Background

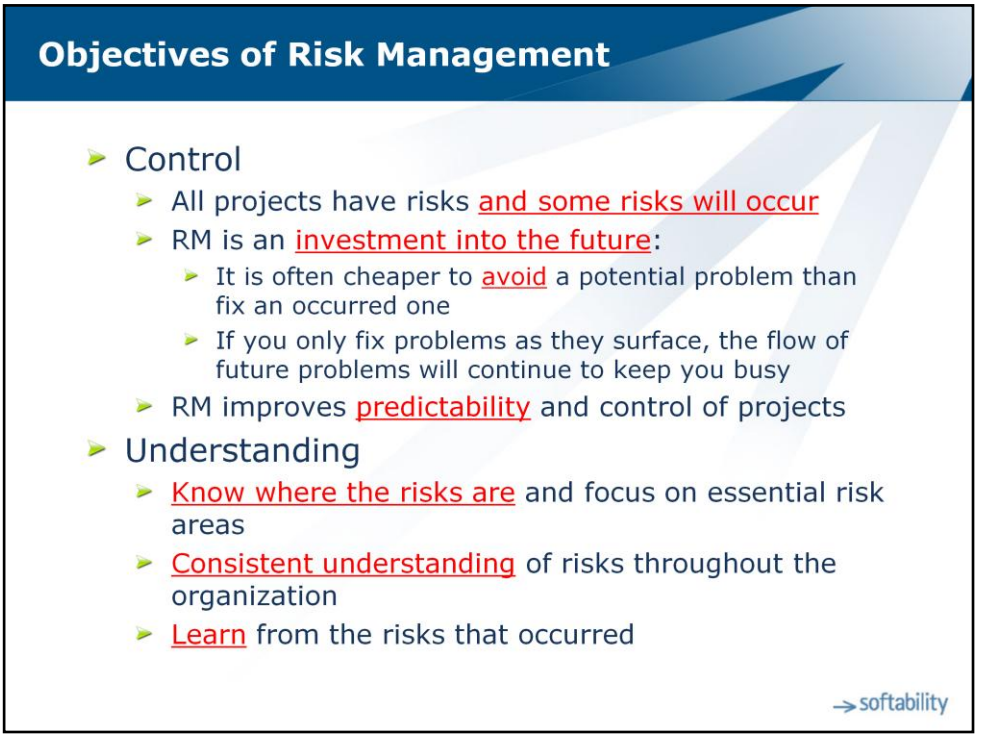
- Development Director, Softability Oy
- Board member at QPR Software Oyj, Softability Oy, Webropol Oy, Tietotekniikan Liitto, Ohjelmistoyrittäjät ry.
- Professor of Software Product Business @ Helsinki University of Technology, 2002 – 2007
- Nokia, 1986 – 2002
  - Knowledge-based systems research and consulting at Research Center (1986-92)
  - Manager of the software engineering research group at Research Center (1992-94)
  - Quality manager at a business unit (1997-99): Nokia's process management principles, Nokia Risk Management System
  - Senior manager at Nokia Networks: process management (1999-2000)
  - Principal Scientist at Nokia Research Center, software capability (2001-02)
- Founding partner at R & D-Ware Oy, http://www.rdware.com
  - Risk mgmt consulting and training
  - Software engineering consulting
  - Technical due diligence
  - Process management and improvement
- Other experience
  - Acting (part-time) professor of Software Engineering at Helsinki University of Technology (1997-2000)
  - Senior researcher at University of Maryland in professor Basili's research group (1994-96)
  - Software development and management in software houses and corporations (1982-1986)

Outline

- Different perspectives on risk
  - Key concepts and definitions
  - Risk management "domains"
- Importance of stakeholders
  - Why are they important, who are they?
- Risk mgmt process
  - Main steps and techniques
  - Main pitfalls
- Process risk management
  - How are risks associated with process?
- How to sell risk management capability
  - Who is the customer?
  - What is the value proposition?
  - What is the solution?

Everybody manages risks all the time in their every day life. We buckle up and are in constant alert for something unexpected, when we drive a car; we eat well and take health insurance. These risk are familiar to people and they are easy to manage intuitively.

Risks in complex and large projects cannot be managed intuitively, because the risk are too numerous, they are too complex and they require communication with other people.



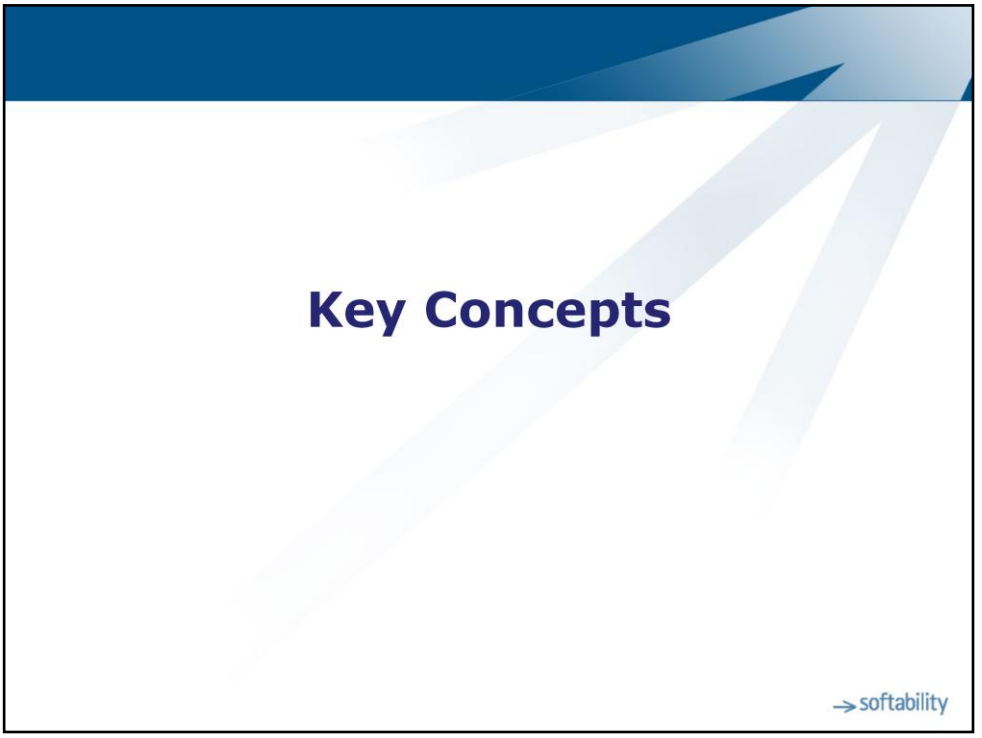
All projects have risks and some of them will inevitably occur. However, it is often cheaper to avoid a potential problem than fix an occurred one. Risk management tries to do this and you can think of it as an investment into the future.

By identifying and analyzing risks, it is possible to know the essential risk areas and to concentrate risk controlling efforts effectively.

By controlling the biggest risks, we improve predictability and control in projects.

Consistent use of risk management practices and terminology helps communicating and understanding the risk information.

By analyzing the performed risk management activities and the risks that occurred, we can improve risk management for the future.



This part gives an overview of the key terminology of risk management.

What is Risk?

