

Risk intelligence is a core skill in an uncertain environment. How can it be improved?

by Babette Drewniok



Risk management has been on the corporate agenda for many years, with mixed success. Companies tend to focus on the introduction and development of risk management processes and tools on the organisational level. Meanwhile, the personal risk intelligence¹ of the actors - the decision-maker or the person supporting decision-making processes in the organisation - is receiving less attention. As a result, when decisions are based on the decision-maker's personal willingness to take risks rather than the organisation's risk tolerance, attempts to explain decisions that failed to achieve the desired outcome may fall short of the mark.

Why is risk intelligence important?

We are living in a time characterised by increasing uncertainty.² Navigating successfully in these uncertainties requires a different skill set from managing in a secure and stable environment³ - and risk intelligence is part of this skill set. The psychologist Gerd Gigerenzer phrased this very accurately with respect to school education: "We teach our children the mathematics of certainty - geometry and trigonometry - but not the mathematics of uncertainty: statistical thinking."⁴ Many people associate risk exclusively with events that should be avoided; classic risk management aims to preserve assets and to avoid risks. Yet, the fact that an organisation needs to take risks to ensure its survival and growth in the long-term is often neglected in these considerations. In other words, **sustaining competitiveness and creating enterprise value are invariably connected with taking risks**. The philosopher Ernst Bloch put this very succinctly: "If you don't expose yourself to danger, you'll perish in it." "Version 2.0" of the adage is "**If you don't risk anything, you put everything at stake**". With regard to an organisation, one might say that the biggest risk of all is the risk one fails to take.

What is risk intelligence?

At its very core, risk intelligence is the ability to judge one's knowledge about an issue. This means being able to evaluate the degree of certainty of that knowledge. It may sound trivial, but that doesn't make it wrong; the more uncertain the times, the more important this skill is.⁵ Now, if we look at a continuum, **underconfidence** - and consequently, **risk aversion** - on one end of the scale and **overconfidence** - and therefore **strong risk appetite** - at the other end, then **risk intelligence is the ability to stay in the middle of this continuum**. Alternatively, one could picture a scale, balancing the two weights *risk appetite* and *risk aversion*, depending on the situation. Given that humans have different dispositions by nature, some will be rather risk averse, while others love taking risks. Thus, the starting point for the journey towards risk competency will differ. Yet, the required skills are identical.

What is risk?

To achieve risk intelligence, we must first define what risk is. Interestingly, opinions are diametrically opposed. This may be rooted in the fact that the origin of the term is unknown.⁶ In the economic sciences, many authors base their definition of risk on the differentiation between uncertainty and risk offered by Frank Knight:

*"(To differentiate) the measurable uncertainty and the unmeasurable one we may use the term "risk" to designate the former and the term "uncertainty" for the latter."*⁷

Frank Knight's definition includes two key statements. Firstly, we are not able to quantify the probability of possible events in the case of uncertainty. If we are able to state their probability, then - according to Knight - we are dealing with a risk. Secondly, it makes no reference to the possibility of a loss. Risk can therefore be positive or negative; the term includes both the negative and the positive consequences of a contingency or dependence.

The author takes a critical view of this definition. Firstly, it would suggest that the act of throwing a coin was a risk in itself, as one can state the probability for each possible result. Yet, if nobody places a bet on either outcome, there is, in fact, no risk. Secondly, the author holds that assigning both positive and negative connotations to the terms is not helpful when discussing risk communication. Clear lines need to be drawn.

Consequently, the author considers **Hubbard's definition** more useful. It says that **uncertainty is the lack of complete certainty**, that is the existence of more than one possibility. Risk is a special state of uncertainty, where some of the possibilities involve a loss. Uncertainty is expressed by a set of probabilities assigned to a set of possibilities. Risks are stated in terms of quantified probabilities and quantified losses. The following example serves to illustrate the definition:

Uncertainty

There is a 60% chance that our oil drilling is successful, 40% chance it won't.

Risk:

We believe there is a 40% chance the proposed oil well will be dry with a loss of €12 million in exploratory drilling costs.

