

Bridging the gap between hard and soft approaches for decision aiding

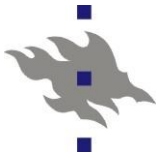
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■ Research network "**Methods and processes of
decision making in forestry**" <http://www.metla.fi/org/dm/>

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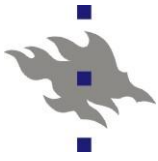
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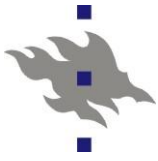
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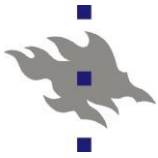
Some traditional concepts of forest planning

- Methods and applications for optimized harvesting schedules:
 - Originating back to 18th century and Germany
 - Nachhaltigkeit, Forsteinrichtung, Massenfachwerk
- Multi-objectivity, evolving from the late 20th century
 - Simulation and optimization
 - MCDA and OR methods
 - Rigorous computational procedures based on large datasets



Widened view of forest planning as a research discipline

1. Development of forest information systems to facilitate the variety of different planning problems (with respect to geographical extent, time horizon, decision-maker's perspective, objectives etc.)
 - E.g. SIMO in Finland, HEUREKA in Sweden
 2. In-depth qualitative or experimental investigations on decision-maker's subjective perspectives
 - Not only technical but as well cognitive and social approaches for decision aiding
- Technocracy versus phenomenology
 - Is there a bridge to connect these worldviews?

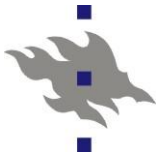


Blended approach

- The different worldviews should complement, not compete with each other
 - In practice, rigorous information systems mediate the boundedly rational decision making of real people

- Solution: a combination of 1) the development of hard systems, and 2) understanding of soft processes as **a blended research agenda**
 - Hard modeling: estimation of harvested yield
 - Soft modeling: mental patterns of individual reasoning
 - Statistical modeling of patterns
 - Taking into account social and behavioural aspects

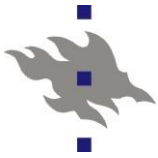
→ Meaningful decision aid for the decision-maker



Challenges and research examples (1)

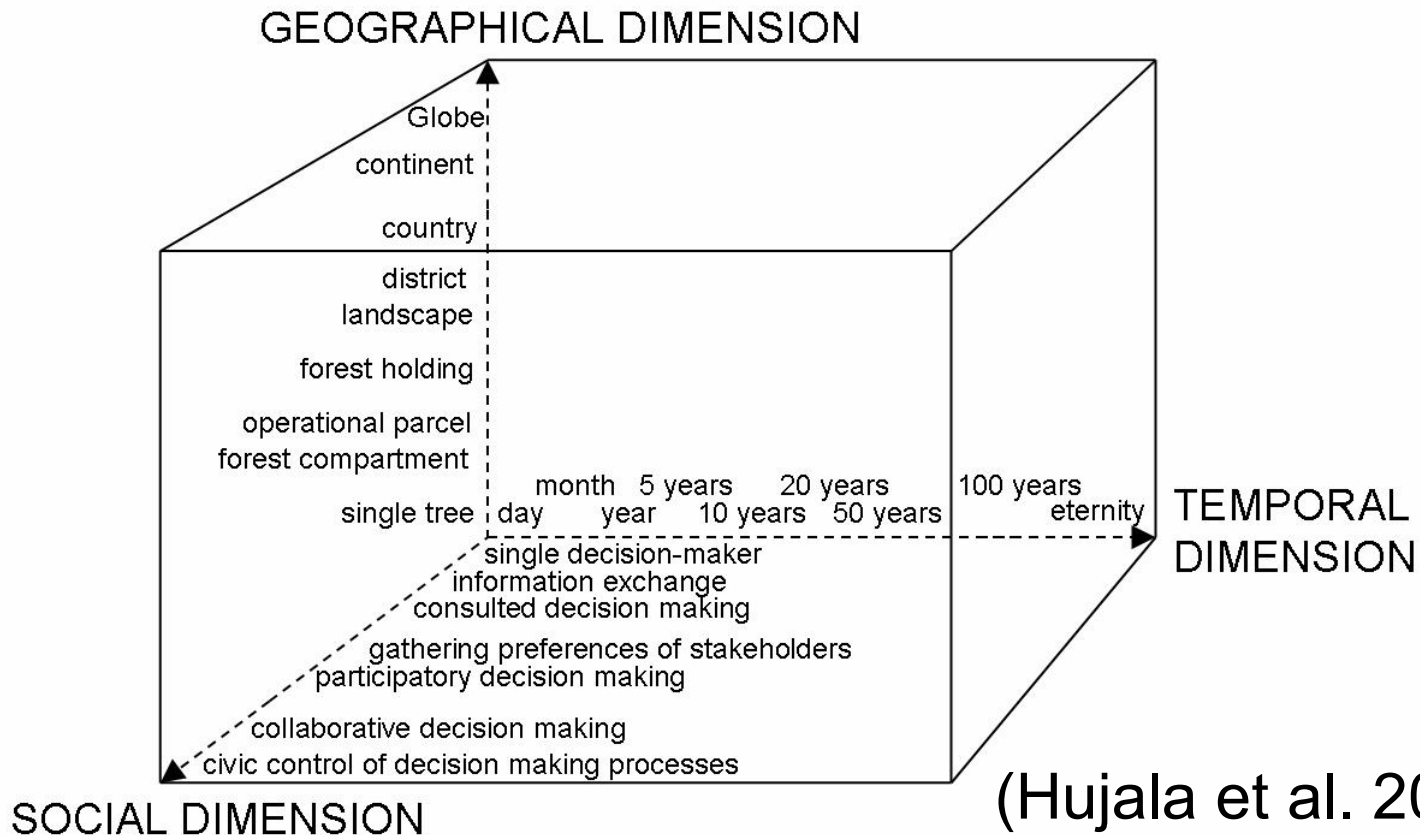
- How to initiate the blending?
- How to find shared objectives?
- Where in fact is the soft knowledge most useful?
- When is it recommended to apply an intervention by a hard system into the social reality?