1.	"We don't have a lot of experience in graphical user interface" "Requirements are unstable"
2.	"Excessive time may be spent on user interface development" "Requirements may change"
3.	"We may have to rework the user interface" "Extra development effort may need to be spent due to requirements change"
4.	"Project may be late and over budget"
5.	"There is a 50% risk that Joe will quit before system testing phase"
6.	"The use of CASE tool XYZ is a risk in the project" "It would be a risk to deliver the prototype too early"

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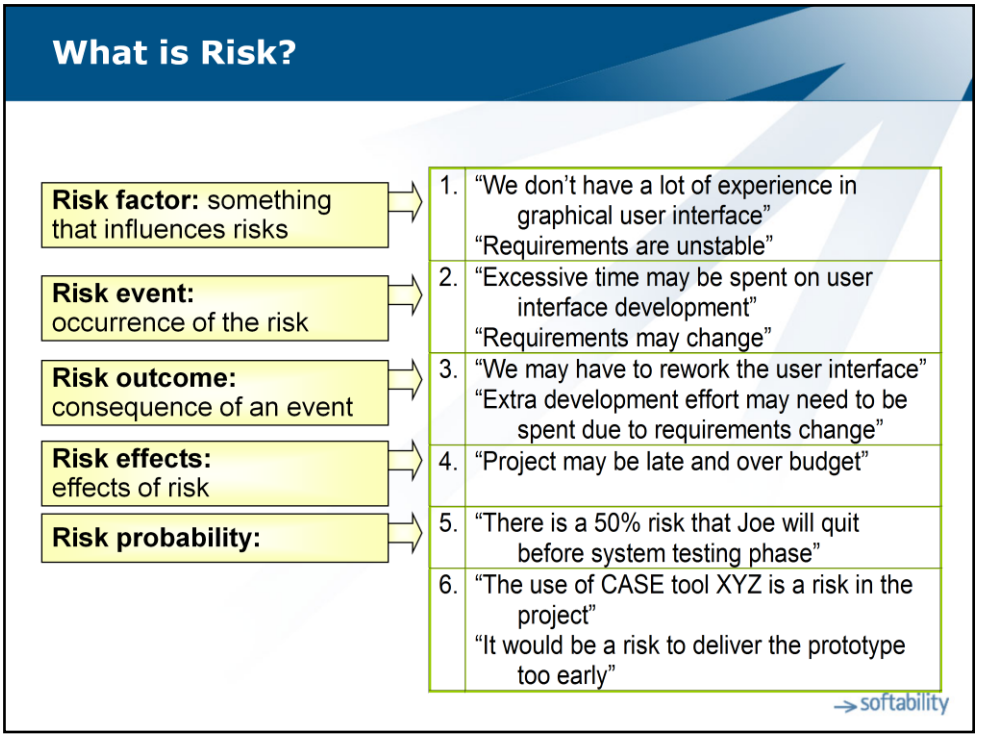
Here are different kind of statements. Which ones of these correnspond to your idea of ”risk”?



Risk is a complex, multi-faceted concept and a single word ”risk” is often insufficient for deeper and thorough analysis.

In order to understand risks well, more precise terms need to be used: they will allow more accurate and effective discussion and analysis of risks.

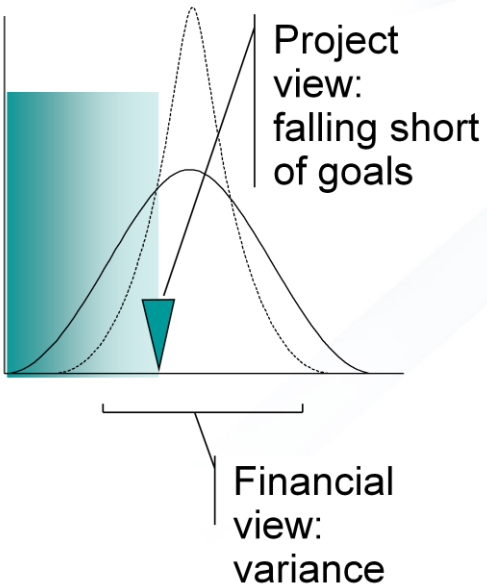
Risk Factor is a known characteristic that affects the probability of a negative event occurring. It describes the environment and does not have a probability associated with it.

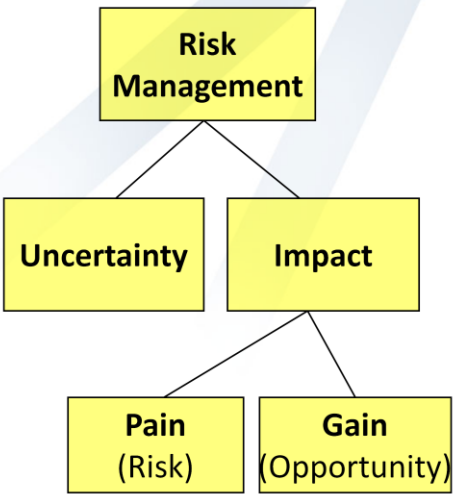
Risk Event represents an occurrence of a negative incident. It is a probabilistic phenomenon, i.e., it is not known for certain whether it will happen or not.

Risk Effects represent the final impact of a risk event to the project and they should be described in terms of project goals.

Probability is an attribute of risk event.

