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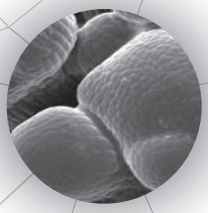
Expertise of the scientific community in the Occitanie area (France)

COMPLEX SYSTEMS

From biology to landscapes



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Multicriteria decision support

Thau Bassin observatory – supervised learning amongst Thau stakeholders

Stakeholders in the Thau region (Hérault, France) have—since the mid-2000s—been stepping up efforts to safeguard the quality of the environment and develop the region by streamlining the sectoral governance imposed by each public policy (development, water and environment). In 2005, a regional engineering team was set up, i.e. the *Syndicat Mixte du Bassin de Thau* (SMBT). Then from 2005 to 2014, long-term planning documents (territorial coherence plan, water development and management plan, Natura 2000) were drawn up in a coordinated manner, while an ambitious action programme (2012-2018 integrated management contract) was launched and innovative environmental monitoring systems (preventive *malaïgue* shellfish disease monitoring, VigiThau and Thau Observatory) were also developed. Among these initiatives, the Thau Bassin Observatory monitors actions carried out under the integrated management contract. A web application jointly designed by SMBT and UMR TETIS is being developed—its core component is a multimodal interface for visualizing indicators (thematic maps, time-series diagrams, objective tracking, etc.).

When viewed as a product, the Observatory provides data, maps and technical documents to stakeholders and parties involved in the collective action (elected officials, technicians, economic stakeholders, associations and citizens). When viewed as the process illustrated in the adjacent figure, the Observatory oversees the learning process among the same local stakeholders. In phase 1, joint brainstorming on the dynamics involved will help define the monitoring system. Once the system is deployed, it becomes a collective action support, thus promoting the transfer of skills and the sustainability of the practices. At the end of the pilot learning period, the knowledge acquired is used collectively to enhance the overall understanding of the complex 'territorial' system and allow for a new iteration.

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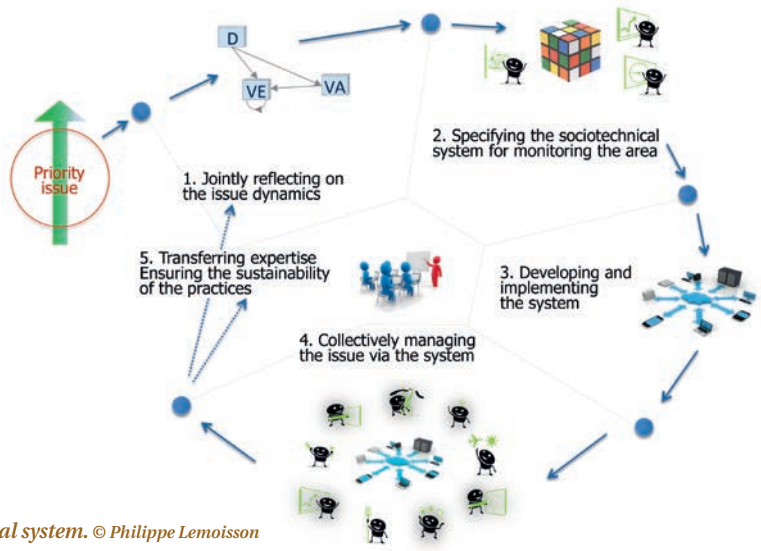

▶ *Collective learning and action on the territorial system.* © *Philippe Lemoisson*

Multicriteria decision support methods for comparison of alternatives – application to environmental management

The KID team (LGI2P of IMT Mines Alès) has developed a recognized level of expertise on multicriteria analysis and decision support in uncertain environments, which prompted it to conduct the study «Using multicriteria analysis for decision making in life cycle assessment (LCA)»* in 2015-2016. LCA is an internationally standardized method for assessing the environmental impacts of products and processes based on a multicriteria functional approach (see *adjacent Figure*). The LGI2P engineering laboratory proposed a formalization of the assessment procedure, which was tested via calculation of the environmental impact of vehicles. LGI2P, in collaboration with ENGIE, the French energy supplier, has meanwhile carried out a comparison of low-carbon technologies with multicriteria analysis methods and tools for the French Environment and Energy Management Agency (ADEME). Environmental criteria must be complemented by technological, economic and social criteria for a more comprehensive comparison of technologies in terms of their uses. Modelling of decision makers' preferences will be enhanced as the aggregation model becomes more sophisticated, but the amount of information required will also conconcomitantly increase. For instance, a model based on a simple weighted average would require little information while a sophisticated model based on fuzzy integrals would need much more extensive data. Analysts are required to formalize knowledge building to help address decision-making issues raised by environmental management. Two types of reality must be considered, i.e. realities based on physical properties and sensory perceptions that may be verified by repeated experiments (e.g. toxic gas diffusion phenomena), and realities for which consensus is no longer based on perception, but instead involve value systems specific to a society or policy (e.g. vulnerability of a territory). KID analysts thus help decision makers to come up with a working hypothesis, and then to build knowledge useful for decision making by clearly distinguishing the two types of reality under this hypothesis, and finally to make their decisions reportable.

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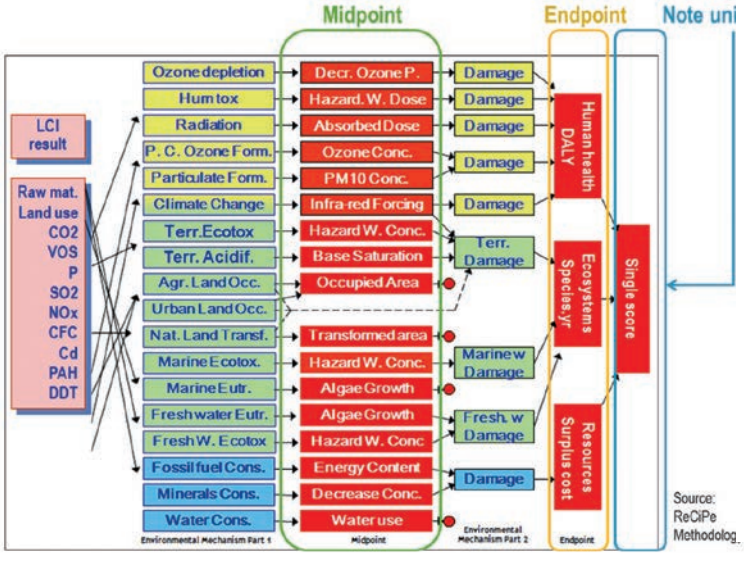
http://lgi2p.mines-ales.fr/pages/equipe-de-recherche-kid-0

* Study carried out for the SCORELCA national association of large-scale industrial groups in France.



▶ *The impact indicators taken into account by LCA and necessary multicriteria aggregation steps, i.e. midpoint/endpoint aggregation, then endpoint aggregation to a single final score.*
Source : ReCiPe Methodology