

Ensuring the quality of safety analyses in industry



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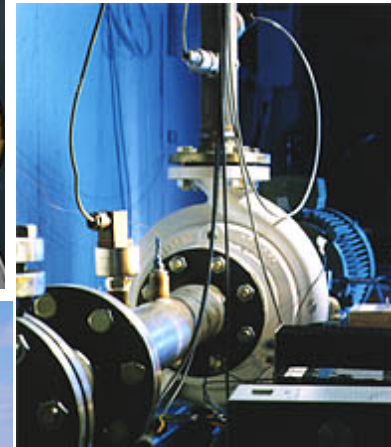


Business from technology

Ensuring the quality of safety analyses in industry

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- Quality concepts in safety analyses
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What we mean by a safety analysis

Safety analysis is here defined to be a systematic examination of the structure and functions of a system that aims to identify potential accident contributors, to evaluate the risk induced by them, and to find risk-reducing measures

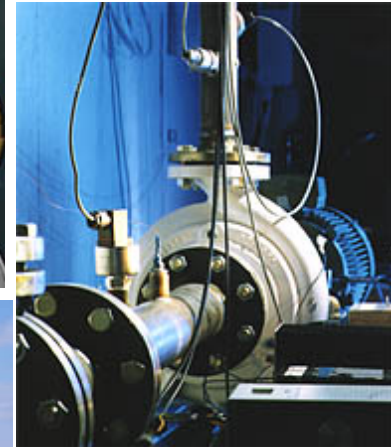
- The concepts "safety analysis" and "risk analysis" have the same meaning in this presentation.
- We focus here on risk analyses in conventional industry.
- In many fields the risk analysis is defined more strictly, e.g. in nuclear industry.

Importance of quality in safety analyses

Same aspects highlight the question on quality of safety analysis:

- Safety and risk analyses have become more and more common in all industrial applications
- National legislation and international agreements demand safety and risk assessments for various industrial activities
- Criticism about the high demand of resources in analyses
- Results depend on analysis leader and analysis team
- Lack of new safety analysis experts in the field

How can we replace the experts that are expected to retire within the next years?



Quality concept in safety analyses

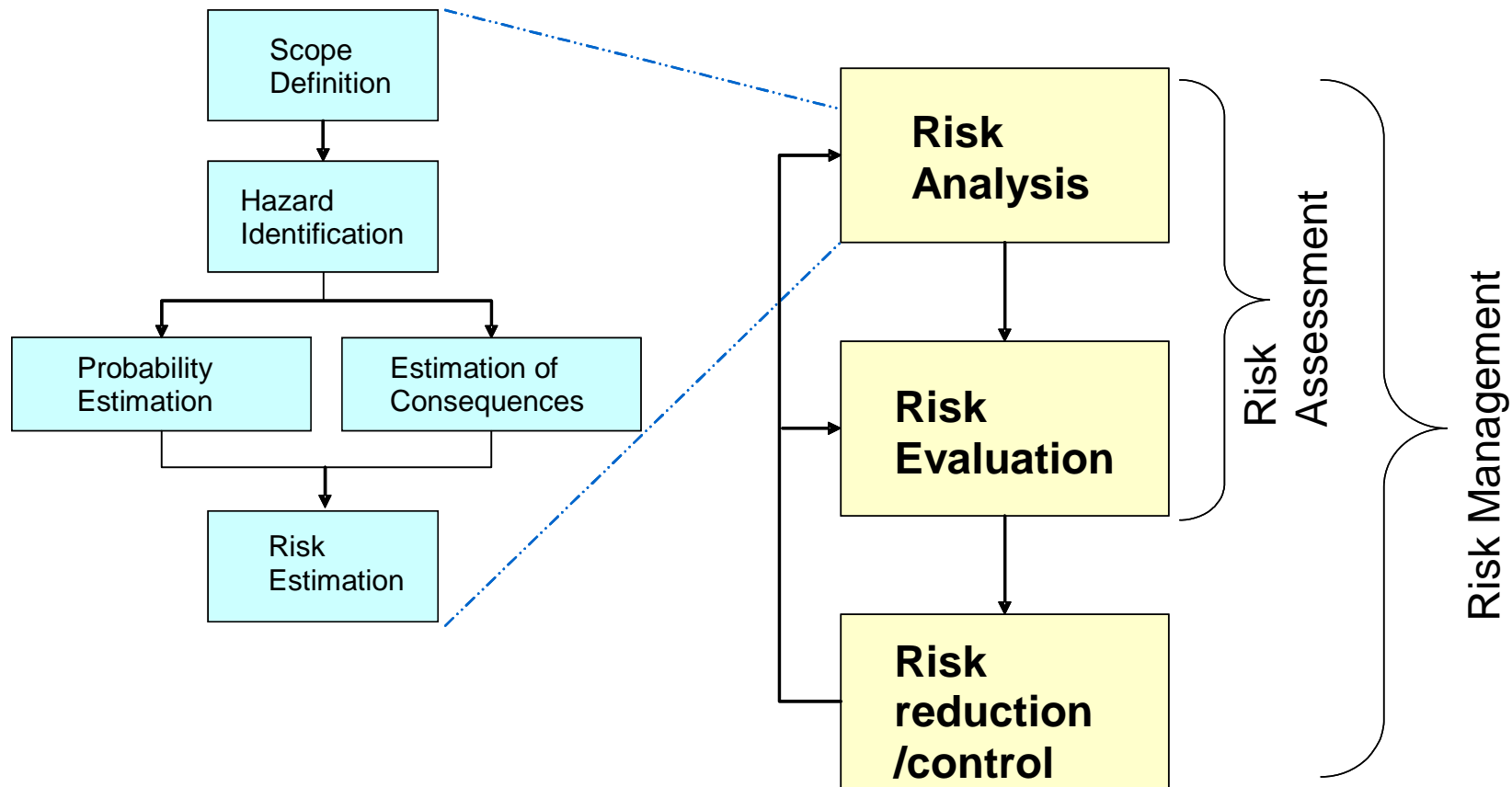
Quality of a safety analysis means its
"applicability to satisfy the requirements of the user"