Scope of Risk Management





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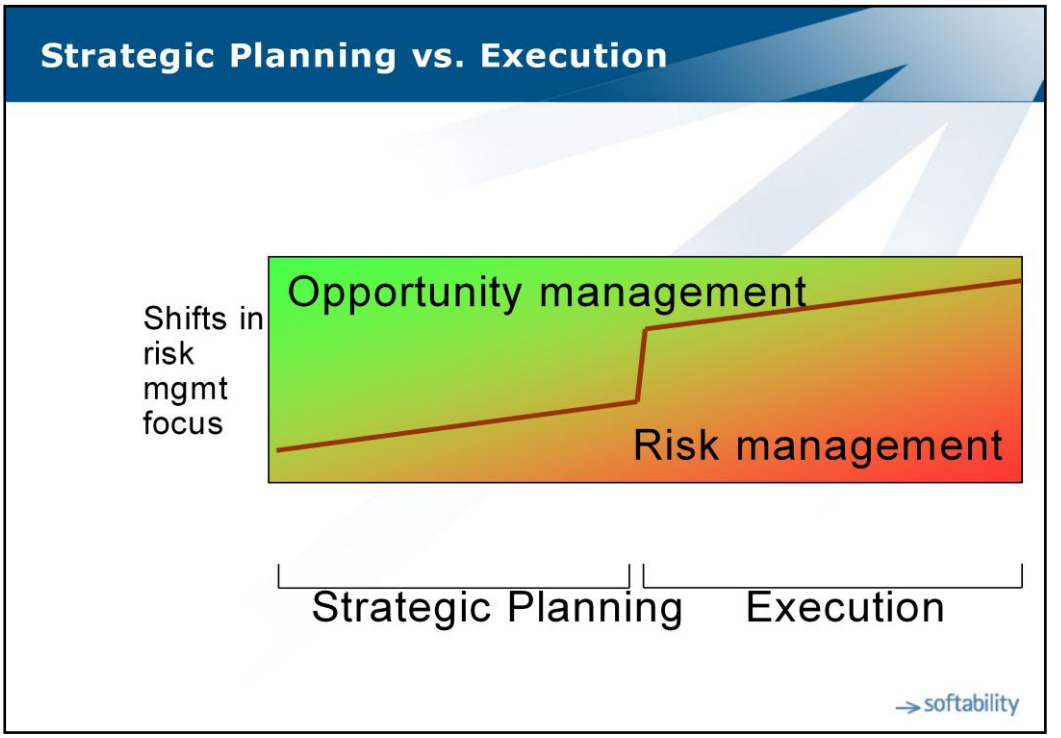
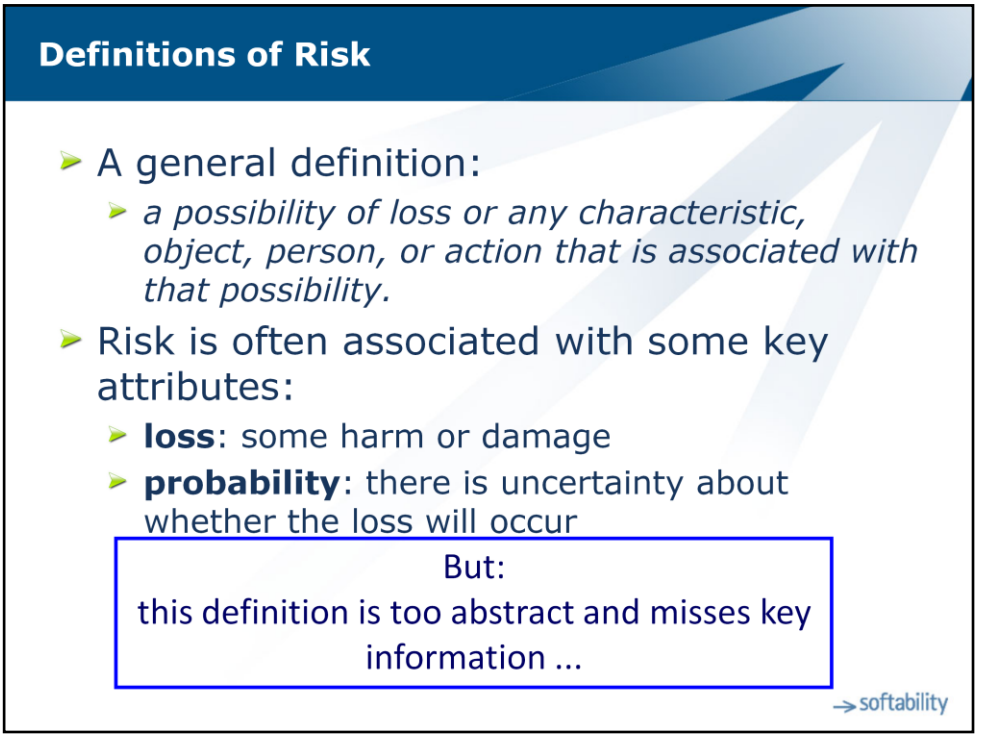


Risks and opportunities need to balanced with each other.

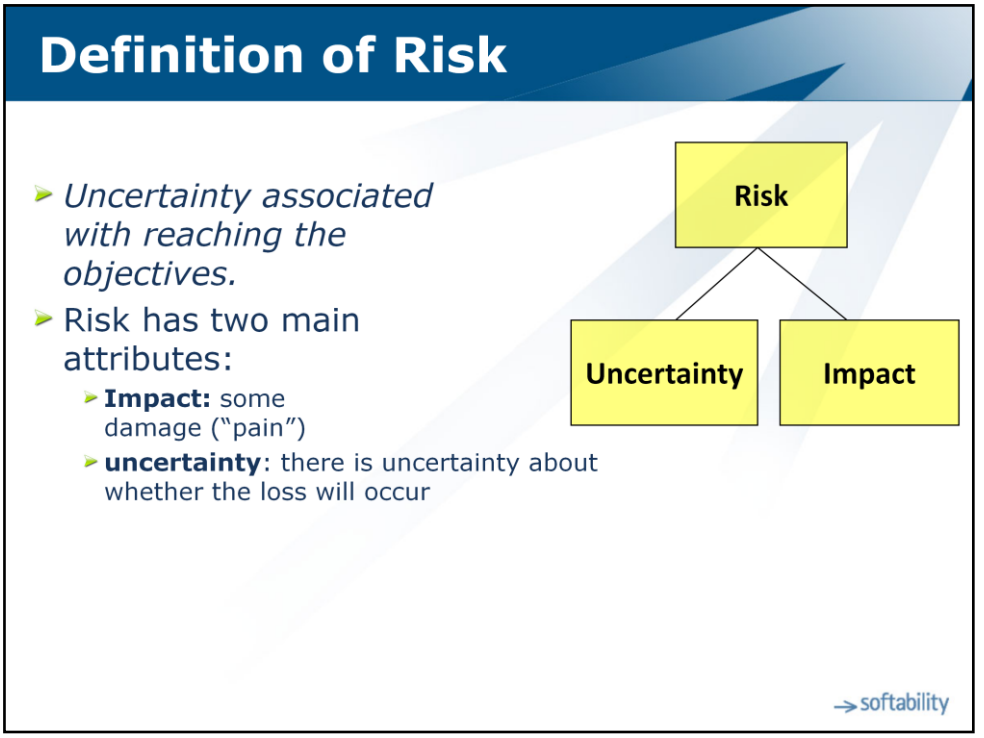
In the strategic planning, opportunities receive the main attention and primarily determine the strategy, risks being considered as well.

When action plans are being made, opportunities and risks need to be balanced to result in a feasible plan, be that program plan, business plan or production plan.

Once the plans and commitments have been made, the main focus of risk management shifts to ensuring that the intended commitments and planned objectives can be met.



A dictionary definition of risk is: ”A possibility of loss or any characteristic, object, person, or action that is associated with that possibility.” However, this definition is too abstract.

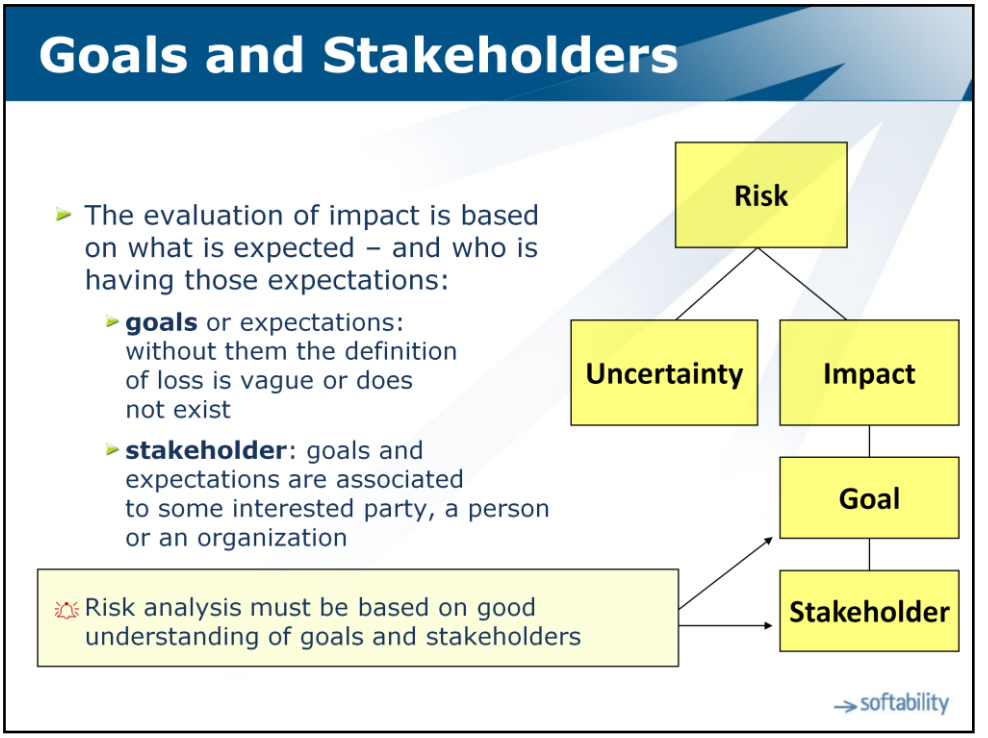


Risk is traditionally characterized by probability and loss, and this is how most of the risk management approaches value risks.

