

Perspectives in Business Culture

Antonio Borghesi  
Barbara Gaudenzi

# Risk Management

How to Assess, Transfer  
and Communicate Critical Risks

 Springer

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and Communicate Critical Risks

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# Preface

When I first met Antonio Borghese over 20 years ago I was impressed by his desire to share his knowledge and know-how on risk management and its role in our society. As we have often worked together since that first meeting I can attest that this desire has not diminished one bit and the following chapters demonstrate his desire to make the subject of enterprise risk management more accessible to both new and experienced practitioners alike. Antonio brings his ERM foresight into play by making this work available to a wider audience through this English version.

With the project leadership in the more than capable hands of Barbara Gaudenzi we have taken a systematic approach to presenting the key elements of enterprise-wide risk management concepts and actions.

It is essential to any person or organization engaged in the ERM process to begin with a well-founded understanding of the breadth and width of ERM practices. From a theoretical overview of ERM, the establishment of a common language and standard to a clear analysis of alternative risk financing mechanisms, this work will allow the reader to grasp both the basic concepts and the more advanced thoughts around ERM.

The interconnectedness of risk even in the most diverse organizational activities and the need to keep a competitive edge in today's marketplace make this work a must read for all levels of management.

We trust that you will gain valuable insight and a shared vision of why ERM is an essential ingredient of a well-managed and sustainable organization.

Tony Cabot  
Director Product Development for Europe and Asia, Argo Group  
Senior Executive Officer, Argo Re (DIFC) Ltd.

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An erratum to this preface is available at [10.1007/978-88-470-2531-8\\_9](https://doi.org/10.1007/978-88-470-2531-8_9).

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**Part I**  
**Reference Theories**

# Chapter 1

## From Social and Natural Science Comes a Historical Overview on the Concepts of Uncertainty and Risk

### 1.1 Risk... Beginning with Newton and Heisenberg

Whoever is interested in understanding the concept of risk and its interpretation should consider some important reflections provided by the principles of the theories of physics, from pure physics to Newtonian theories.

In the works *The method is the ideology: from a Newtonian to a Heisenbergian paradigm in economics* and *reflections on uncertainty in economics*, Weisskopf (1979) describes the *cognitive aspect* (which endeavors to provide an explanation on the unknown) and the *regulatory aspect* (aimed at outlining lines of action and behaviors for the individual) of human actions.

These and the following reflections are particularly important in studying risk management.

Among the emblematic paradigms from a cognitive point of view, the following are noteworthy:

- *Newton's or celestial mechanics paradigm*. This states that reality is independent from the observer: subject and object belong to separate and distinct spheres. Moreover, it highlights how, once the system's instantaneous state has been identified, its future evolution is also determined.
- *Heisenberg's or the indetermination paradigm*. Following many intuitions and discoveries in different spheres of science, it is mainly the emerging science of thermodynamics that makes an important breakthrough in classical mechanics, by proving—thanks to Boltzmann—the *existence in nature of irreversible processes* and describing entropy as the extent of the spontaneous evolution of an isolated system toward its state of thermodynamic balance. It is in this context that *for the first time probability is introduced in physics to explain a phenomenon rather than approximate it*. This turning point is indeed essential for risk analysis. The most important turning point for a total break from the past, was reached by Heisenberg and his indetermination (or uncertainty) principle, which crossed quantum mechanics. Heisenberg reverses the supposition of the separation between observer and object being observed, stating that

the influence of the observer on the position and speed of the particles makes it impossible to know both of them at the same time. *The observer changes the image of reality and becomes one and the same with the object.* These reflections are important for understanding the weight of subjectivity in risk assessment.

- Prigogine’s or dissipation structures paradigm. If classical thermodynamics show that a system in a situation of non-balance drifts toward balance, Prigogine’s paradigm proves that, in living creatures, few are the processes that move toward the situation of balance and that there are many cases where the state of non-balance generates structures that are evolving toward states of “orderly complexity”. This paradigm raises uncertainty as the engine room of the lives and actions of living creatures.

