



Introduction to Quantitative Info-Gap Decision Theory

This 2-session course will provide participants with a brief introduction and hands-on experience with quantitative info-gap decision theory. Info-gap is a decision methodology for modeling and managing deep uncertainty, especially when probability distributions are unavailable or highly uncertain. Info-gap theory has two decision functions. The *robustness function* responds to pernicious uncertainty, and prioritizes decision alternatives to achieve satisfactory outcome over the greatest range of uncertainty. The outcome is satisfied and the robustness to uncertainty is maximized. The *opportuneness function* responds to propitious uncertainty, and prioritizes alternative decisions to facilitate better-than-anticipated outcomes. Windfall outcomes are facilitated and the opportuneness from favorable uncertainty is maximized. In quantitative info-gap analysis the robustness and opportuneness functions are evaluated with mathematical models of the systems, uncertainties, and goals.

The first session (1 hour and 45 minutes) is devoted to lectures demonstrating the quantitative info-gap methodologies of robustness and opportuneness. Two distinct examples are presented: environmental monitoring¹ and net assessment of military effectiveness.²

The second session (1 hour and 45 minutes) is devoted to formulation of mini-problems by the participants, working individually or in small groups. Each group will outline an info-gap response to the problem they formulate, and at least begin to develop a solution based on info-gap robustness and/or opportuneness analysis.

References

1. Yakov Ben-Haim, 2018, *Dilemmas of Wonderland: Decisions in the Age of Innovation*, Oxford University Press.
2. Yakov Ben-Haim, 2010, *Info-Gap Economics: An Operational Introduction*, Palgrave-Macmillan.
3. Yakov Ben-Haim, 2006, *Info-Gap Decision Theory: Decisions Under Severe Uncertainty*, 2nd edition, Academic Press.
4. Further information and examples of applications of info-gap decision theory, by scholars from around the world, are found here: <https://info-gap.technion.ac.il/>