Uncertainty associated to risk indicates that we are dealing with phenomenon may happen – or it may not.

Impact refers to the effects that the risk would have. In the case of risks (as opposed to opportunities) the impact is mainly a negative one: loss of money, resources, reputation, or missing a deadline.

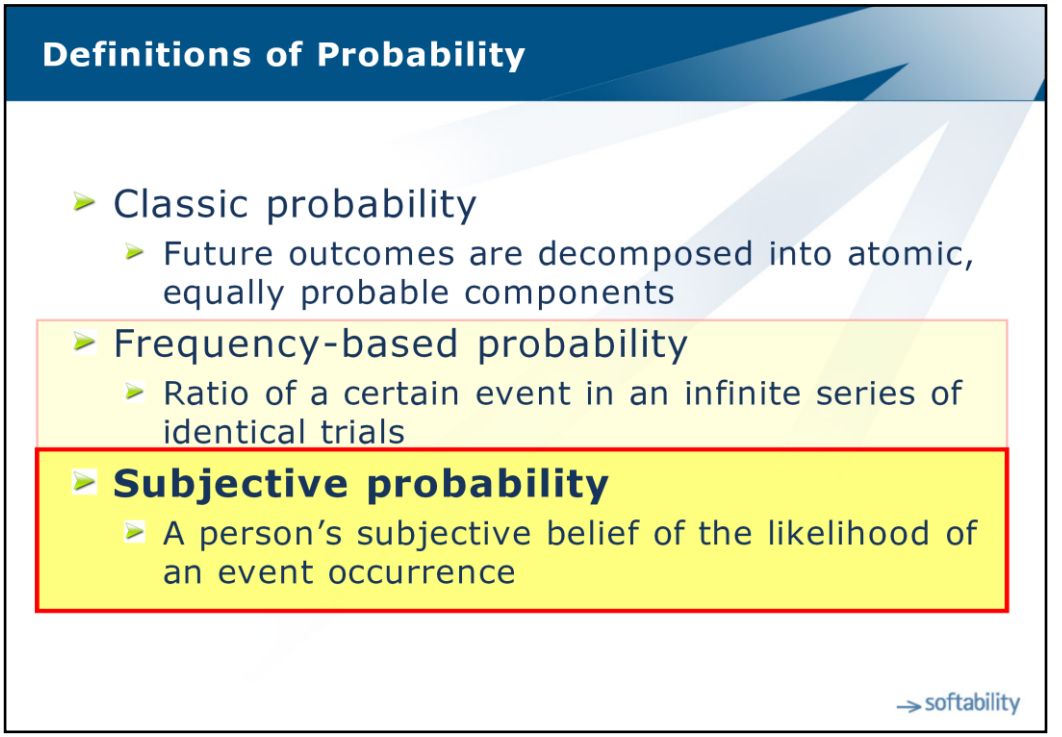
Risk is different from a problem (or an "issue"). Problem is a situation where there is (practically) no uncertainty associated with the negative impacts. Problems are often identified during risk management but they do not need to be carried along in the risk analysis: they should be assigned for resolution ASAP, depending on their seriousness.



Risk is traditionally characterized by probability and loss, and this is how most of the risk management approaches value risks. However, to understand the loss, one needs to know, what the expectations were.

Say an event causes the project to be finished by the end of December. If the original goal of the project was to finish by end of December, this is not a risk. But if the goal was to finish by the end of September, this event represents a delay of 2 months and therefore is clearly a significant risk.

Goals and expectations don't exist as such, but they belong to stakeholders. By identifying relevant stakeholders and their expectations, it is possible to prioritize risks and then decide, what to do with them.



Here are listed three different definitions of probability.

•The most basic of them is classic probability, where future outcomes are decomposed into atomic, equally probable components, such as throwing dice. This definition, however, cannot be used in software projects.

•A second definition is frequency-based probability and this definition may sound useful, but software projects are always unique and so this definition does not apply here either.

•The definition that is left is subjective probability, where a likelyhood of an event is based on a person's subjective belief. This may not be very scientific, but it is the only definition that can be used.

Risk Management "Domains"

- Risk compliance
  - Prove that you have an effective risk management system in place
- Enterprise risk mgmt
  - Gain business value from effective risk management
- Project risk mgmt
  - Ensure success of projects

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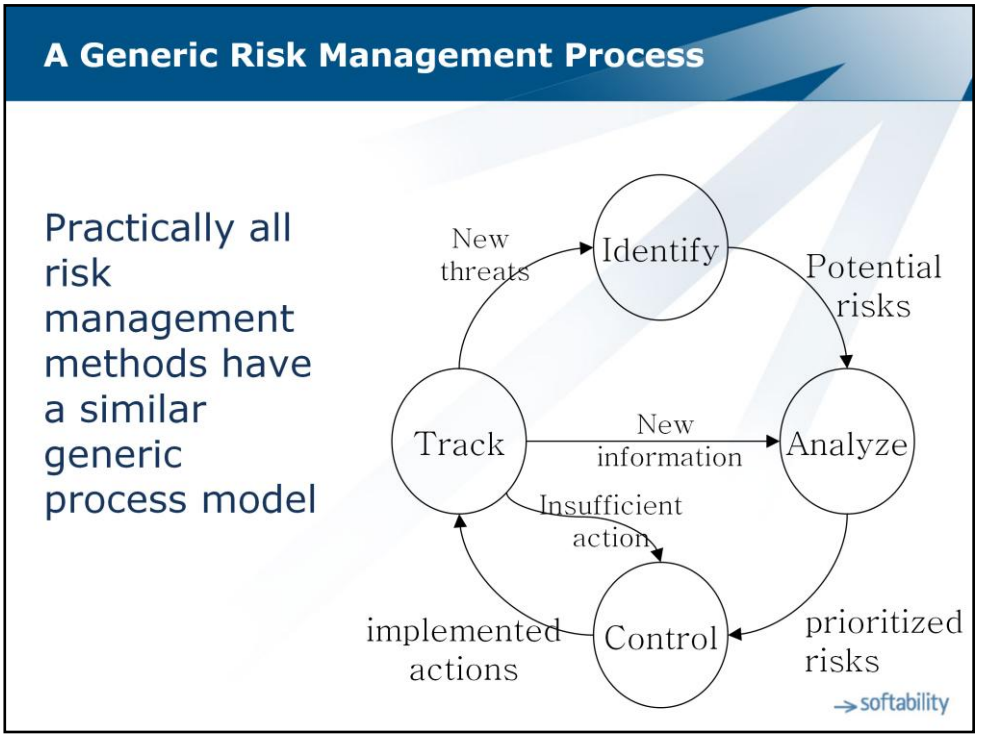
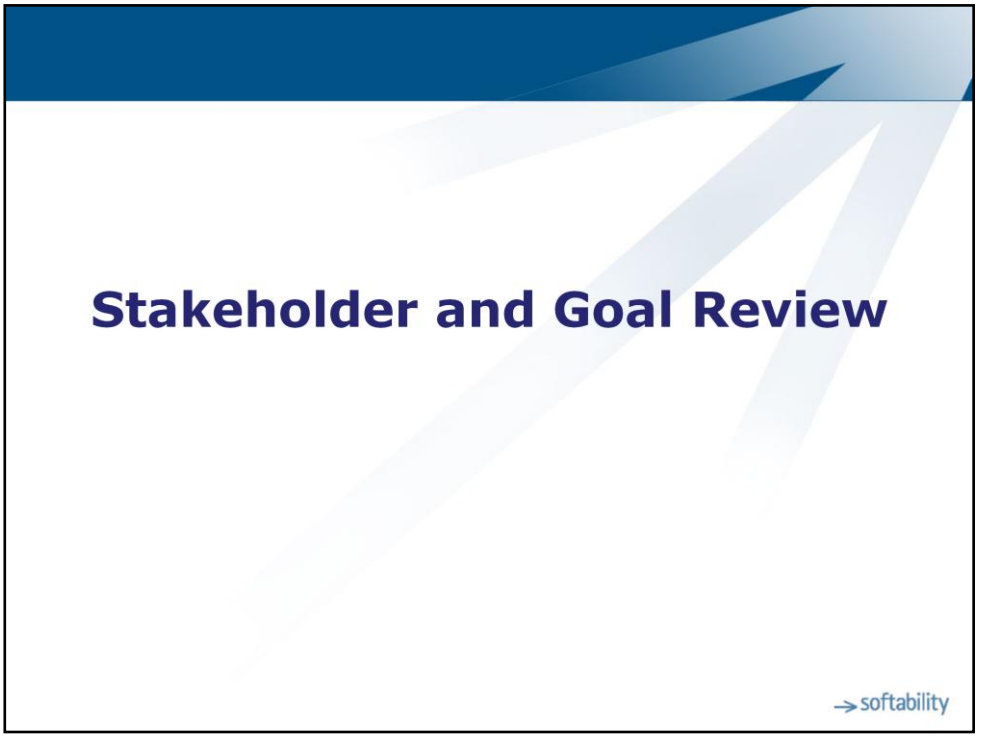


