

Info-Gap Theory: An Overview

Yakov Ben-Haim

Technion — Israel Institute of Technology

Haifa, Israel

yakov@technion.ac.il

FEMTO-ST Institute

Université de Franche-Comté

Abstract The search for ever better outcomes should guide the decision maker in engineering design, public policy, economics, medical decisions and many other areas of human endeavor. However, uncertainty, ignorance, and surprise may jeopardize the achievement of optimal outcomes.

The concept of an innovation dilemma assists in understanding and resolving the planner's challenge. An innovative and highly promising new policy is less familiar than a more standard approach whose implications are more familiar. The innovation, while purportedly better than the standard approach, may be much worse due to uncertainty about the innovation. The resolution (never unambiguous) of the innovation dilemma results from analysis of robustness to surprise (related to resilience, redundancy, flexibility, etc.) and is based on info-gap decision theory.

Info-gap theory provides decision-support tools for managing the challenges of planning and decision under deep uncertainty. We discuss the method of robustly satisfying critical requirements as a tool for protecting against pernicious uncertainty.

These ideas will be illustrated with two examples: structural design and safety certification for seismic loads, and conservation management to save the Sumatran rhinoceros.