Major quality problems in safety analyses:

- How well has the analysis identified hazards and their contributors?
- How accurately and reliably has the analysis estimated the risks of a system?
- How effectively has the analysis revealed the remedial measures needed in the system?

Quality concepts in safety analyses



Quality concepts in safety analyses

Quality-challenges to be assessed:

- Quality of the analysis?
- Cost-effectiveness of the analysis?
- Reliability of the results?
- Investment for different phases of the analysis process?
- Later phases of the analysis depend on previous phases; how can the quality of previous phases be assured?
- Can it be too detailed?
- Less ambitious or systematic analysis would weaken the results, but the results might be more cost effective.
- Can it be too exact; what kind of information do decision makers need?
- The optimisation should ensure the effectiveness of the analysis process and the balance between its phases.
- Quality assurance emphasises the importance of the safety analysis process.

Sources of uncertainty in safety analyses

All phases of a safety analysis include aspects that amplify the uncertainty of the analysis:

- Some kind of risks and parts of the system may be excluded when defining the object of the analysis.
- Some hazards may be omitted in the hazard identification phase.
- Each method has limitations.
- Inappropriate methods may mislead the analysis team.
- Available resources and calendar-time are limited.
- Available information and knowledge are limited.
- Estimation of the magnitude of risks may lead to an optimistic or pessimistic view on risks.



Criteria for performing high-quality safety analyses

VTT has developed a checklist -based method for assessing the quality of safety analyses.

The quality of safety analyses is a result of the planning, organising and execution of the analysis.

Quality control is needed:

- Quality assurance should provide "adequate confidence" that a safety analysis will satisfy given requirements.
- Safety analyses are performed for various reasons, and for different systems.
- The requirements of a safety analysis vary depending on the situation and the object.
- It is not possible to define a tight criterion for the quality of safety analyses.



Roles of the analysis leader and subscriber

The following indicators strongly influence the performance of a safety analysis and its quality:

- Definition of the object
- System definition and description, including limitations
- Analysis methods - chosen according to the system and the objective of the analysis
- Quality of the source and background information
- Competence of the analysis leader
- Availability of the required resources
- Documentation
- Results and the analysis process meet the objectives of the safety analysis
- Communication of the results

Roles of the analysis leader and subscriber

The safety **analysis subscriber** (orderer/customer/end-user) has a significant role in the quality assurance of a safety analysis.

The subscriber is the owner of the safety analysis process, and **the subscriber needs to:**

- Know the basic principles of safety analysis and how to use it
- Determine the system and objectives for the safety analysis
- Define requirements for the analysis leader's competence and experience
- Ensure the experience and expertise of selected safety analysis experts
- Provide the analysis team with the necessary source and background information
- Form an expert group that is cooperative, motivated, and committed
- Ensure that the required knowledge and resources are available
- Inform relevant interest groups of the safety analysis work, its objectives and execution
- Follow the execution of the safety analysis and intervene if problems or deviations from the objectives appear.

Roles of the analysis leader and subscriber

Requirements for a **safety analysis leader** include:

- Knowledge and understanding of the current industrial branch
- Understanding of the technological phenomena and basic concepts of the system
- Understanding of the risk types under examination
- Knowledge of the selected analysis methods and how to use them correctly
- Knowledge to
 - plan the analysis work,
 - determine the necessary experts and the source and background information, and
 - define the required resources
- Masters the meeting practices.

Roles of the analysis leader and subscriber

The safety analysis leader:

- Is responsible for carrying out the safety analysis (scope and objectives)
- Familiarises themselves with the system to be analysed
- Formulates a written goal and agreement of the safety analysis
- Defines the objectives of the safety analysis with the analysis subscriber
- Selects the safety analysis methods and the accuracy level
- Defines the available resources allocated for this safety analysis
- Plans the required number of analysis meetings
- Introduces the analysis team to the objectives and basics of the safety analysis
- Describes the rules of the analysis work to the team and complies with them
- Leads the expert team firmly and impartially, and summarises the results
- Reviews the documentation and assures its quality
- Prepares the analysis report with the analysis secretary
- Delivers analysis results to the subscriber in a clear manner
- Remains in contact with the analysis subscriber throughout the analysis process
- Ensures that the results are reported to interest groups.

Conclusions

- Defined objectives of a safety analysis are the key element for the quality of a safety analysis
- The safety analysis process will reflect the quality of the analysis
- The role of a safety analysis subscriber is significant in assuring its high quality
- The subscriber defines the objectives and quality requirements of the analysis
- The safety analysis leader needs to ensure that he correctly understood the subscriber's demands
- The safety analysis subscriber is the owner of the analysis
- The safety analysis subscriber commissions the analysis work and the obtained results
- The quality criteria support those performing the safety analyses; encouraging them to develop the quality of their own work as well as of their clients