This slide presents a generic risk management process. All of the well known risk management process models have the same four basic steps, even though they may be named differently:

- Identify – risks are identified
- Analyze – risks are analyzed and prioritized
- Control – controlling actions are taken to mitigate risks
- Track (Monitor) – risk situation is monitored and new identify, analyze and control steps are initiated as needed.



This presentation describes the project goal review.

Stakeholders

- Stakeholder is any individual, group, or organization who can affect, or be affected by, the process or its results
- Stakeholders can be, e.g.,
  - Line management
  - Customer(s)
  - Partners, suppliers and vendors
  - Other programs or units
  - Personnel
  - Society

- It is important to know the main stakeholders and their interests

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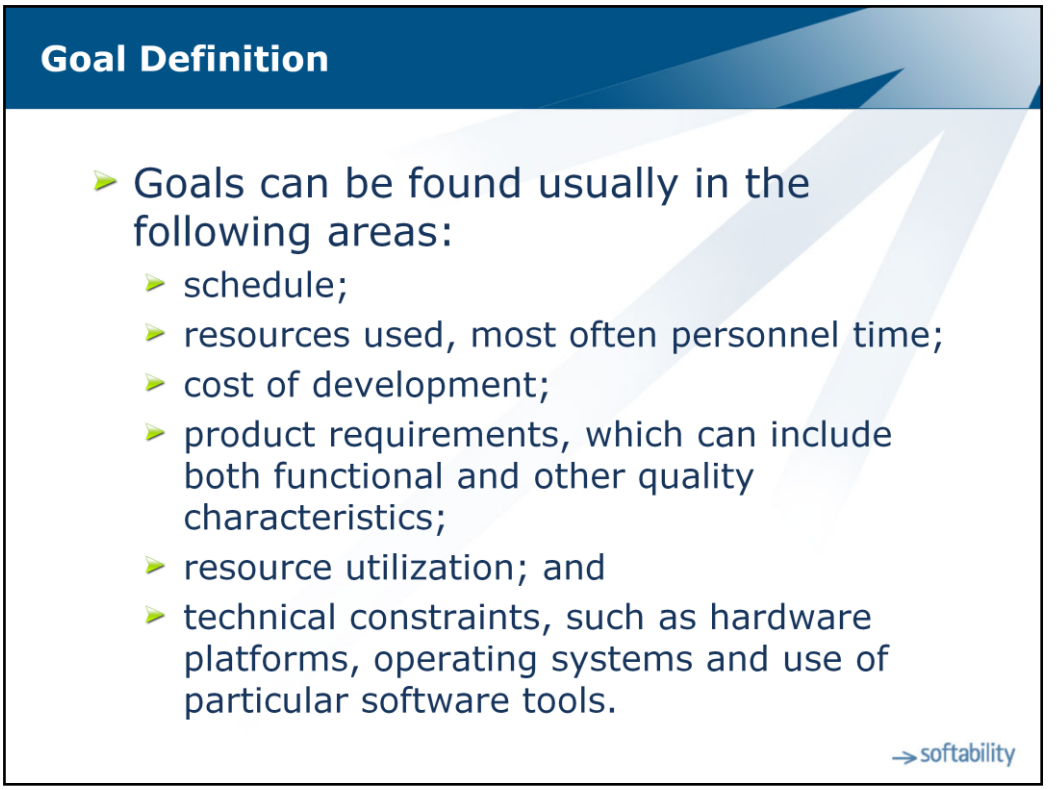

Goal Definition

Description

Existing goal definitions are reviewed and refined, if necessary, implicit goals are identified and defined.

The association and expectation levels between goals and stakeholders are defined.

Frequency

Performed once right after risk management mandate definition.

Can also be performed if new goals or stakeholders have been identified or existing goals or stakeholders have changed.

Responsible

Project manager.

Participants

Project owner, project stakeholders, project personnel.

Inputs

Project authorization information: goals, resources, schedule, budget.

Risk management mandate.

Output

Goal definitions.

Duration

1-2 hours

Goal and Stakeholder Priorities

- Priorities for goals and stakeholders are defined
- Approximate priorities are adequate

Stakeholders: **Goals:**	Customer priority: 1	Project personnel priority: 2	Upper management priority: 1
Schedule	1	3	1
Cost	2	4	2
Quality	2	1	4
Functionality	3	2	3

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Goals are linked to different stakeholders that are associated with a project. This information will later be used in risk analysis to compare and rank risks