How Can We Become More Risk Intelligent?

As stated above, risk intelligence is the ability to judge what one knows and what one does not know.

There are three starting points to gain or improve risk intelligence:

1. Reflection of your own risk attitude
2. Understanding the psychological aspect of risk
3. Adapting the technical toolbox and applying statistical thought more often

This article aims to present these three issues and offer - where possible - individual approaches to improve them.

1. Reflection of your own risk attitude

Risk attitude is not the same as risk intelligence. While the first one is a character trait, risk intelligence is a cognitive skill. Assuming that a decision-maker may probably not be able to clearly distinguish their effects when evaluating risks, it is crucial to understand both. We all have a particular default value, a “factory setting”, on the basis of which we analyse a situation and reach a decision.

Different predispositions lead to the fact that some people develop a tendency towards risk aversion whereas others develop one towards risk taking. Proven testing procedures exist to clarify a person’s predisposition.⁸ This does not only help in general interpersonal communication but also provides further insight into one’s own risks appetite. The Herrmann Test classifies thinking style D as rather risk taking and thinking style B as rather risk avoiding. In terms of communication models, type D or *red* tends to be willing to take risks, while type C or *blue* tends to be risk averse.

Interestingly, the predisposition appears to be also influenced by culture. The Dutch social psychologist Geert Hofstede has developed five dimensions that can be used to describe and measure cultures. One of these is *uncertainty avoidance*. It characterises the degree of discomfort at which members of a society feel threatened by uncertain or unknown situations.⁹

Uncertainty avoidance, like the other dimensions, is expressed by means of an index (the *Uncertainty Avoidance Index* or *UAI*) on a scale of 1 to 100. An index of < 50 is classed as a low UAI and an index of > 50 as a high UAI. **This index scores Germany at 65 and the USA at 46.**¹⁰ **Societies with a low uncertainty avoidance score are primarily characterised by a higher risk appetite.**

Insights from psychological research on the general risk attitude are also very important for the development of risk intelligence. In the literature, this is often illustrated with the example of the “**Asian disease**”¹¹:

Imagine that the United States is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:
Program A: 200 people are saved.

Program B: There is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved.

Now you are asked choose between the following alternative programs:

Program C: 400 people will die.

Program D: There is a one-third probability that nobody will die and a two-thirds probability that 600 people will die.

In the first decision (choice between program A and B), most people choose alternative A; saving 200 lives is a more attractive proposition than the risky alternative with the same expected value. However, in the second decision (choice between programs C and D - again, the expected value of the treatment is the same), most people prefer the riskier treatment D; the certain death of 400 people is worse than a two-thirds probability of 600 people dying. Since all four programs have the same expected value, this experiment shows that choices between certain and uncertain results are made differently. When the outcomes are good (illustrated by the choice between program A and B), people tend to be risk averse and choose the safe program A. When both outcomes are negative (program C and D), people tend to be risk seeking and choose program D - hoping that nobody dies. **In business practice, the latter example is known as the phenomenon of “throwing good money after bad”, which can often be seen in projects.**

2. Understanding the psychological aspect of risk

While the first point dealt with risk attitude, we will now take a closer look at risk perception. Extensive research in the field of decision-making has provided various insights which are relevant to the development of risk intelligence. The research into decision-making has come up with the concept of **biases**, which affect risk perception and therefore make risk analysis and evaluation more difficult. The following biases are particularly relevant for the development of risk intelligence:

- **Optimism Bias**

This bias describes people's tendency to be overly optimistic and to overestimate the probability of favourable results. It may lead to an **overestimation of benefits and underestimation of costs** during planning, resulting in an organisation taking excessive risks.¹²

- **Overconfidence bias**

Overconfidence is part of the *optimism bias* and a **common cause of high-risk decisions being made**. It describes the difference between that which a person actually knows and what he thinks he knows. In extreme cases, this may even go as far as hubris. In many cases, organisations would benefit from acknowledging uncertainties. Yet, **in business practice, appearing confident is often preferred**.

