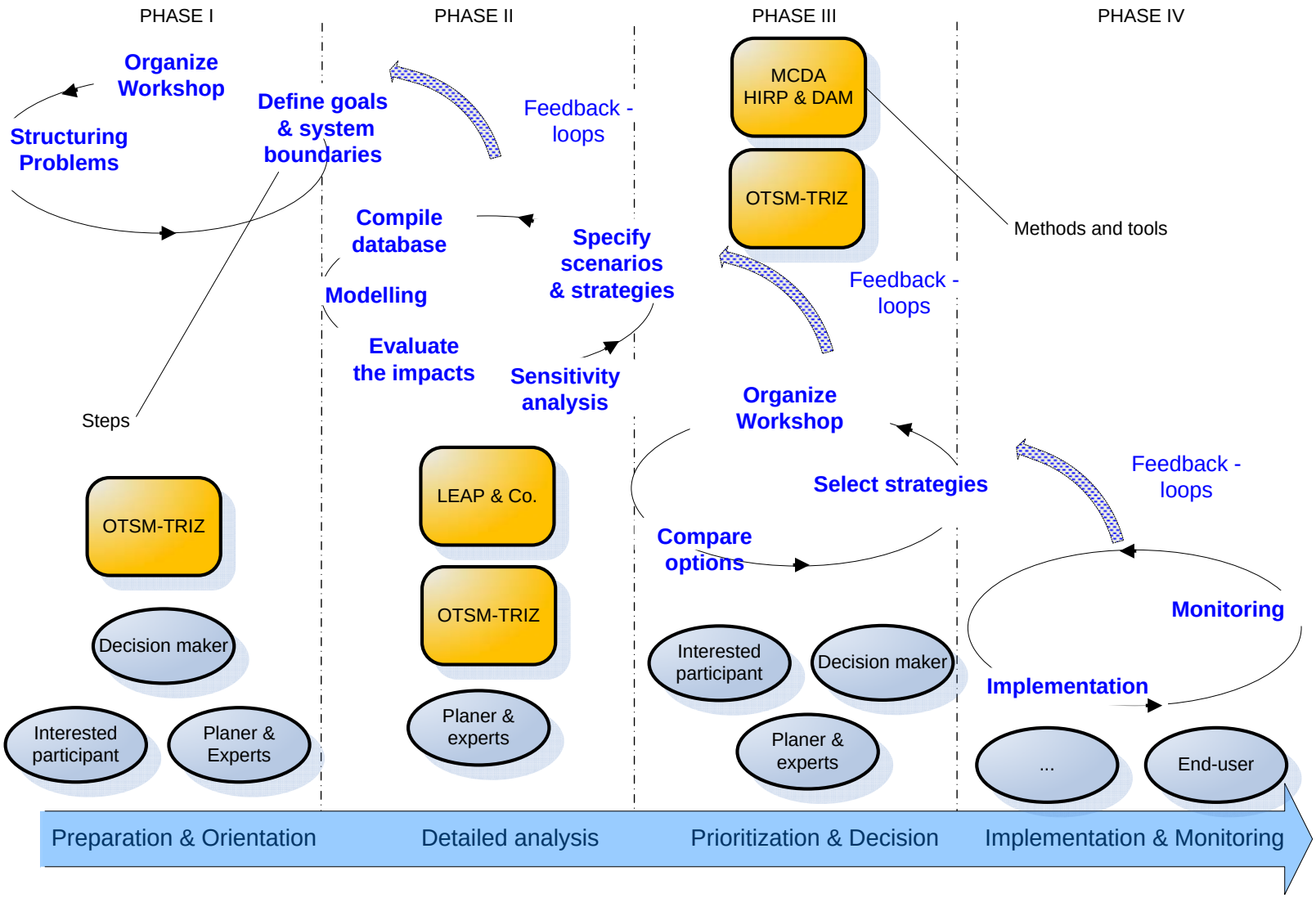
General overview of RIEP procedures



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OTSM and Classical TRIZ provide practical tools for general ideas on sustainable development

OTSM-TRIZ Tools :

- TRIZ law of ideality
- Altshuller‘s Schema of Powerful Thinking.
- OTSM Problem flow Networks approach and ARIZ or „Tongs“ model.
- Negative System technique and Law of completeness of an engineering system
- OTSM express Analysis of initial situation.

Sutainable development

E. g.

- A development which takes into account future needs of coming generation or
- “Think globally, Act locally”

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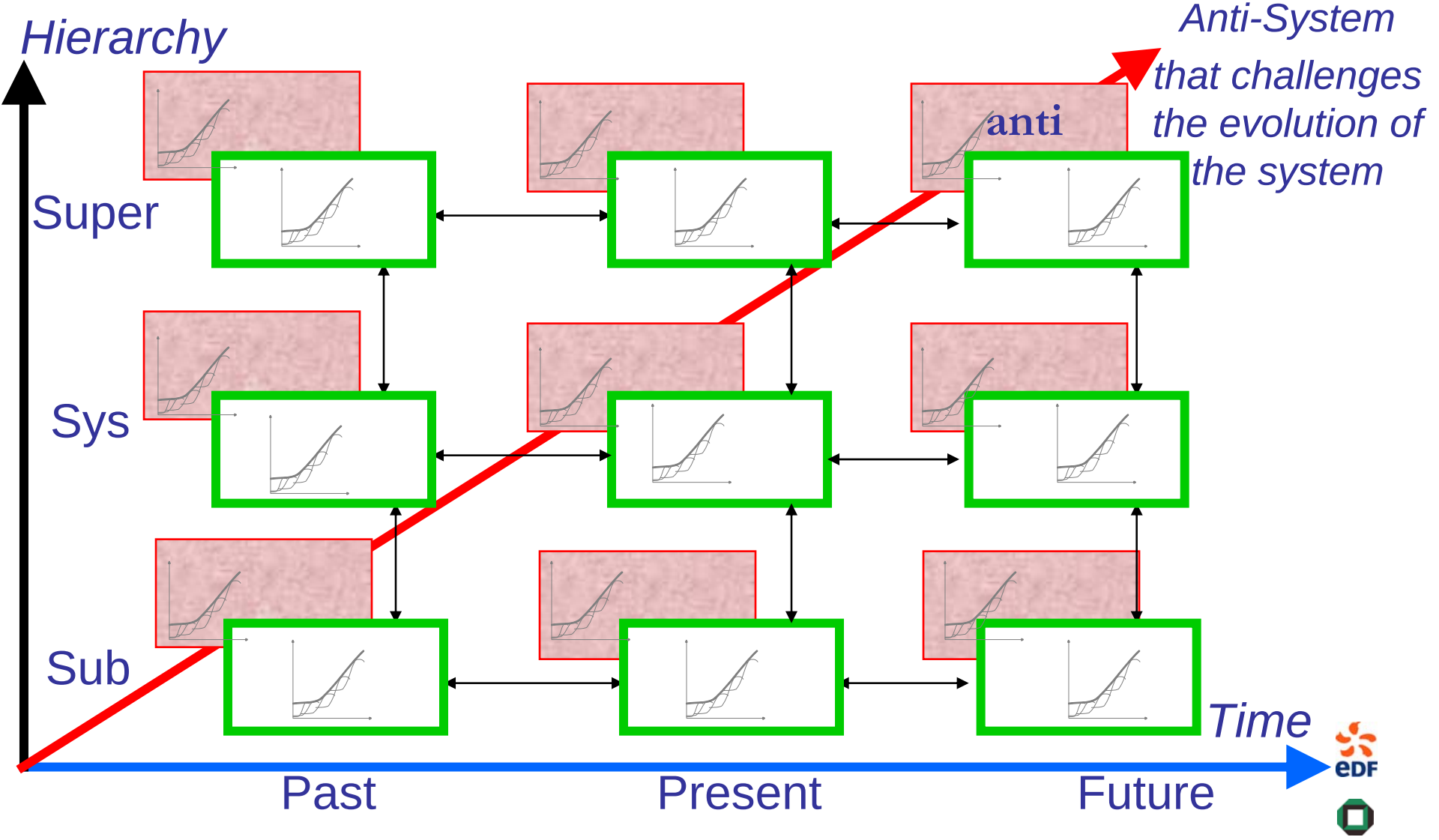
Classical TRIZ: Scheme of Powerful Thinking