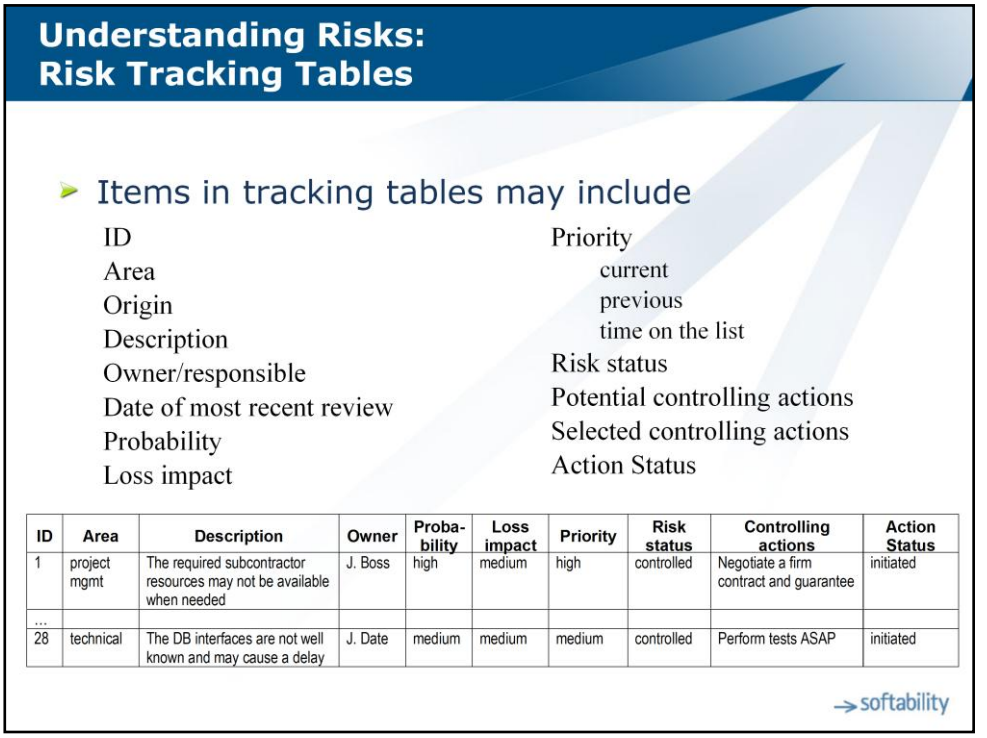
The relationships between goals and stakeholders can also be documented using a stakeholder-goal priority table presented above. Such a table allows approximate prioritization of goals for each stakeholder: each cell in the table documents relative importance of goals for each stakeholder. It is important to point out that if such rankings are documented for stakeholders, each column should be read and interpreted independently. Priority values *between* stakeholders for a given goal cannot be derived from such information. In other words, goal priority rankings should be interpreted only within a single column, not across columns.

As shown above, the relative priorities between stakeholders can also be documented in stakeholder column headings.

This presentation describes the risk analysis step.

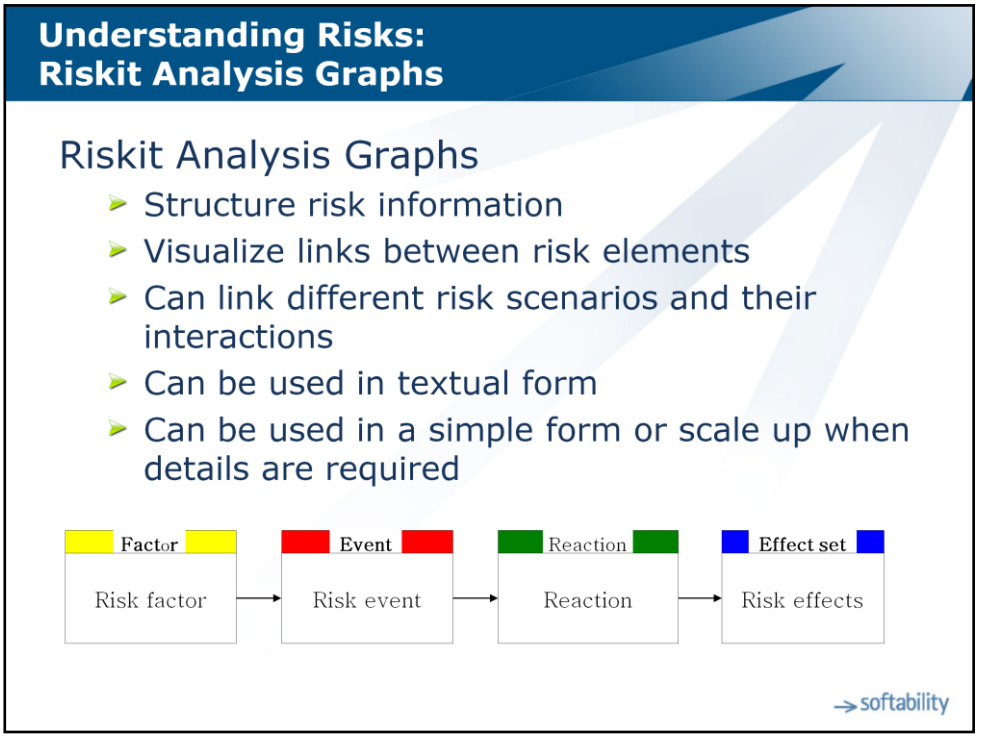
Main Messages

- Analysis performs two things:
  - understand and communicate about the risks
  - Prioritize the risks
- Several different techniques can be used, each have their strengths and weaknesses
- Analysis relies in subjective views of participants



There are several ways of documenting risks. One of them is using Risk Tracking Tables.

The benefit of using this kind of documentation method is that it allows you to document several risks one sheet of paper and gives you a good overview of the risk situation. The downside of it is that it allows you to store only very little information about the risks.

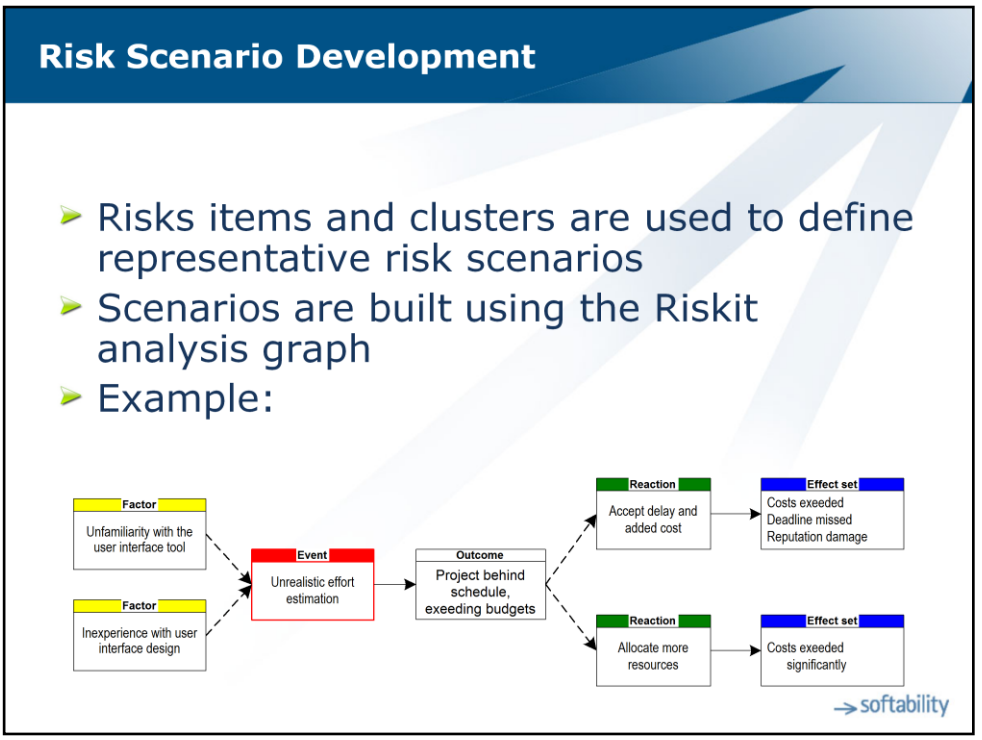


The *Riskit analysis graph* is a graphical formalism that is used to define the different aspects of risk more formally. The Riskit analysis graph can be seen both as a conceptual template for defining risks, as well as a well-defined graphical modeling formalism. In both cases, it can be used as a communication tool during risk management.