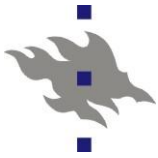
- **Example 1: Generating user-interface for SIMO**
 - Principles: Interactive, scalable planning system; the user-interface comprises components, of which different realizations can easily be constructed for different uses
 - Practice: The use cases (qualitative in-depth descriptions how the application would be used) are generated through intensive field experiments including observations and contextual interviews with real end-users



Challenges and research examples (2)

■ Example 2: Selecting suitable decision aid methods and tools with the aid of a three-dimensional decision problem space





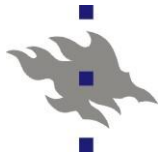
Challenges and research examples (3)

■ Example 3: Enhancing the use of elicited preferences in MCDA procedures

- Empirical preference elicitation enquiries
- Analytic and behavioural analysis of discrepancies between different elicitation methods
- The discrepancies can be analyzed by statistical decision support models and uncertainty measures

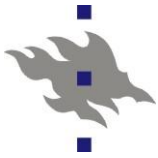
■ Example 4: Problem structuring and problem solving in regional forest planning cases

- Evaluation of participation conceptions of different stakeholder (groups) by qualitative cognitive mapping tasks and a psychological measurement survey
- Workshops for collaborative problem structuring
- Generating alternatives and utility functions
- Interactive selection of the final plan: the use of MCDA-tools



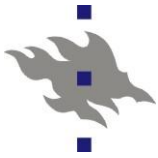
Challenges and research examples (4)

- **Example 5: Applying sequential mixed methods in evaluating decision-support needs of Finnish family forest owners** (Hujala et al. 2007b)
 1. Preliminary case study: qualitative
 2. Pilot enquiry: quantitative
 3. Semi-structured in-depth interviews: qualitative
 4. Conceptual modelling of decision-support needs qualitative
 5. Postal survey for quantifying the phenomena around decision-support motives: quantitative
 6. Testing and enhancing the model by means of an adaptive design-based process: qualitative (+quantitative)
 - C.f. presentation by Tikkanen et al. in SSFE 2007



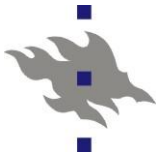
Implications for forest research

- Mixed or blended decision aid requires the development of new research methodology
- In order to maintain the high standard of applied forest research, theoretical concepts as well as methodologies ought to be adopted from hard and soft basic sciences
- Further dialectics between research paradigms is needed to find a combined way for collaboration
- From interdisciplinarity to **transdisciplinarity**



Implications for forest policy

- Societal modernization leads to diversification of values, which necessitates focusing more on decision-makers' subjective perspectives
 - Customer orientation in planning of private forests means individual flexibility and communicatively intensive services
- Research and development projects following the blended approach might provide something new for the forest planning field
- Since the social and participatory perspectives in forest planning are more and more important, those should be discussed in detail in renewing and implementing national forest policies



References

- Hujala, T., Kainulainen, T. & Leskinen, P. (2008). **Psychological Aspects of Decision Making As New Research Topics in Natural Resources Management.** In: K.P. Hofmann (ed.) Psychology of Decision Making in Economics, Business and Finance. Nova Publishers (Available in 1st Q 2008).
- Leskinen, P., Kangas, A., Korhonen, P. & Kurttila, M. (2007). **Multiple scales of decision support systems in forestry.** Research plan.
- Hujala, T., Kainulainen, T. & Leskinen, P. (2007a). **Behavioural observations on preference enquiry.** Oral presentation at EUROXXII European Conference on Operational Research, 8-11 July, 2007, Prague, Czech Republic.
- Hujala, T., Tikkanen, J., Hänninen, H. & Virkkula, O. (2007b). **Evaluation of Decision-support Needs among Family Forest Owners in Finland: An Application of Mixed Methods.** In: Harrison, S.R., Bosch, A. and Herbohn, J.L. (eds.) (2007), Improving the Triple Bottom Line Returns from Small-Scale Forestry, Proceedings from an International Conference held in Ormoc, the Philippines, 18-21 June, 2007, Brisbane, pp. 215-220.