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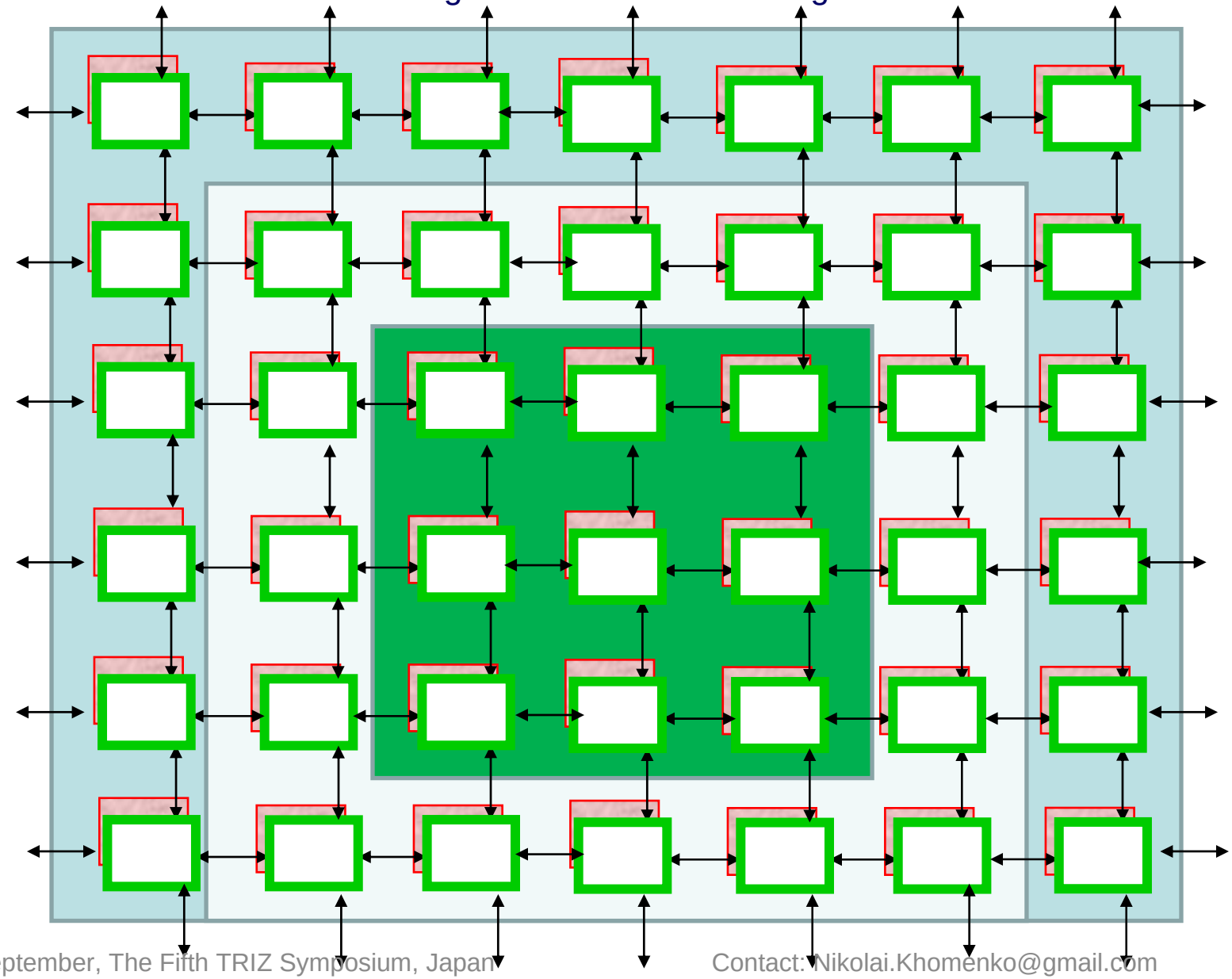
Altshuller's Scheme of Powerful Thinking – infinity.

(Classical ARIZ and OTSM Problem Flow Networks (PFN) approach are tools to manage the schema of thinking.



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The mission for OTSM-TRIZ for RIEP

- Clearly identify and study the object of planning.
- Support for transition form reality to Master model and then to Formal model.
- System integrator for all planning tools in order to develop partial solutions and converge them into satisfactory solution.
- Provide planning process efficiently in order to obtain convention among stakeholders of the planning process.
- Support learning process.