It may not be necessary to create graphical scenarios from all the risks, just the ones that are most important.

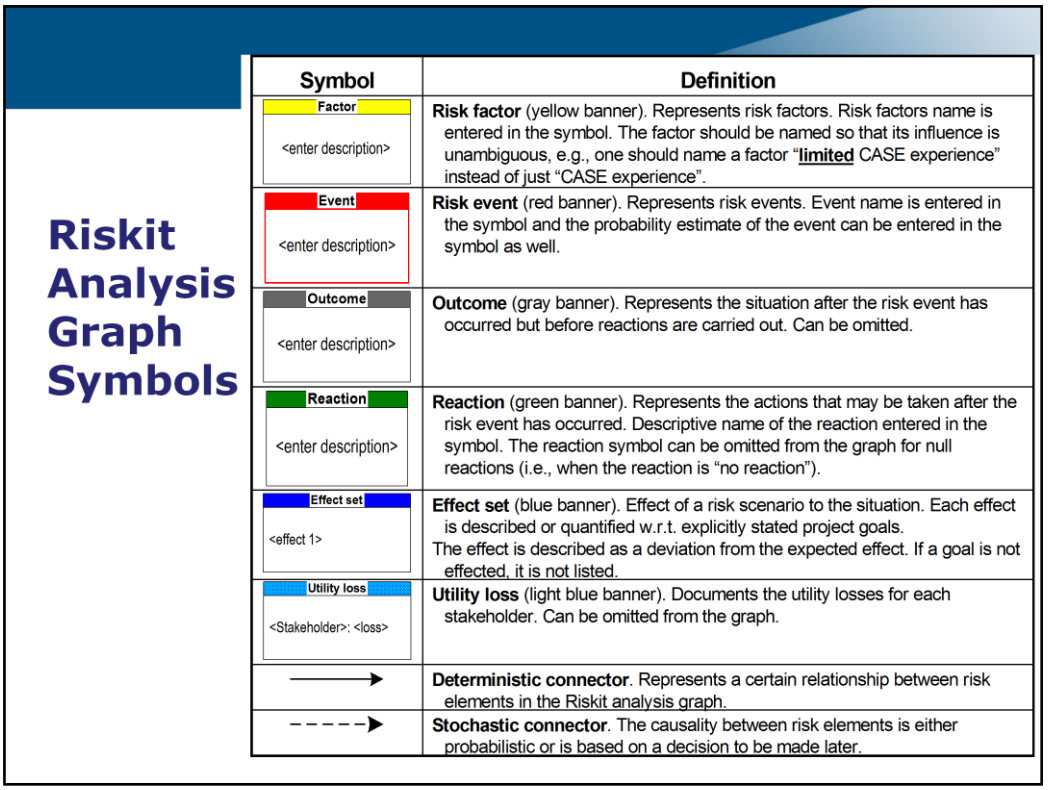
We have noticed that RiskitFlaps make it particularly easy to create risk scenarios and discuss risks in risk management sessions.

(RiskitFlaps are colorful laminated Risk analysis graph elements that stick to magnetic boards with magnets. They can be written on with water-soluble pens and wiped clean for the next meeting. RiskitFlaps are available from R & D-Ware at www.rdware.com)



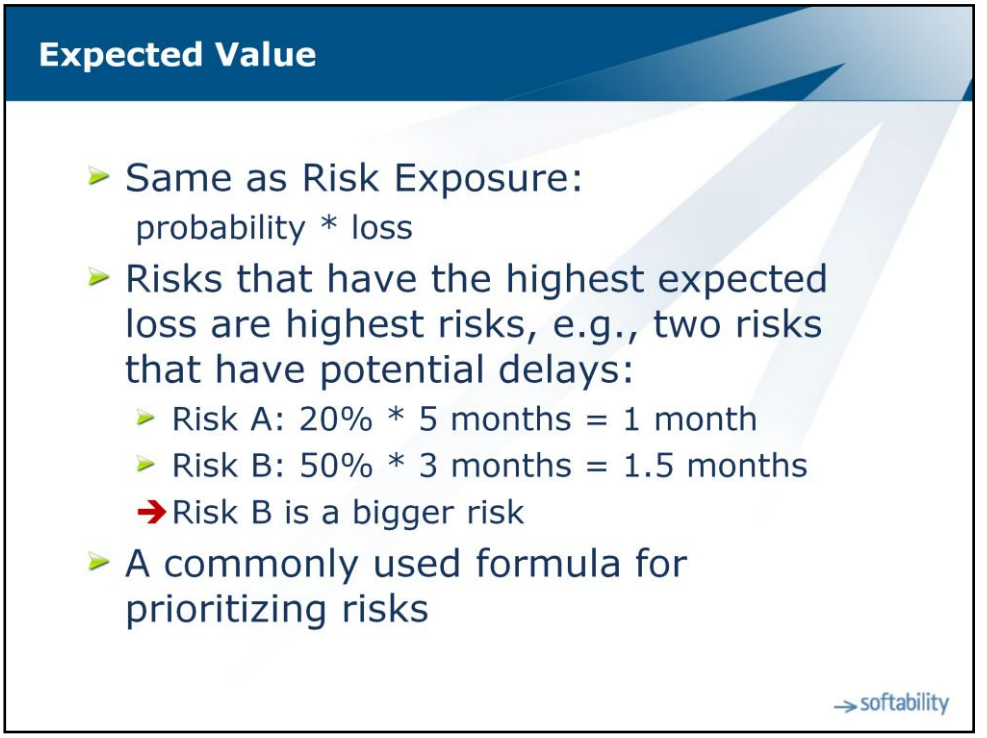
Risk scenario development provides the detailed documentation of risks that are selected for analysis. Risk scenarios are documented using the Riskit analysis graph.

As there normally is limited time available for risk analysis, not all risk items from the risk identification process can be included in risk analysis. Therefore, selecting (“raw”) risk items from risk clusters is an initial risk prioritization choice, yet this choice is made when the risks are not yet analyzed. To counter the possible bias caused by such an early selection, an adequate number of risk scenarios should be developed.



The Riskit analysis graph uses specific symbols to represent risk elements. The allowed symbols in the Riskit analysis graph are defined above. The banners of the symbols are color-coded to support easier recognition of risk elements. The Riskit symbols can be drawn manually or with any drawing tool. However, we have implemented a drawing template on VISIO which contains the Riskit symbols and thus supports easy creation and editing of Riskit analysis graphs. The symbols are also available as MS Office Drawing objects.

While the risk effect represents the impact the risk had on each project goal, the concept of *utility loss* captures how severe the overall impact of effects is. The concept of utility loss is based on the utility theory, a concept widely used in economics and decision theory. The use of utility theory allows the simultaneous consideration of multiple criteria and consideration of several stakeholders. Furthermore, it is likely to result in more realistic evaluation of the losses as the utility functions of stakeholders are generally believed to be non-linear and there may be points of discontinuity in them. We have sometimes used the term "pain" as a synonym for utility loss as the concept of utility may appear too theoretical for practitioners. The utility loss is estimated for each relevant stakeholder. Thus, each risk effect set has at least one utility loss estimate associated with it.