- **Loss aversion**

At the other end of the spectrum, loss aversion - illustrated in the previous section in the context of the “Asian disease” - causes people's fear of loss to exceed their regard for benefits of equal value. **This leads to organisations failing to act despite risks being at an acceptable level**. Thus, loss aversion is a key driver for risk avoidance and consequently a major obstacle in the improvement of risk intelligence.

In addition there are biases which impact our risk intelligence irrespective of the issue of “too few” or “too many” risks.

- **Confirmation bias**

The *confirmation bias* is one of the greatest "enemy's" of risk intelligence.¹³ It causes people to select and evaluate information in a manner that supports their own objectives. In other words: **We pay more attention to information that confirms us and neglect information that disproves our opinion.**

- **Hindsight bias**

The *hindsight bias* causes us to evaluate information differently after an event in full awareness of the result. This undermines our risk intelligence, as it **prevents us from learning from our mistakes.**

- **Misconception of chance**

A third bias in this group is the human phenomenon of the misconception of chance: People regularly tend to misinterpret luck as competence.

- **Illusion of control**

Illusion of control is another important psychological phenomenon. It is the human tendency to believe one is able to control or at least influence outcomes which they clearly have no control over. A frequently quoted example of this is the increase of lethal road traffic accidents after the terror attacks of 9/11.¹⁴

- **Illusion of certainty**

Risk perception is not only biased by the illusion of control, but also by the illusion of certainty. It describes the conviction that an event is absolutely certain, even though when this is not the case. It manifests itself, for instance, in an organisation relying on individual indicators (e.g. value at risk) and/or their IT systems - which runs the danger to impede the ability to assess risks.

3. Adapting the technical toolbox and applying statistical thought more often

A crucial prerequisite for the achievement of risk intelligence is the ability to assess one's own knowledge realistically. The concept of “**metaknowledge**” is fundamental in this context; that is, **knowing what we do and what we do not know**, and to know the degree of certainty in each case. Evans¹⁵ illustrates the issue at hand with the image of a light bulb in an otherwise dark room. The nearby objects are fully illuminated and can be seen in every detail. These are the things that we know, the facts. Then there are objects in the room that receive no light from the light bulb and which are therefore completely in the darkness. These are the things that we don't know.

Between the light and the darkness lies a grey area. In this twilight zone, there are things that we know something about, but there are gaps in our knowledge, it is incomplete. Risk intelligence comprises two things; firstly, the ability to assess the extent of one's knowledge on a particular issue. In other words, where are we on a scale between certainty (absolute knowledge) and ignorance (no knowledge)? The other aspect of risk intelligence is the indispensable ability to handle states of knowledge somewhere between the two extremes. While this is easy to say, many people find this difficult. The psychological phenomenon of the **need for closure means that people seek definite answers to their questions.** In other words: They are uncomfortable in the grey area with its ambiguities. In order to escape this zone, people exhibit a behaviour that the social scientist Herbert Simon termed

satisficing: **Rather than searching for the perfect solution, people search for the nearest solution that meets their requirements.** If we apply this concept to uncertainties, our discomfort in the grey area means that we try to get back to our comfort zone of - even apparent - absolute knowledge or absolute lack of knowledge. In uncertain times, this type of behaviour shows a lack of risk intelligence. The strategies to escape this grey area depend on a person's risk appetite. Risk averse people will question everything outside of the fully illuminated area. Risk hungry people, on the other hand, will make statements about parts of the grey area with certainty that is not adequate.

A closer examination of the three areas around the light bulb

The darkness or “Do I really know nothing?”

Our first thought when faced with a question is often “How am I supposed to know? I have no idea about these things.” While this may be an understandable initial reaction, it seldom stands up to a more thorough analysis. One method that helps to clarify this issue is to apply the “Fermi questions”. They are named after the Italian physicist and Nobel Prize winner Enrico Fermi (1901-1954) who was famous for providing good approximations despite a lack of knowledge. A **Fermi question is an assessment of what you already know** about a problem in such a way that it can get you in the ballpark. The challenge of Fermi questions is that one has neither the experience gained from similar problems nor the relevant data that would allow a direct calculation of the answer. **The lesson of Fermi questions is that the key to the solution is to start asking what things you know about the problem.** Fermi's most famous question was the number of piano tuners in Chicago.¹⁶

The Fermi question: What is the number of piano tuners in Chicago?