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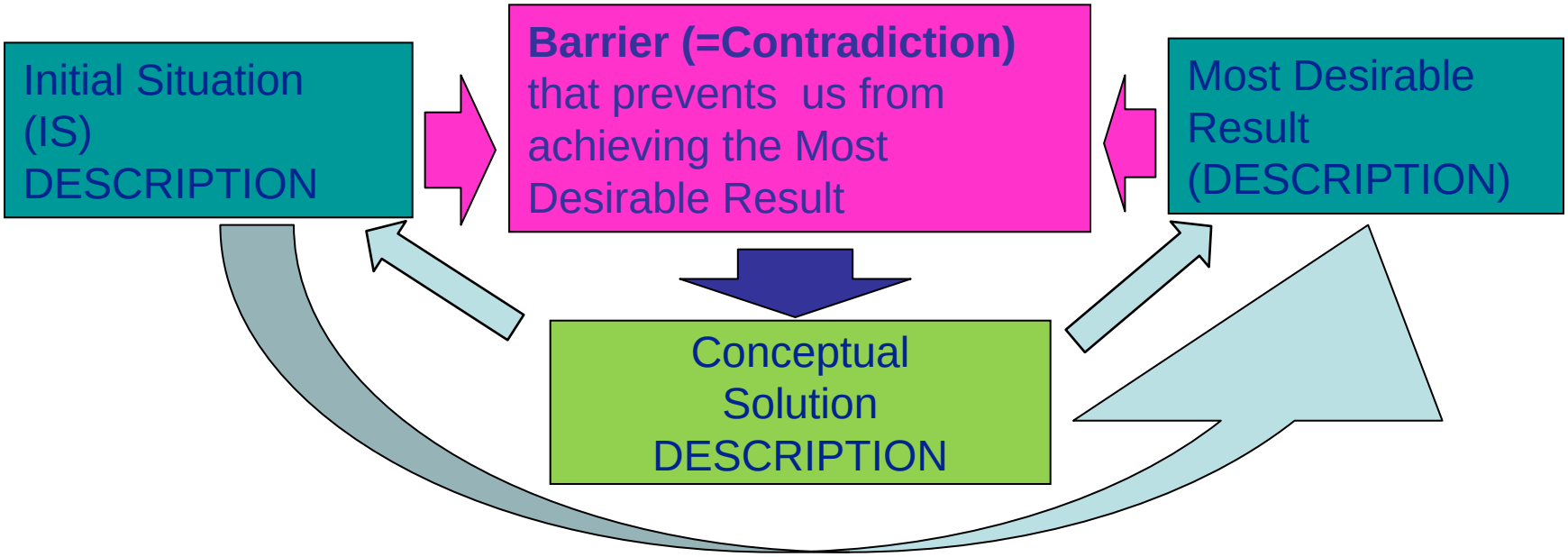
“Tongs” Model of the Problem Solving Process



A specific barrier that we should overcome is the root of a specific problem.
The root of the barrier is a hidden CONTRADICTION.
The deepest root of all contradictions is a conflict between
Natural processes and Human desire.
Therefore, solving problem is harmonization of Human-Nature relations.
As a result we can obtain Sustainable Development.

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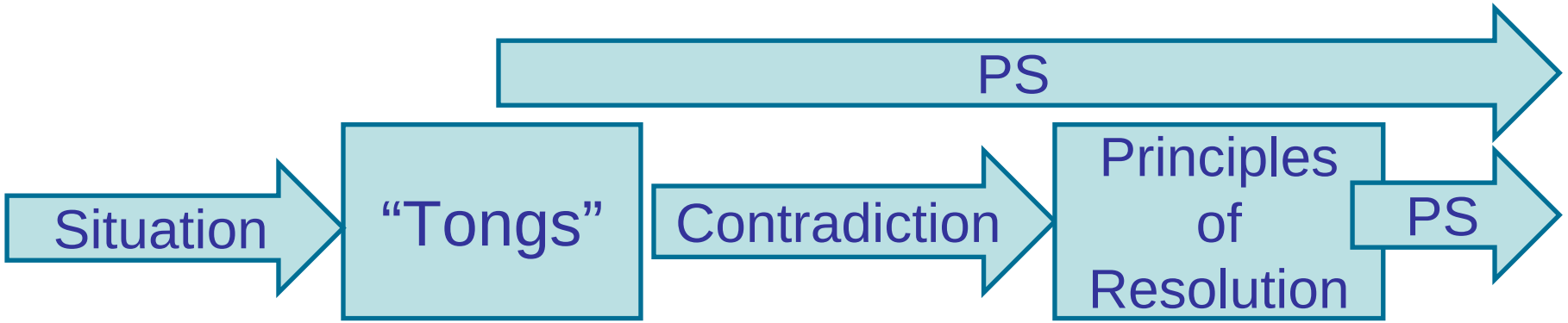
“Tongs” model in the case study



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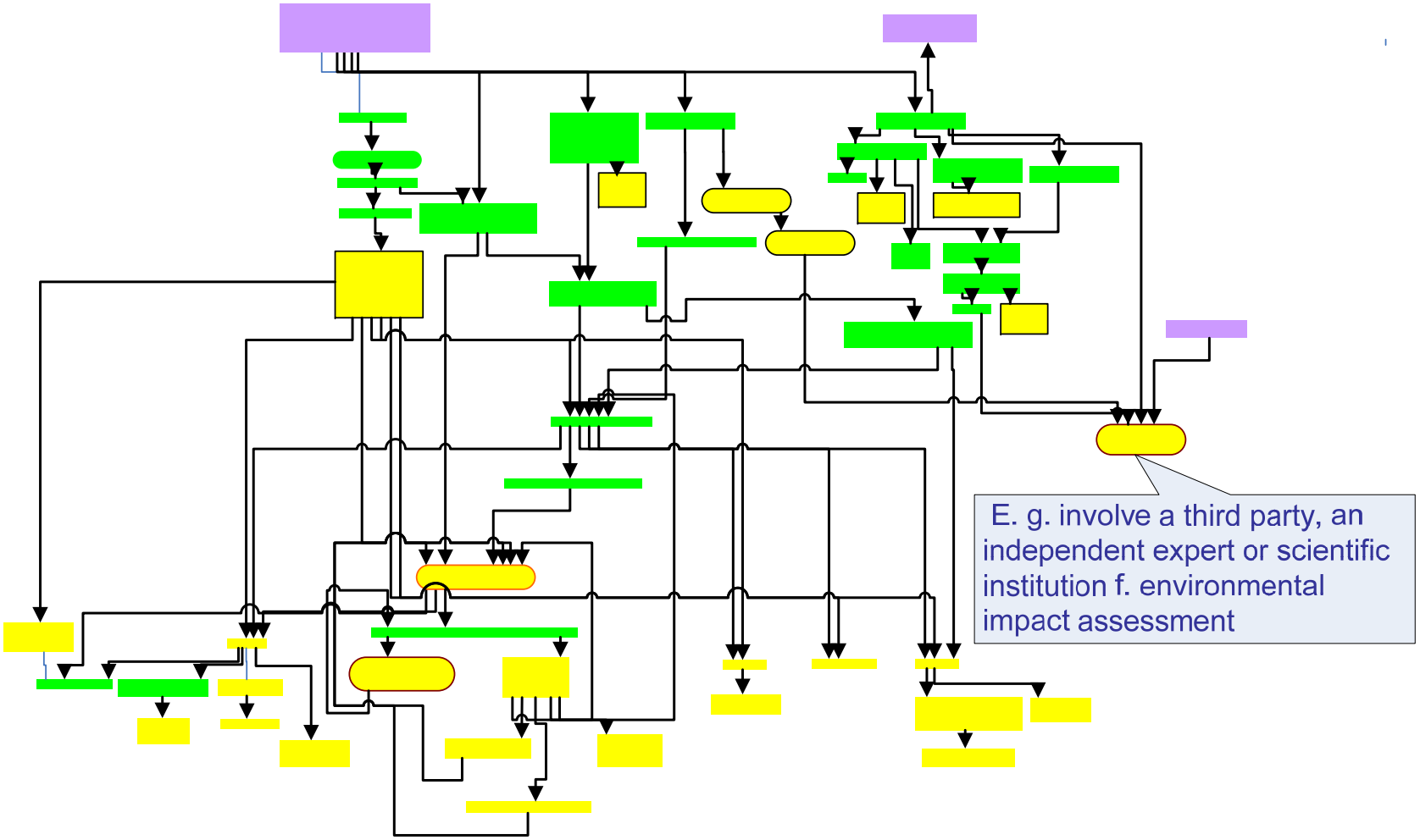
A fragment of Interdisciplinary "Network of Problems" using in the case study



