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Risk-management as an essential element to assess conflicts of sustainability objectives

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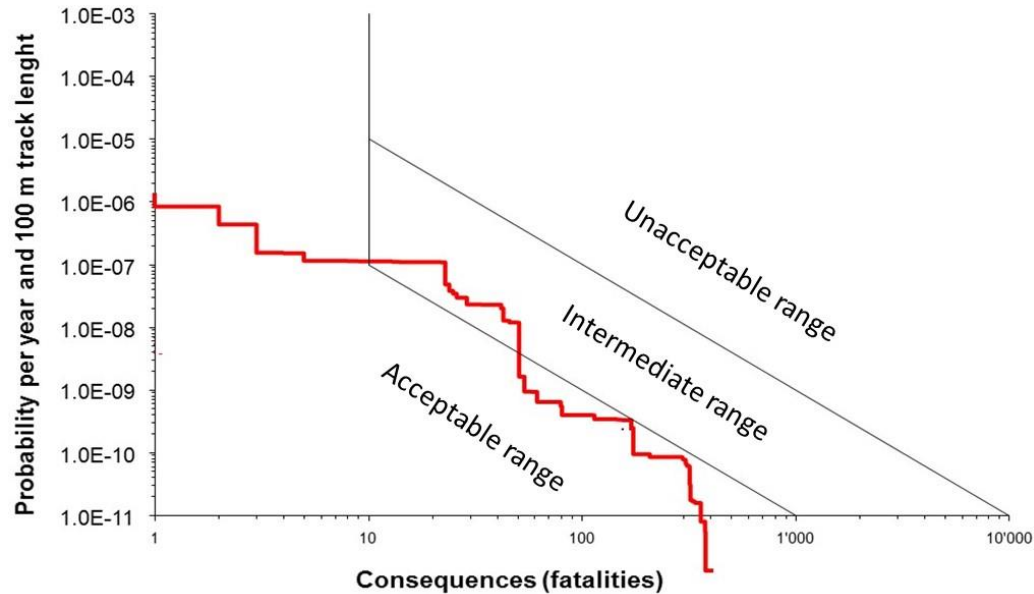
- ▶ Risk assessment of the transport of dangerous goods
 - ▶ The region "Arc lémanique"
 - ▶ Screening of person and environment related risks
 - ▶ Mitigation measures: joint statement
- ▶ Risk management and conflicts of sustainable transport objectives

Arc lémanique



- Fast growing area with respect to economy and population
- Rail transport has to meet needs of commuters and of international freight transport
- Large parts of the tracks are situated near the lake shore and in densely populated areas
- Transport of considerable quantities of mineral oil products and toxic gasses creates significant person and environment related risks

Screening (1)

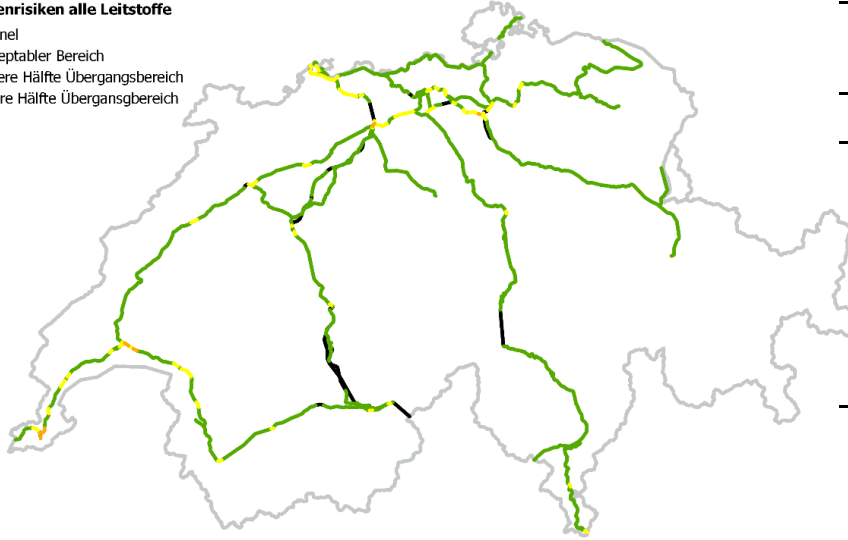


- Rough, conservative analysis of collective risks for railway network
- Fault tree and event tree analysis combined in a bow-tie
- Generic and specific local data
- Risk curves are calculated for sub-elements of 100 m length
- Assessment of risks on basis of defined acceptance criteria

Screening (2)

Personenrisiken alle Leitstoffe

- Tunnel
- akzeptabler Bereich
- untere Hälfte Übergangsbereich
- obere Hälfte Übergangsbereich



- In 2001, first screening of person related risks. Updated and revised in 2006, 2011 and 2014
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- Position of the risk curves in probability / consequence diagram is determined by scenarios of toxic gas release (high potential consequences) and gasoline release (higher probabilities)
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- In 2014, first screening of the risks related to surface- and groundwater contamination
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- Risks are determined by the release of mineral oils

Mitigation measures

- First screening in 2001: for 1 % of network risk curves are situated partially in unacceptable range, mainly due to chlorine transport
- Government agreed with infrastructure manager and chemical industry on implementation of mitigation measures (technical, operational, regulative)
- Screenings performed in 2006, 2011 and 2014 indicated no risks curves situated in unacceptable range
- Assessment of environmental impacts for a large infrastructure project at "Arc lémanique" indicated unacceptable person related risks as of 2020
- Subsequent screening of rail network showed that unacceptable risks may be expected for several track segments due to expected increases in residential densities
- Task force (chemical and transport industry, infrastructure managers, railway undertakings, regional, federal government) identified and assessed different solutions.
- Letter of intent with list of technical, operational, regulative, economic mitigation measures and controlling process is submitted to responsible authorities of each organization represented in task force

Risk management and sustainability

- Swiss regulations include most objectives of sustainable transport
- Decisions on political level or by competent authorities (approval of projects, plans, ...) in case of conflicts of objectives are normally solved by balancing of interests
- Balancing of interests is often made by preferring one objective over others due to uncertainties and insufficient information about consequences of derivations form objectives
- Risk management as defined by ISO 31000 identifies and assesses derivations from objectives (risks), effects of uncertainties, positive and negative consequences
- Application of risk management concept to a set of objectives (e.g. sustainable transport) would allow for decision-making in full knowledge of risks and chances (positive and negative derivations) and uncertainties

Thank you for your attention