The approach to finding an estimate to Fermi questions is to estimate other things that might seem easier to estimate. So, to answer the question about the piano tuners, one might make an estimate of the following things:

- The current population of Chicago (a little over 3 million in the 1930s to 1950s)
- The average number of people per household (2 or 3)
- The share of households with regularly tuned pianos (not more than 1 in 10 but not less than 1 in 30)
- The required frequency of tuning (perhaps 1 a year, on average)
- How many pianos a tuner could tune in a day (4 or 5, including travel time).
- How many days a year the tuner works (say, 250 or so).

Depending on the specific values one chose, the answer will probably be somewhere between 20 and 200.¹⁷

The interesting thing about the Fermi questions is that people tend to answer a question such as “How many piano tuners are there in Chicago?” with “I have no idea. I could not possibly know anything about such a quantity.” or something along those lines. Yet, if we consider that we already know something about the quantity in question, we are usually able to arrive at a result that is closer to the actual value than one would assume.

The grey area

Within this area, the tools of calculus of probabilities and statistical analysis help to develop our risk intelligence. “An uncertain figure has a shape” is the motto - which means an

uncertain figure should not be stated as a single point value. As we have seen above, psychological effects or a lack of the statistical knowledge required mean that such shapes are outside of our comfort zone and that we therefore escape into the darkness with statements such as “I don’t know”. Alternatively, we convert the uncertainty into a single point solution and pretend that we are in the illuminated area. This is where metaknowledge is crucial; that is, the ability to assess what one does and what one does not know. **At the very core, how much or how little a person knows about an issue is less important than that person’s ability to assess the limitations of his own knowledge.**

The following exercise aims to show the necessary skills in this area.

For each of the following questions, provide a low and a high guess questions such that you are 90% sure the correct answer falls between the two. If you succeed, you should have nine correct answers in the end.

1. What is the weight of an empty Airbus A340-600 (in kilograms or tons)?
2. In what year did John Steinbeck win the Nobel Prize for Literature?
3. What is the distance (in kilometers or miles) from the Earth to the Moon?
4. What is the air distance (in kilometers or miles) from Madrid to Baghdad?
5. In what year was the construction of the Roman Colosseum completed?
6. What is the height (in meters or feet) of the Aswan High Dam?
7. In what year did Magellan's crew complete the first naval circumnavigation of the globe?
8. In what year was Mohandas K. Gandhi born?
9. What is the surface area (in square kilometres or miles) of the Mediterranean Sea?
10. What is the gestation period of the great blue whale (in days)?¹⁸

The ability to answer nine of the ten questions within the correct confidence interval is known as “being calibrated”. Calibration is a skill that can be learned. This is metaknowledge, not primary knowledge. This skill is one of the core prerequisites for achieving risk intelligence.¹⁹

Given that quantitative probability is one of the best ways to express uncertainties, some fundamental statistical knowledge is required in an uncertain environment. If we are sure about something, we have no need for probabilities. Probabilities are used to convey uncertainty. They are far more effective than the scales we often come across (e.g. high/medium/low rating systems or 1-to-5-point systems), as the classifications used are often not clearly defined or communicated. As illustrated by the saying of “the glass being half full or half empty”, the interpretation of the terms “high”, “medium” or “low” can differ between the participants in a process - and this has a negative impact on the quality of the decision made.

The illuminated area

In the context of risk intelligence, this area causes the fewest problems, since we are dealing with certain knowledge.

How can the risk intelligence be improved?

Since it is usually easier to notice other people's inadequacies than your own, it makes sense to **take measures for the improvement of risk intelligence at an organisational level**. The measures described here include both measures aimed at the individual level as well as accompanying measures at an organisational level that aim to compensate individual inadequacies.