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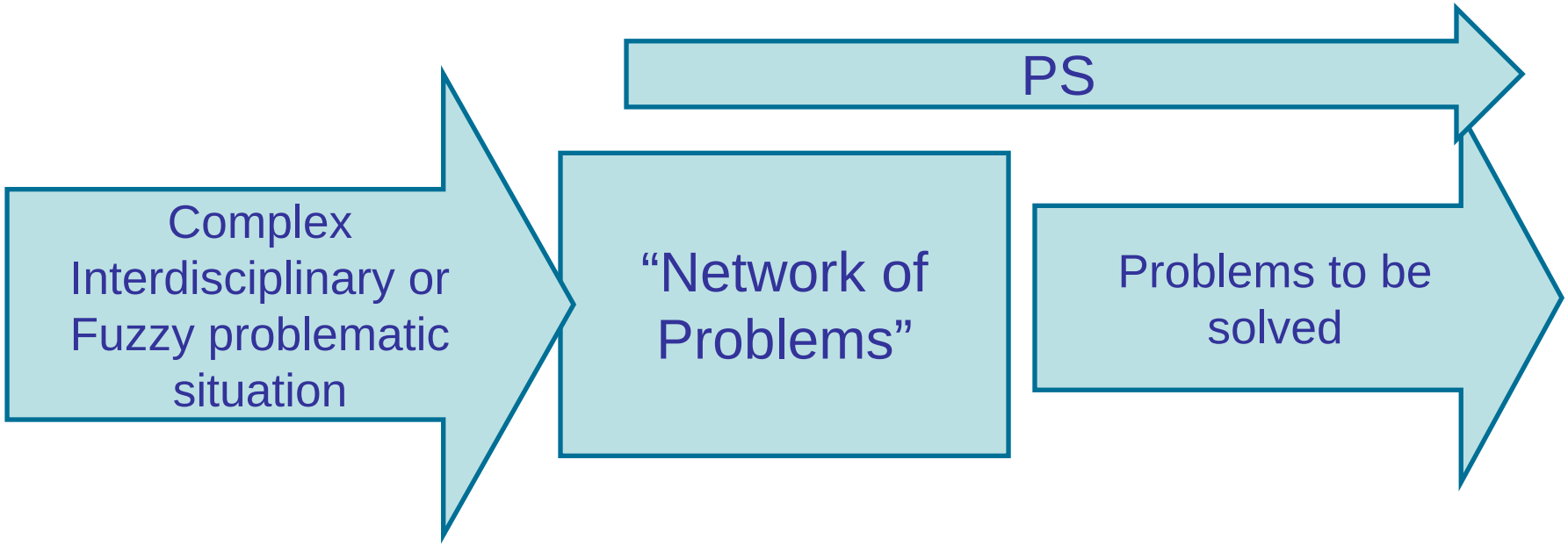
“Network of problems”



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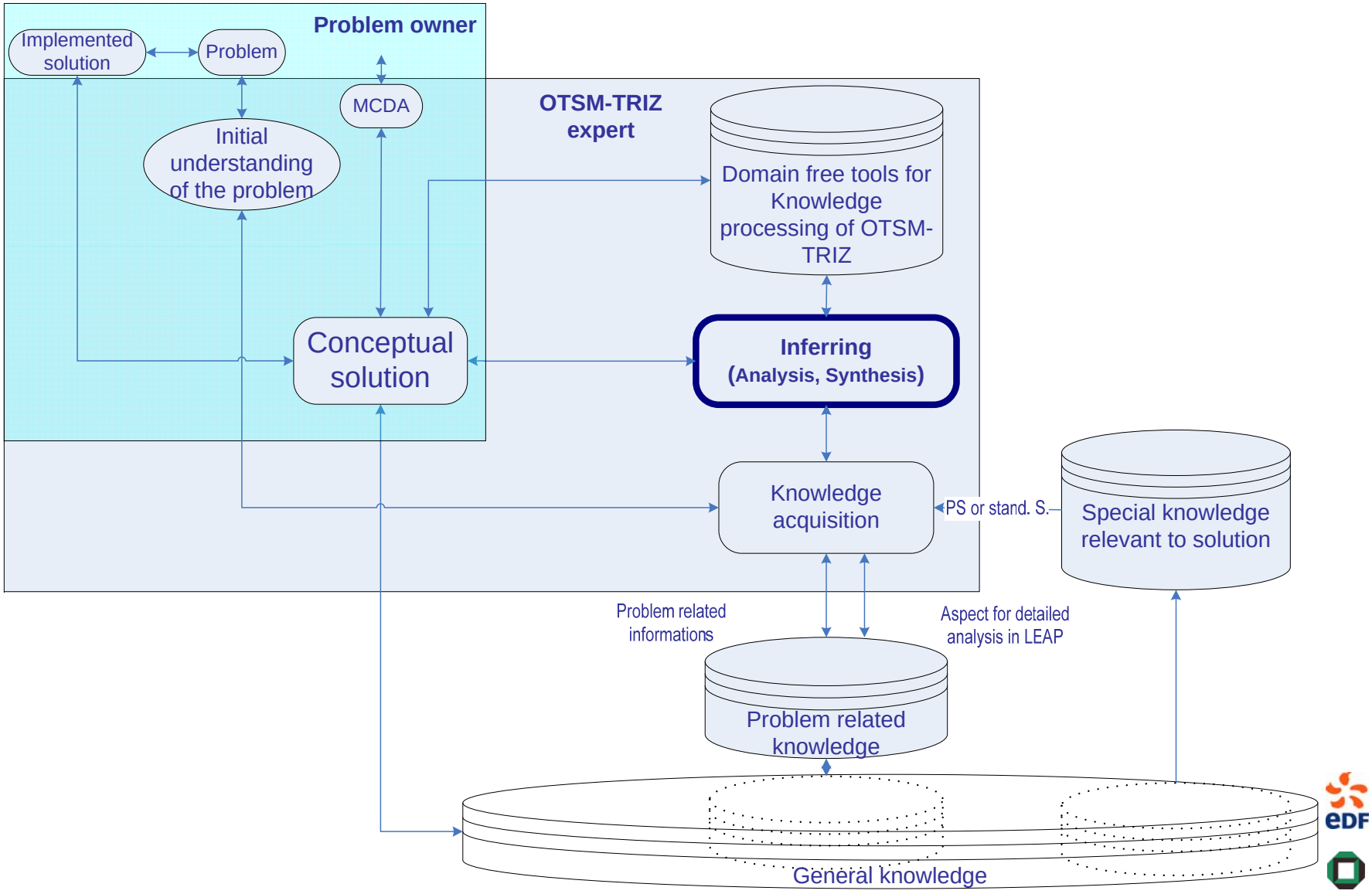
OTSM-TRIZ model of knowledge processing in RIEP



