

Modelling collective threats

A threat is typically associated to an event, which occur with a more or less known likelihood, the consequences of which are estimated to be “negative” by the impacted individual(s). This is the typical setting through which we consider threats in risk analysis and management ([4], [1]).

However, consider the case where the impacted individuals are a social group (characterised through a set of common features) and/or a territory. Besides, consider the case where what could be “negatively” impacted is a “common” (in the sense of Ostrom’s [5] theory of commons). Finally, consider the case where the likelihood of such an event is not totally random, but depends from the behaviour of an independent agent (in case of deliberate action we will consider such an agent as an “adversary”, otherwise as a “danger”). The above cases are far from being unrealistic, but are generally neglected in mainstream decision analysis and risk management theories and practices. On the other hand such problems are crucial when policy design issues need to be supported, such as the design of “protection” or “prevention” policies.

The proposed research is part of a long term effort aiming to contribute to the methodological innovation of decision aiding for the design, implementation and assessment of public policies: policy analytics ([8]). The theoretical framework of this research is related to welfare economics and more specifically Sen’s capability theory ([6],[7]), implying measuring welfare as a the expression of freedom of choice in a multidimensional space, to adversarial risk analysis ([2]) and to decision aiding under risk and uncertainty [3]).

Interested candidates need to have a solid background in mathematics/economics/computer science with possibly a major in decision analysis or related areas (operational research, discrete mathematics, econometrics, optimisation etc.). Abstract reasoning and formal modelling skills are very much appreciated. The research will be essentially theoretical, but some experimental work should be considered.

Funding is assured for 3 years (36 months). Knowledge of the French language will help the successful candidate to integrate his/her income through assistantships at the University.

The research will be carried out at the LAMSADE, a joint research centre of the CNRS and Université Paris Dauphine within the PSL University. A long stay to a foreign (out of France) research centre should be taken into account.

Prospective candidates should get in touch with Alexis Tsoukiàs at the address: tsoukias@lamsade.dauphine.fr, submitting a CV and a motivation letter.

References

- [1] G. Allen and R. Derr. *Threat assessment and risk analysis*. Butterworth-Heinemann, Elsevier, Oxford, 2015.
- [2] D.L. Banks, J. Rios, and D. Rios Insua. *Adversarial risk analysis*. CRC Press, Taylor and Francis, Oxford, 2015.
- [3] D. Bouyssou, T. Marchant, M. Pirlot, P. Perny, A. Tsoukiàs, and Ph. Vincke. *Evaluation and decision models: a critical perspective*. Kluwer Academic, Dordrecht, 2000.
- [4] S. French. *Bayesian Analysis in Practice*. Edward Arnold, London, 1997.
- [5] E. Ostrom. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge Univ. Press, Cambridge, U. K., 1990.
- [6] A. Sen. *Development as Freedom*. Oxford Press, New York, 1999.
- [7] A. Sen. *The Idea of Justice*. Harvard University Press, Cambridge, 2009.
- [8] A. Tsoukiàs, G. Montibeller, G. Lucertini, and V. Belton. Policy analytics: an agenda for research and practice. *EURO Journal on Decision Processes*, 1:115–134, 2013.