Why We Design to Spec:
Info-Gap Explanation for Satisficing Design Requirements

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Abstract

Why does the engineering profession commonly specify performance requirements as inequality constraints, rather than specifying constrained-optimal design? Hammurabi's Code of Law imposed extreme penalties for design failures, providing strong incentives for engineers to meet design specs. Engineers still bear legal liability for design failure, though less severely than in ancient Babylonia. So why to engineers *satisfice* rather than *optimize* performance requirements?

In this talk we discuss theorems asserting that, under severe uncertainty, a robust-satisficing decision has a better probability of survival than a best-model outcome-optimizing decision. These theorems are based on non-probabilistic info-gap decision theory, which provides a quantification of Knightian uncertainty. We discuss a stylized design problem, a fault-detection example, and forecasting subject to surprises.

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More references, links to international workshops on info-gap theory, and other sources, can be found on my website: http://www.technion.ac.il/yakov

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