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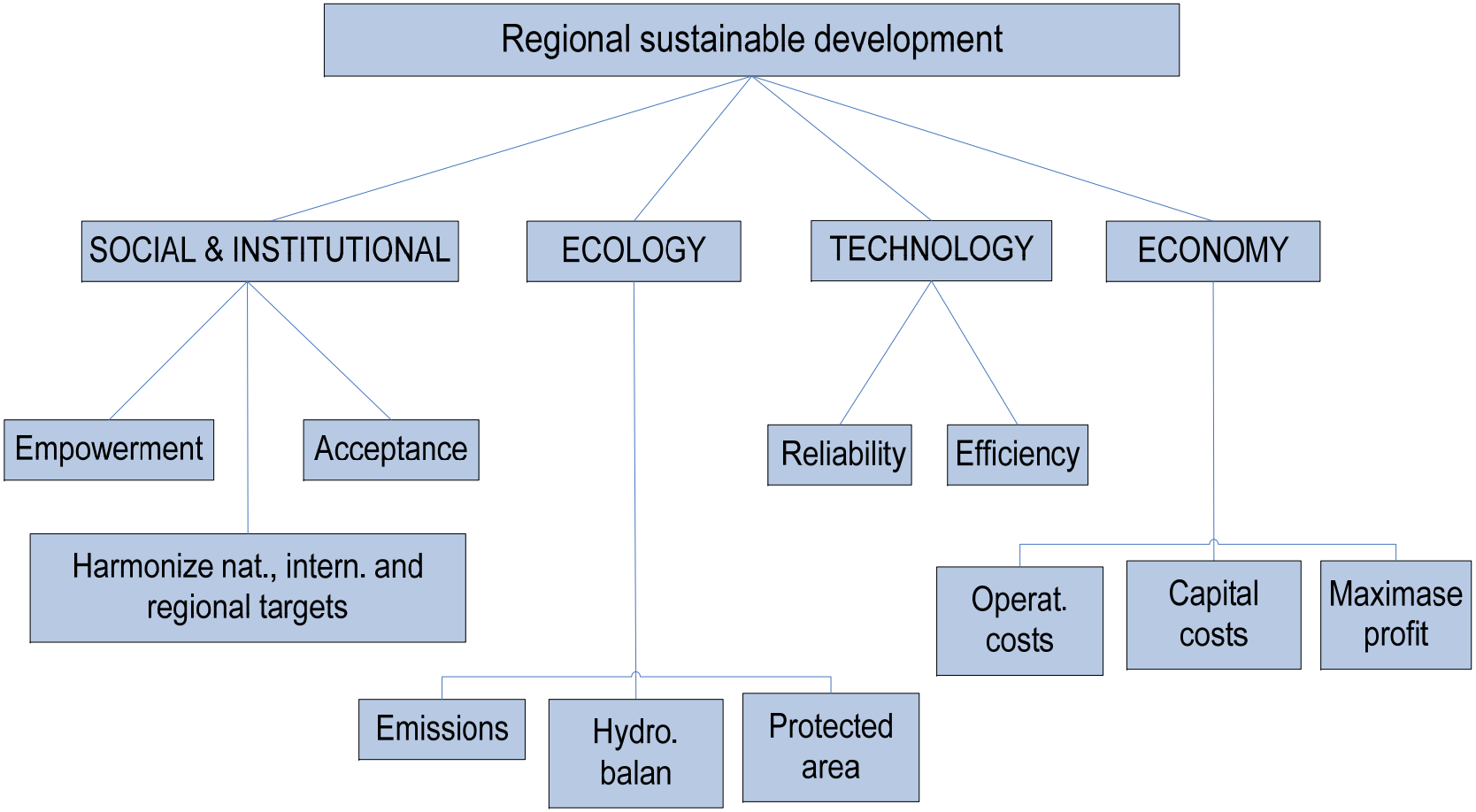
MDR: the set of evaluation or target parameters for a French region case study



The MDR was obtained as a result of complementary using "Tongs" model (Simplified Classical ARIZ) and OTSM Network of problems.

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Initial barriers or potential conflicts of some existing or proposed standard solution

Partial or potential solutions	Technical barrier	Environmental barrier	Economic barrier	Social, Institutional barrier	Schedule barrier
Increasing the use of existing hydropower production	X	X			X?
Construct new thermal power plants in east PACA	X	X?	X?		
Export		X		X	
Increase the installation of PV, wind or other DG			X	For wind X	X?
DSM measures, load management			X?	X	
…					