One thing needs to be made clear at this point: Searching for more information and facts is not a suitable means to remove uncertainties. In practice, however, it is one of the most common things done. Unfortunately, this frequently has negative consequences. **Studies have shown that too much information results in a lower quality of decisions.**²⁰ A statement of estimates, percentages or value ranges is not a sign of analytical weakness, but one of risk intelligence. **Numerical precision or *single point answers*, on the other hand, come at the risk of illusive certainty in the decision-making process.**

On the individual level

The discussion above already provided some suggestions: awareness of one's own risk attitude, better understanding of the psychology of risk, extension of technical knowledge on the mathematics of uncertainty, as well as calibration to improve metaknowledge. In addition, the following ideas are suggested:

- **Expanding general knowledge**

Studies have shown that **generalists are better at handling uncertainties.**²¹ Recent years have seen an increasing demand for holistic knowledge and it appears that this has a positive impact on the development of risk intelligence. Interestingly, intercultural research has come to similar conclusions: in countries with a low level of uncertainty avoidance, generalists are preferred.

- **Creation of heuristics**

Heuristics, or rules of thumb, are conscious or subconscious strategies that exclude a part of the information available to allow a better judgement to be made.²² According to Gigerenzer **in an uncertain world, simple rules of thumb can lead to better results than complex calculations.**²³ When put into practice, the problem is that many managers are not able to articulate heuristics explicitly but describe them as intuition instead.²⁴ The author's own experience shows that many appropriate heuristics exist in the business environment. However, there are few empirical studies or even lists of such heuristics. We should therefore encourage decision-makers or participants in the decision-making process to take up this issue and to consciously watch out for such heuristics. They can often be found in casual or even humorous phrases during a discussion. **According to the author's experience, another good source from which heuristics can be derived is to ask managers about their biggest mistakes in hindsight.**

At the organisational level

- **Create a culture of failure**

Rethinking the organisation's culture of failure can provide immense leverage. **Risk intelligence requires a culture that promotes an open admission of mistakes to facilitate learning from them.**²⁵ When a culture of failure is missing, people lack the courage to make decisions for which they may be held responsible.²⁶ The achievement of risk intelligence requires constructive feedback, which is only possible in a culture of failure. With respect to the attitude towards mistakes, there are corresponding findings from the intercultural research: Cultures characterized by a high level of uncertainty avoidance also have a high *need to avoid failure*.²⁷

In a negative culture of failing, the organisation removes one of the main sources of innovation and success, as it is highlighted by numerous quotes. Of these, Henry Ford's "*Failure is the opportunity to begin again more intelligently*" and Wernher von Braun's "*It takes sixty-five thousand errors before you are qualified to make a rocket.*" shall be mentioned.²⁸ If you are trying to find the root cause for negative culture of failing, the cultural roots discussed above certainly play a key role. In addition, the idea of "zero defect", which originates in quality management and is appropriate there, has maybe gone too far and been transferred to areas where it is not suitable. Another problem is that in our evaluation of results we fail to differentiate between factors that can be influenced and those that cannot.²⁹