It is in the areas of high improbability—almost in agreement with Popper’s (1959) theories—that we can find the answer to the reality surrounding us. Minor fluctuations around the stationary condition are reabsorbed by the system, but when they amplify beyond a certain limit *the system becomes unstable and this instability generates a morphological transformation* that makes it evolve toward a new order.

## 1.2 Uncertainty and Risk: Loss and Gain—A Historical View

Since the eighteenth century, thanks to Smith (1776), the concept of risk is mainly linked to the concept of unfavorable event. An exception is represented by Smith, who did not comprehend risk in his studies.

In the twentieth century, mainly in the U.S., we had the first instances of risk in the business sphere being dealt with for the purpose of identifying techniques and procedures for the identification, measurement, and treatment of risk in business decisions.

At the beginning of the twentieth century, the first significant studies in business risk management were developed by Willet (1901), Leitner (1915), Knight (1921), Oberparleiter (1930), Stadler (1932), and Sassi (1940). These authors for the first time treated risk as an independent topic of study, and described ‘risk’ as a measurable uncertainty in contrast with the concept of non-measurable uncertainty (ignorance about future events).

Between the two world wars the Austrian (Viennese) school and the Italian school (from Florence) were the most relevant ones in Europe, particularly with Oberparleiter, Leitner, Corsani, and Fazzi.

Worthy of a brief comment are the reflections developed by Rowe (1977) and later by Borghesi (1979) when the latter describes the concept of uncertainty as “the lack of information on parts of a system under consideration” which may be expressed on a scale from 0 (certainty) to 1 (total uncertainty). The absence of information required to describe the system brings about a situation of *descriptive*

*uncertainty*, whereas the lack of information required to measure variables, brings about a situation of *measurement uncertainty*.

A feature that is common to the management of systems and related processes is represented by the consequences that may be alternatively either losses or gains, where, in the presence of competitors, the loss by one entity may be conversely the gain by another. Risk therefore appears to be associated with consequences that involve losses for those who take it. Risk agents often voluntarily expose themselves to risks in order to achieve possible gains if the possible gains exceed possible losses. If, instead of “possible” gains and losses we were to refer to “probable” gains and losses, their quantitative balancing is possible within the limits of measurement uncertainty. On these grounds, we must associate risk to losses alone; in other words, let us assume that Man is opposed to risk. At any rate, we have risks that at times are taken to achieve possible desired gains. The action undertaken to reduce the risk may be considered a gain in the sense that a possible loss is reduced.

This, in summary, is Rowe’s opinion, who concludes by defining risk as “the realisation potential for undesired and negative consequences of an event”.

Even though this has been for a long time the prevailing position, other authors have defined the risk by distinguishing the dual character of risks capable of producing alternatively either losses or gains, for example through choices and events that have financial consequences. See, for example, Mowbray et al. (1979), Dickinson (2001), Bannister et al. (1981) and Carter (1979).

According to this position, indeed, it is impossible to see what logical difference may be found between the situation where an individual, due to the occurrence of a certain event, suffers a loss or a smaller gain compared to the one expected.

Two examples. Let us assume the case of a business that has forecast in the production planning an “equipment failure” equal to 5 % of hours worked. The “equipment failure” may be certainly classified among the unfavorable events. Let us now assume, in hindsight, that the equipment failure that has actually occurred is equal to 3 % of hours worked. Certainly this is not an unfavorable event: so long as the “equipment failure” remains below the planned 5 % we can only maintain that for this business, the event was favorable, being equal to the difference between the planned and the actual rates.

Now let us assume that an economic initiative whereby a profit of 1000 had been forecast and that, in hindsight, recorded instead an actual profit of 500. The profit of an economic initiative is by definition a favorable event. However, the businessmen will maintain that an unfavorable event has occurred with an effect equal to the difference between the forecast figure and the figure actually recorded.

From the above considerations we can conclude that, depending on the position of the entity concerned, an unfavorable event may turn into a favorable event, and vice versa.

Indeed, it is our opinion that the attempt to objectivise concepts such as the concept of risk (or the concept of a favorable or unfavorable event) clashes with the dominant logics of relativism. It is also amazing that, while social science has over the past century pursued objectivity in their theories, natural science, at the