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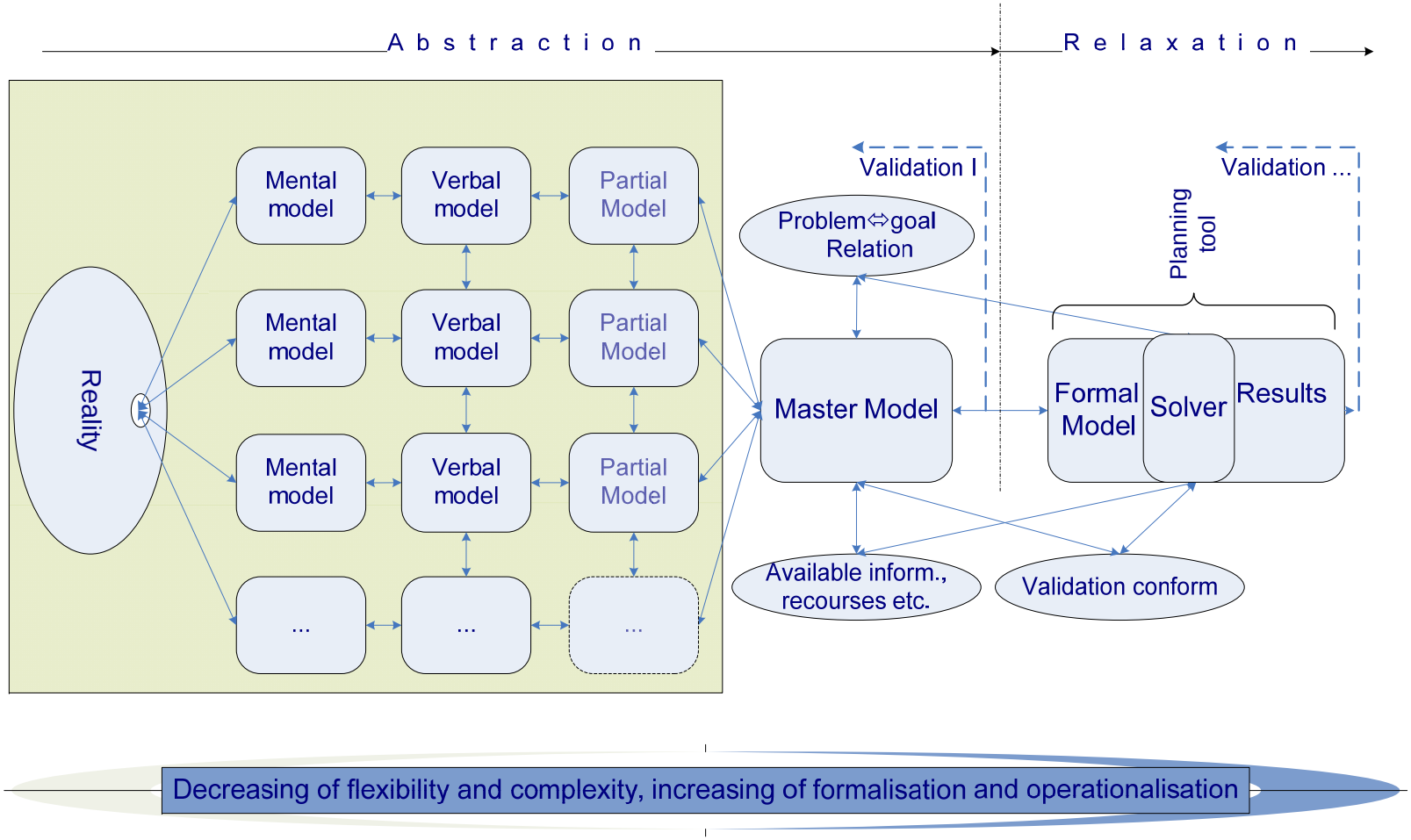
Model building steps in the integrated, interactive energy planning

(OTSM-TRIZ tools support transition from Reality to Master and formal models)



- The quality of future planning depends strongly on the quality of master model.
- If the master model was not done properly by using above all qualitative methods (e.g. OTSM-TRIZ) then using any analytical approaches in the planning instruments will lead to the results, which will be neither relevant nor helpful

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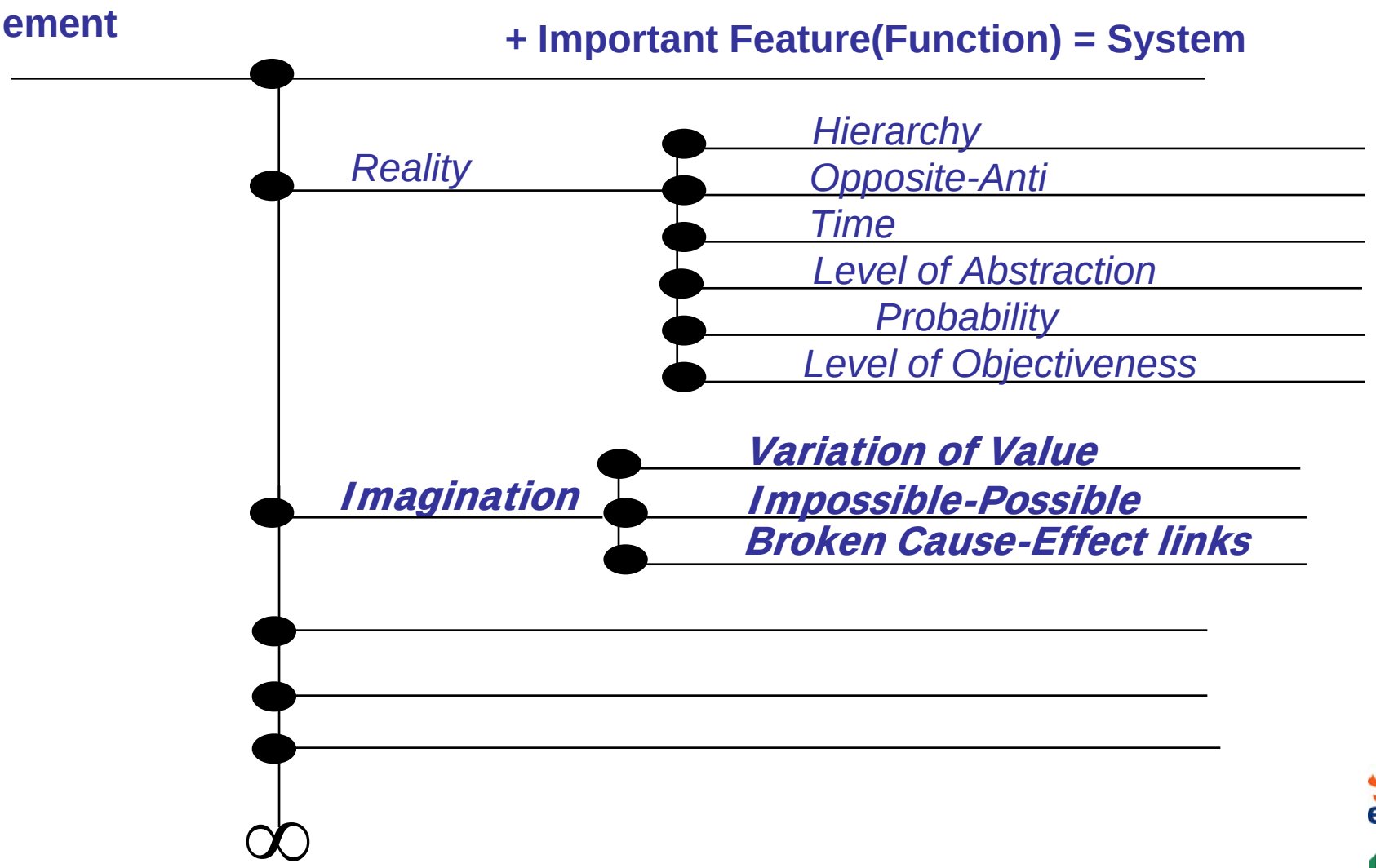
Advanced Schema of Powerful Thinking