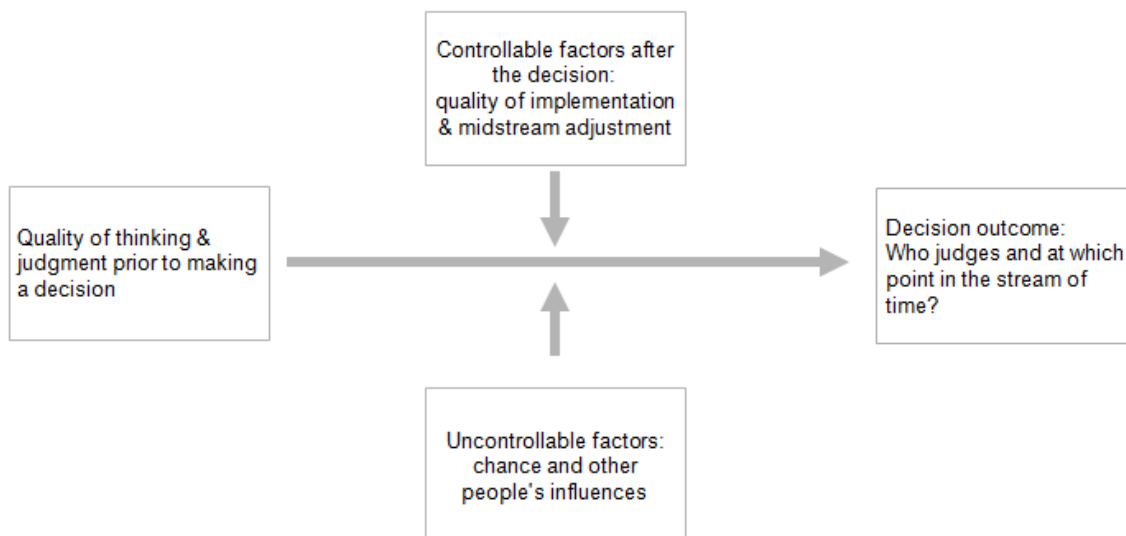


Figure 1: Factors impacting a decision's outcomes

- **Risk dialogue**

Another important tool is risk dialogue. Research into decision-making has shown that the **number of differing opinions that one takes into account has a positive impact on the quality of decisions.**³⁰ Risk dialogue means any form of exchange about risks beyond the communication institutionalised via process steps. This exchange with others provides an opportunity for "repairing" the *confirmation bias* explained above. **Examples for formal methods of risk dialogue include the "Devil's Advocate" (Advocatus Diaboli)** whereby one of the participants of the dialogue argues against the status quo - similar to a court hearing. A variation of this is the *Devil's Inquisitor*³¹, who is asking

questions instead of arguing an alternate point of view. This may be an advantage for the discussion atmosphere as well as for the comfort of the person taking the devil's role.

▪ **Principle of *independent judgement***³²

The general principle of *independent judgement* postulated by Kahneman can also be applied to risk assessment. **The idea is to obtain information from several independent sources.** A possible application could be to ask participants to write down a brief summary of their position on an issue (in our case, their risk assessment) before the discussion takes place.

It goes without saying, these measures should be supported by specialist and objective risk assessment methods.

In addition to the “classical” business management tools, such as scoring models, scenario planning, sensitivity analyses, risk checklists and portfolios, decision theory provides some new approaches, including *reference class forecasting*³³ (also known as *outside view*).

The use of tools at the interface of “hard” and “soft” is also recommended. These aim to combine specialist and psychological insight and include the project pre-mortem by psychologist Gary Klein³⁴ or the checklist approach by Atul Gawande³⁵.

Personal risk intelligence is no substitute for an expert risk assessment. Yet, the pure application of specialist methods fails to provide an adequate basis for navigating an uncertain environment.

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¹Gigerenzer uses the term "*risk savvy*".

²Comp. "Generation Unsicherheit" (The Generation of Uncertainty) in: Der Spiegel, 1/2013, p. 58-60.

³The English language offers the term VUCA environment, the acronym VUCA describing volatility, uncertainty, complexity and ambiguity. This was originally a military term coined at the end of the Cold War which gained momentum outside of military use with the events of 9/11 or, more recently, with the financial crisis.

⁴Gigerenzer, Gerd: Risiko - Wie man die richtigen Entscheidungen trifft (published in English as: Risk Savvy- How to make good decisions), Munich 2013, p. 27

⁵And for the "generation of uncertainty", this is a core skill. Comp. "Generation Unsicherheit" (The Generation of Uncertainty) in: Der Spiegel, 1/2013, p. 58-60.

⁶Also comp. Luhmann, Niklas: "Soziologie des Risikos" (Sociology of risk), Berlin, 2003, p. 17 Important and documented applications are trade and seafaring.

