Building a New Science: The Elements of Risk and Decision Analysis
By Alain Bensoussan

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Risk is an issue in most activities, technical as well as economic, internal or external to any organization. It has been considered so far in the context of different disciplines. In engineering it is closely related to reliability theory, to quality control, to lean processes and more recently to the treatment of uncertainties in the supply chain. One summarizes all these aspects with the label "operational risk."

Financial risk applies the core of financial activities performed by financial institutions such as banks or investment funds and realized within the framework of financial markets. A considerable amount of progress has been achieved in mathematical finance and financial engineering to design new tools to protect investments against risks by hedging techniques and portfolio methodology.

Another line of research, called probabilistic risk assessment, has progressed to model the propagation of risk in complex systems. This concerns large infrastructures, innovative projects or missions such as space missions. Statistical techniques, learning methods, and decision trees are used in this domain.

The increasing concern arising from natural hazards and security has propelled new types of risk problems, which can be considered as such or in relation with economic and social activities.

Last but not least, a new regulation issued from the Sarbanes-Oxley Act of 2002 requires corporations to outline risk factors in their annual reports.

Thus, there is a need for progress in risk and decision analysis, integrating all components and developing generic concepts. The objective is to build a new interdisciplinary science that can provide models and tools for a large variety of applications.

The objective of the research performed within The School of Management's International Center for Decision and Risk Analysis (ICDRiA) is to integrate all the building blocks that are the main components of this new science in a coherent scientific framework and to work on real applications.

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