Whether you are using expected value calculations, risk ranking tables or Riskit Pareto ranking technique to prioritize the risks, you should always rank probabilities and losses separately, so that they don't influence each other (i.e. first rank the probabilities of all risks, then rank the losses).

Once the rankings for probabilities and losses have been obtained for all risks or risk scenarios, they can be ranked. The concept of expected loss can be used to prioritize scenarios if both probability estimates and loss estimates have been estimated using distance or ratio scale metrics. However, since sometimes these estimates are pure guesses, multiplying them is a meaningless operation.

This game demonstrates the effect of unlinear utility loss functions that we have. You can play this game by drawing a number between 1 and 100 on a peace of paper and giving someone else a $20 note. He or she must then decide, whether to give it right back (i.e. 100% probability of losing $20) or by saying a number between 1 and 100. If he/she says the same number as you have written on the paper, he/she must pay you $2000 (i.e. 1% probability of losing $2000).

If the person acts according to the formula of expected loss, the both choices should be indifferent. And if you improve the second offer by reducing the amount to $1900, he/she should always pick that. However, people do not often act this way, because of their unlinear utility function.

Organizations too have unlinear utility functions, therefore risk ranking with expected loss calculations give wrong results, even if the probability and loss estimated were correct.

Process Risk Management

- Processes are the new way of managing an organization
  - Gives the right focus
  - Goes accross organizational borders
  - Leading enterprises are very process-oriented
- Practically all risks can be linked to processes
- Process-based risk management makes risk management more concrete and manageable

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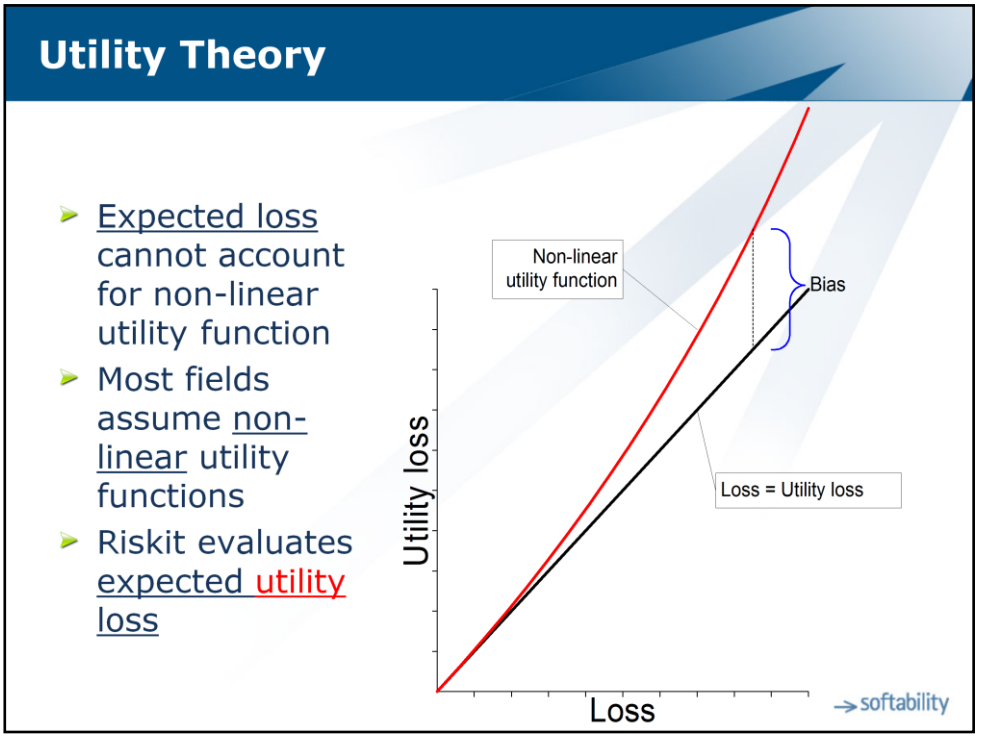

Utility theory is a concept widely used in economics and decision theory. It states that people make relative comparisons between alternatives based on the utility (or utility loss) that they cause. The utility is the level of satisfaction, pleasure or joy that a person feels or expects. (Utility loss is therefore the level of loss of satisfaction, ...). The use of utility theory allows the simultaneous consideration of multiple criteria and consideration of several stakeholders. Furthermore, it is likely to result in more realistic evaluation of the losses as the utility functions of stakeholders are generally believed to be non-linear and there may be points of discontinuity in them.

Many current risk management approaches are based ranking of risks based on the loss they cause to some specific attributes of the project, such as cost, time delay, or quality metrics. Often a single metric is used. This can be detrimental for two reasons. First, the use of a single metric, or a small number of metrics, can create strong bias away from secondary, yet influential goals that should be considered. Second, research in economics and management science has strongly indicated that decision are made based on the changes in the expected utility (or utility loss) of alternatives. As the utility functions of stakeholders are likely to be non-linear, use of direct loss metrics can lead to wrong estimates and rankings of the risks. Therefore, the Riskit method uses the concept of utility loss to compare and rank losses of risks.

How to sell risk management capability?

- Who is the customer?
- What is your value proposition?
- What is the solution?
- Why is it better than competitors' solution?

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What is Risk Management Capability?

- Risk Management Capability refers to ***organization's ability to proactively take and mitigate risks for business benefit***
- Risk Management Capability is based on
  - **Personnel and their skills**
  - **Processes**
  - **Tools**
  - **Software assets**
  - **Technology and architecture**
  - **Management system**
  - **Organizational knowledge** – tacit and explicit
- Risk management can be a *Core Capability* that creates a **sustainable competitive advantage** for the organization in its business

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Who is the Customer?

- Risk compliance:
  - Internal audit unit
  - Quality management function
- Enterprise risk mgmt:
  - Business unit heads
  - Risk management directors
- Project risk mgmt:
  - Process owners
  - Program managers
  - Business unit executives

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What is a Value Proposition?

- Wikipedia:
  - "A value proposition in business and marketing, is a statement summarizing the customer segment, competitor targets and the core differentiation of one's product from the offerings of competitors"
- Moore:
  - "Why should I buy this product or service?"
    - For <**target customer**>
    - who <**statement of the need** or opportunity>,
    - (the <product/service name> is a <product/service category>)
    - that <**statement of benefit**>.
    - Unlike <primary competitive alternative>,
    - our product <**statement of primary differentiation**>.

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What is Your Value Proposition?

- ”We can make your risk management system more effective, more systematic and fully transparent by using QPR to *link risk management activities* to processes and stakeholders and by supporting risk managers and capturing all risk management information automatically”

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What is the solution?

- QPR's software
- Consulting
  - Planning
  - Training
  - Customization
  - Integration
  - Deployment
  - ...
- Benchmarking
  - How good are the customers' practices compared to best of breed?

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Why is it better than competitors' solution?

- Integrated with the processes and key business measures
- Provides full traceability of risk management
- Can deal with multiple effects
- ...

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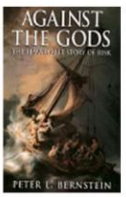
Recommended Books



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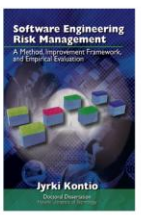

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Questions ?

- Further info:
  - www.rdware.com
  - www.jyrkikontio.fi