⁷Knight, Frank: Risk, Uncertainty and Profit, New York, 1921, p. 19f., cited from: Hubbard, Douglas W.: The Failure of Risk Management, New Jersey, 2009, p. 81. Both Gigerenzer and Dobelli appear to be applying this concept. Comp. Gigerenzer, Gerd: "Risiko" (Risk), p. 386 and Dobelli, Rolf: "*Warum Sie lernen sollten, mit der Unbestimmtheit zu leben*" (Why you should learn to live with uncertainty), published in FAZ, 5th December 2011, No. 283, p. 30

⁸The DISC profile and the Herrmann Brain Dominance Model both analyse the thinking style.

⁹Comp. itim, Intercultural Management, seminar materials, January 2009.

¹⁰ Comp. itim, 5-D Pocket Guide, 2008

¹¹Comp. Kahneman, Daniel: Thinking, Fast and Slow, London, 2011, p. 368

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- 12 This phenomenon is also known as “planning fallacy”. Comp. e.g. Lovallo, Dan/Kahneman, Daniel: Delusions of Success - How Optimism Undermines Executives' Decisions, published in Harvard Business Review, July 2003, p. 56-63
- 13 Comp. Evans, Dylan: Risk Intelligence - How to Live with Uncertainty, London 2012, p.84
- 14 Comp. e.g. Gigerenzer, Gerd: Risiko (Risk), p. 20ff.
- 15 Evans, Dylan: Risk Intelligence, p. 17f.
- 16 Comp. Hubbard, Douglas W.: How to Measure Anything - Finding the Value of Intangibles in Business, John Wiley & Sons, 2007, p. 9ff.
- 17 Comp. Hubbard, Douglas W.: How to Measure Anything - Finding the Value of Intangibles in Business, John Wiley & Sons, 2007, p. 10.
- 18 Based on: Russo, Edward, J./Schoemaker, Paul H.: Winning Decisions - Getting It Right the First Time, 2002, p. 80
- 19 Also comp. Hubbard, The Failure of Risk Management, p. 203ff.
- 20 This is referred to as information overload. Comp. the remarks of the author in Drewniok, Babette: Der Controller als Business Partner: Erfolgskritische Fähigkeiten (Controllers as business partners: skills critical for success), in: Controller Magazin, May/June 2012, p. 32,
- 21 Comp. Mansharaman, Vikram: All Hail the Generalist, HBR Blog, Source: http://blogs.hbr.org/cs/2012/06/all_hail_the_generalist.html
- 22 Comp. Gigerenzer, Gerd: Risiko (Risk), p. 380.
- 23 Comp. Gigerenzer, Gerd: Risiko (Risk), p. 59.
- 24 Comp. Maidique, Modesto: The Leader's Toolbox, Working Paper
- 25 Comp. Gigerenzer, Gerd: Risiko (Risk), p. 62.
- 26 Comp. Gigerenzer, Gerd: Risiko (Risk), p. 78. He describes this phenomenon as *defensive decision-making*.
- 27 Comp. itim, 5-D Pocket Guide, 2008
- 28 On this issue also comp. the valuable article by Schaefer, Jürgen: Fehler? Falsch! - Warum auch Irrtümer uns im Leben voran bringen (Error? Wrong! - Why mistakes get us ahead in life), published in: GEO, 03/2012, p. 136-149
- 29 Figure based on Schoemaker, Paul J.H.: Brilliant Mistakes - Finding Success on the Far Side of Failure, Philadelphia 2011, p. 15
- 30 Comp. Drucker, Peter: The Essential Drucker, HarperCollins Verlag, New York, p. 254
- 31 Comp. Bazerman, Max H./Chugh, Dolly: Decisions Without Blinders, in: Harvard Business Review, January 2006, p. 88-97, here: p. 93
- 32 Comp. Kahneman, Daniel: Thinking, Fast and Slow, London, 2011, p. 84f
- 33 Comp. e.g. Lovallo/Kahneman, footnote 12, or publications by Bent Flyvbjerg
- 34 Comp. Klein, Gary: Performing a Project *Præmortem*, in: Harvard Business Review, September 2007, p. 18-19
- 35 Gawande, Atul: Checklist-Strategie - Wie Sie die Dinge in den Griff bekommen (published in English as: The Checklist Manifesto - How To Get Things Right), btb-Verlag, 2013