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Design of the regional energy model
Scaling

- Time horizon, time resolution
- Geographical coverage
- Sectoral resolution
- Energy system resolution
- …

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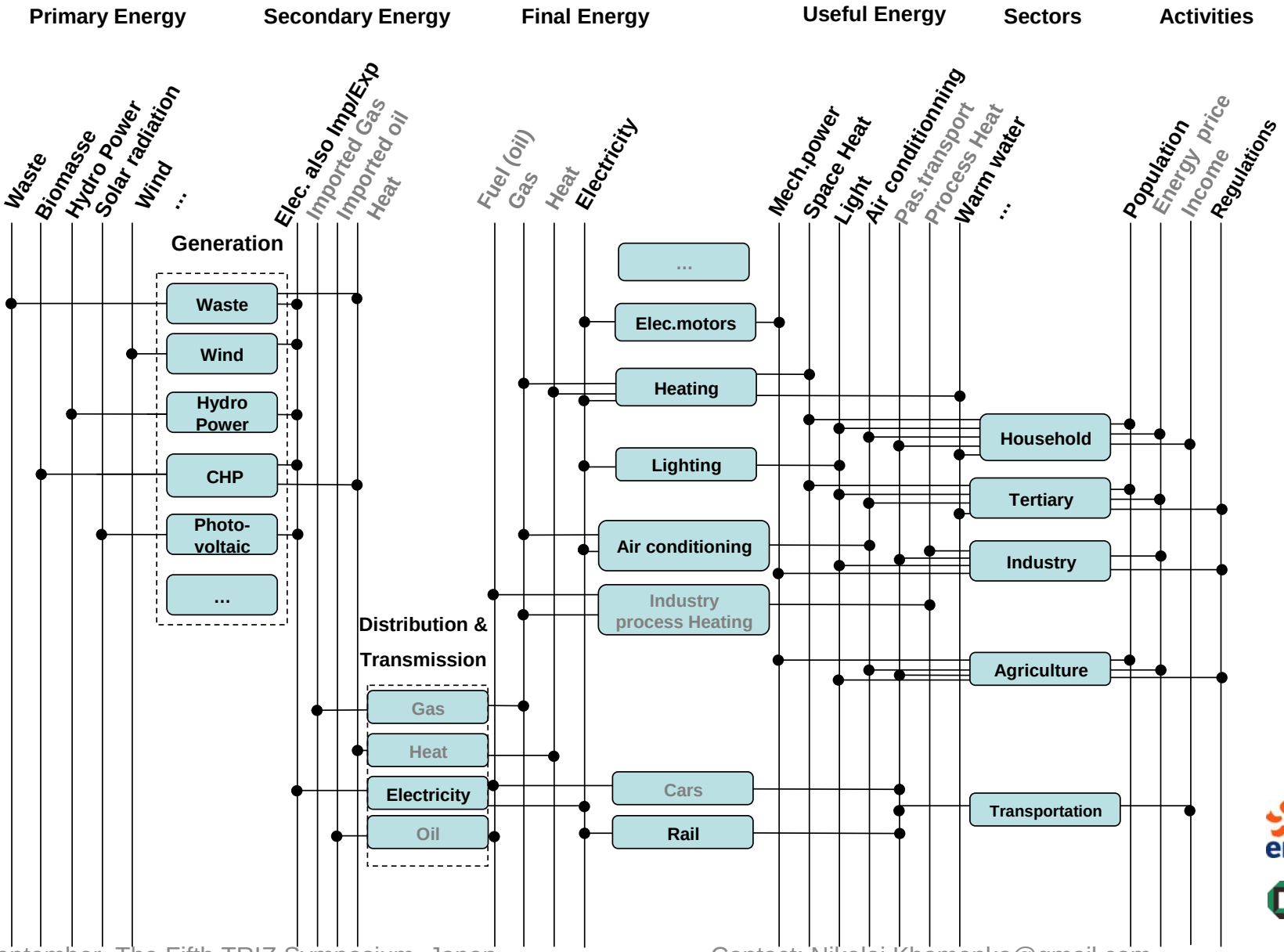
A fragment of Reference Energy System in the region



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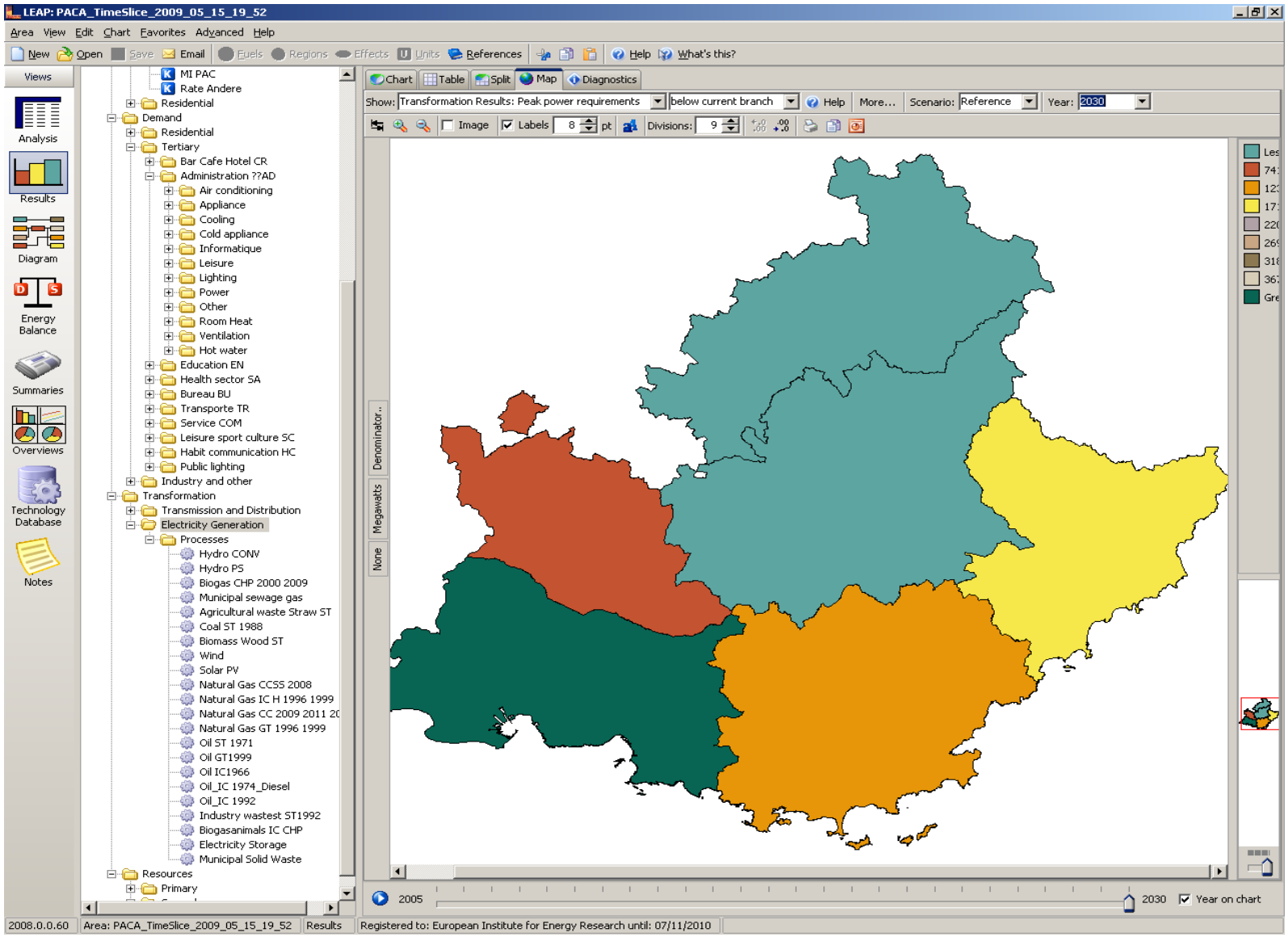
Some results one of the evaluation parameters Peak power requirement



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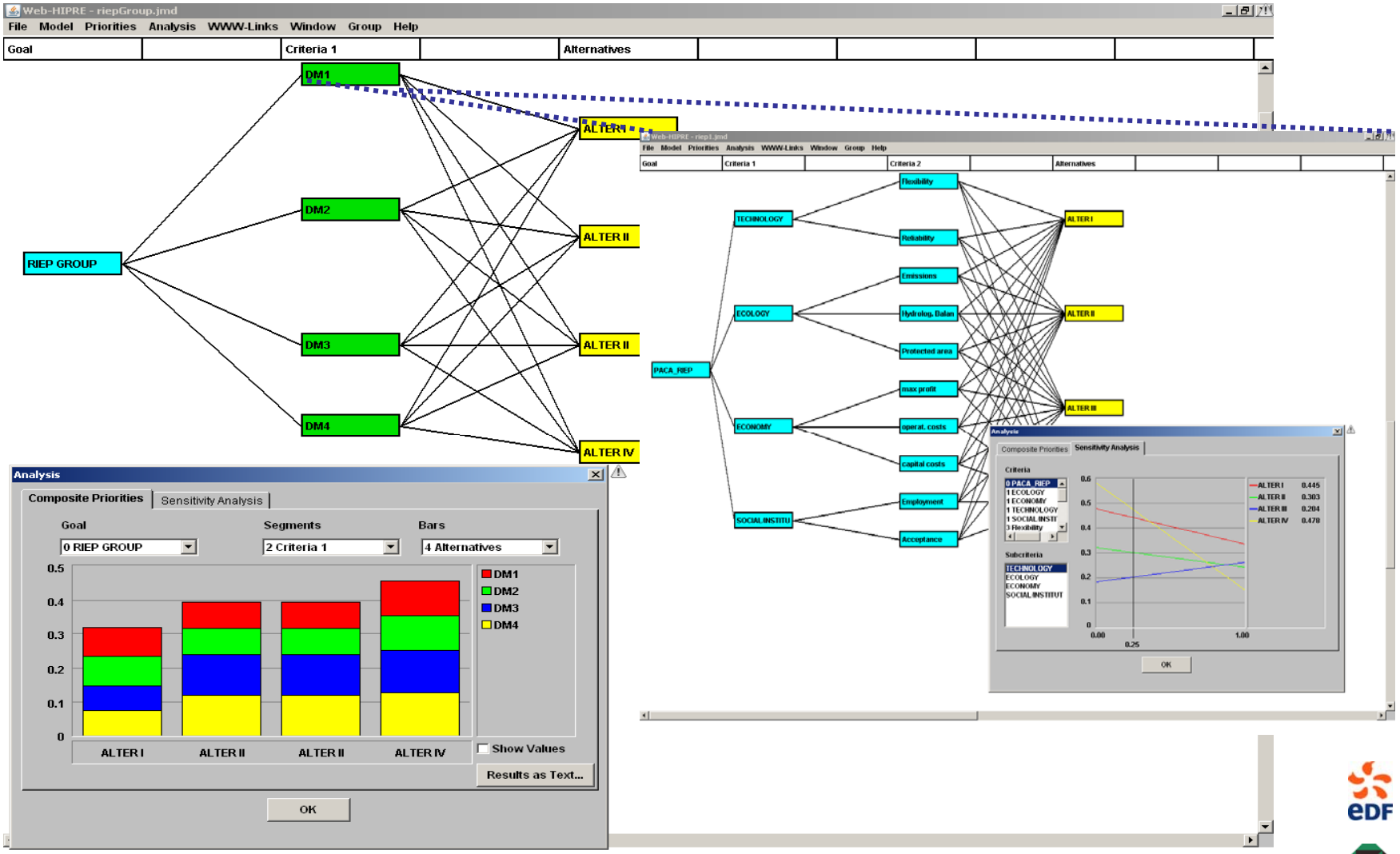
The Results of an alternative approach HIPRE (HIerarchical PREference analysis) for aggregate group Priorities and Sensitivity analysis



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Conclusion

- OTSM “Network of problems/solutions” provides analysis of initial situation taking into account all existing and potential problems, partial or standard solution.
- “Tongs”- model in combination with “Network of Problems” model supports the establishment of MDR, the identification of barriers, the model building etc.
- Other OTSM-TRIZ tools helps to develop an innovative mix of solutions and converge them to unified system.
- The complementary use of OTSM-TRIZ tools with other planning tools provides a consistent platform for the development integrated, long term, sustainable regional energy plan.

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Thank you for your attention

"*Think Globally, Act Locally*"
(David Ross Brower, 1912 - 2000)