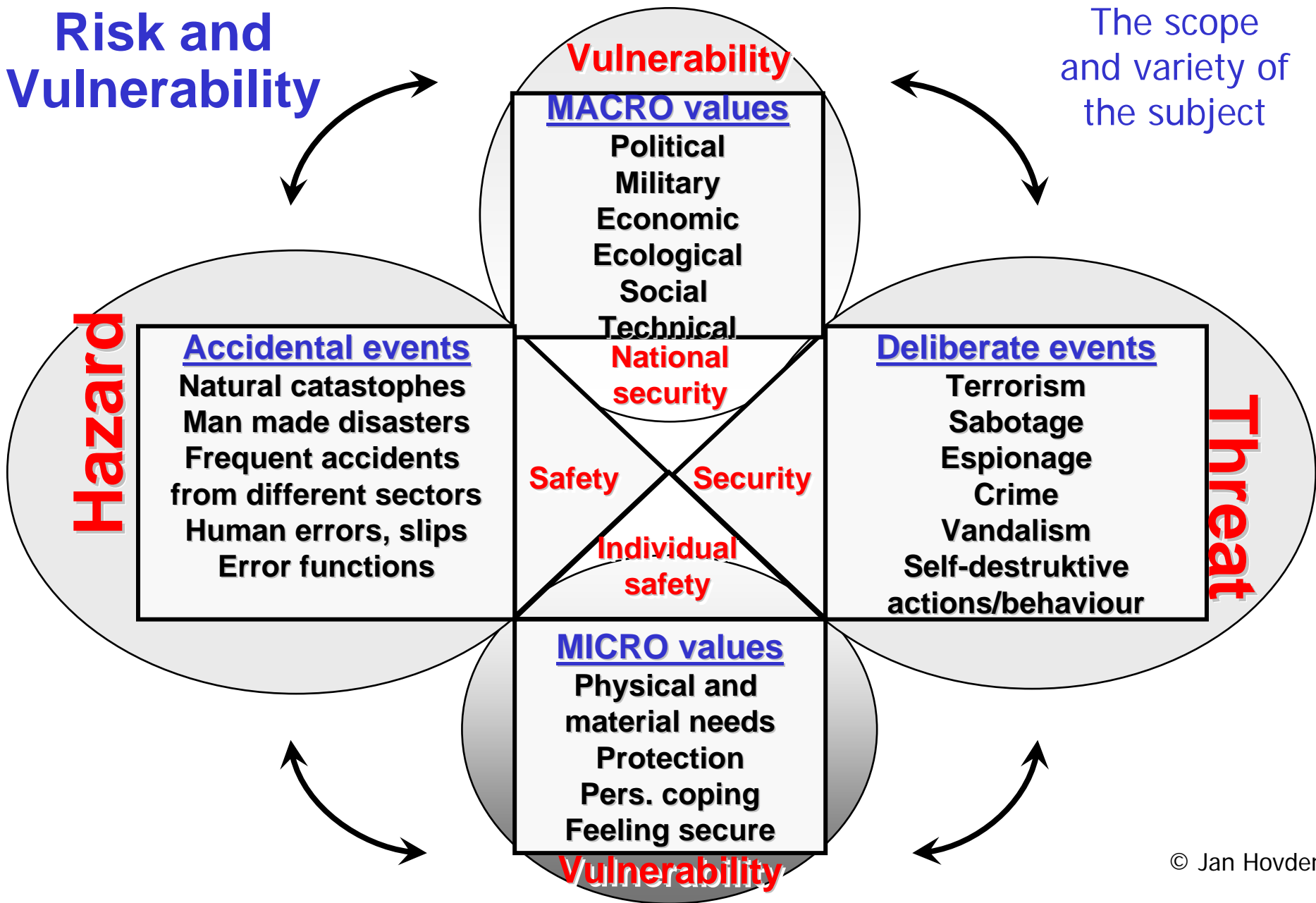


# Research on Safety and Security of Society at SINTEF/NTNU

2009-06-26

**Risk and Vulnerability**

The scope and variety of the subject



© Jan Hovden



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## Protection of critical infrastructures and critical societal functions in Norway

Report NOU 2006:6 submitted to the Ministry of Justice and the Police by the government appointed commission for the protection of critical infrastructure on 5<sup>th</sup> of April 2006

English Summary 1<sup>st</sup> of July 2006

*Report NOU2006:6, <http://www.regjeringen.no>*

# Challenges to safety and security of society

**Some of the threats that need to be taken into account when assessing measures for the protection of critical infrastructure and critical societal functions are:**

- Climate change and natural disasters
- Vulnerability of ageing infrastructures
- Terrorism and organised crime
- Reorganisation, reform and privatisation
- Globalisation
- Threats related to electronic communication
- Espionage
- Vulnerability caused by interdependencies on other infrastructures or societal functions.

*Report NOU 2006:6*

# The definition of critical infrastructure

*“Critical infrastructures are those constructions and systems that are essential in order to uphold society’s critical functions, which in time safeguard society’s basic needs and the feeling of safety and security in the general public.”*

Report NOU 2006:6

# Research Competence at NTNU/SINTEF

## Critical infrastructures

- **Electric power**
- Electronic communication
- **Water supply and sewage**
- **Transport**
- **Oil and gas**
- Satellite-based infrastructure

## Critical societal functions

- Banking and finance
- Food supply
- Health services, social services and social security benefit
- The Police
- Emergency and rescue services
- Crisis management
- Parliament and government
- The judiciary
- Defence
- Environmental surveillance
- Waste treatment

*Report NOU 2006:6*

# Working group on Societal Safety and Security Research at SINTEF/NTNU

- Bodsberg Lars                      SINTEF T&S – Safety and Reliability
- Bertelsen Dag                      SINTEF T&S – Road and Transport Studies
- Øvstedal Eldfrid                      SINTEF ICT – Software Engineering, Safety and Security
- Kjølle Gerd                      SINTEF Energy Research – Energy Systems
- Røstum Jon                      SINTEF Building and Infrastructure – Water and Environment
- Hovden Jan                      NTNU – Dep of Industrial Economics and Technology Management
- Vatn Jørn                      NTNU – Department of Production and Quality Engineering
- Per M Schiefloe                      NTNU Samfunnsforskning AS – Studio Apertura

# Societal Safety and Security Research at SINTEF

- Risk and Vulnerability analysis
- Information Security
- Evaluation of Technical, Human and Organizational Factors
- Electric Power
- Water Supply and Sewage
- Transport
- Oil and Gas



# Risk and Vulnerability Analysis

Development of methods and tools for cross-sector identification and ranking of critical infrastructures and societal functions

## Areas of work

- Electricity supply
- Water supply
- Transportation systems (road and railway)
- Communication networks



## Projects

Project for The Research Council of Norway (NFR) in cooperation with FFI and The City of Oslo

# Information Security

Development of technology and methods to prevent undesired incidents in database systems and ensure that the systems retain their functionality when undesired incidents occur

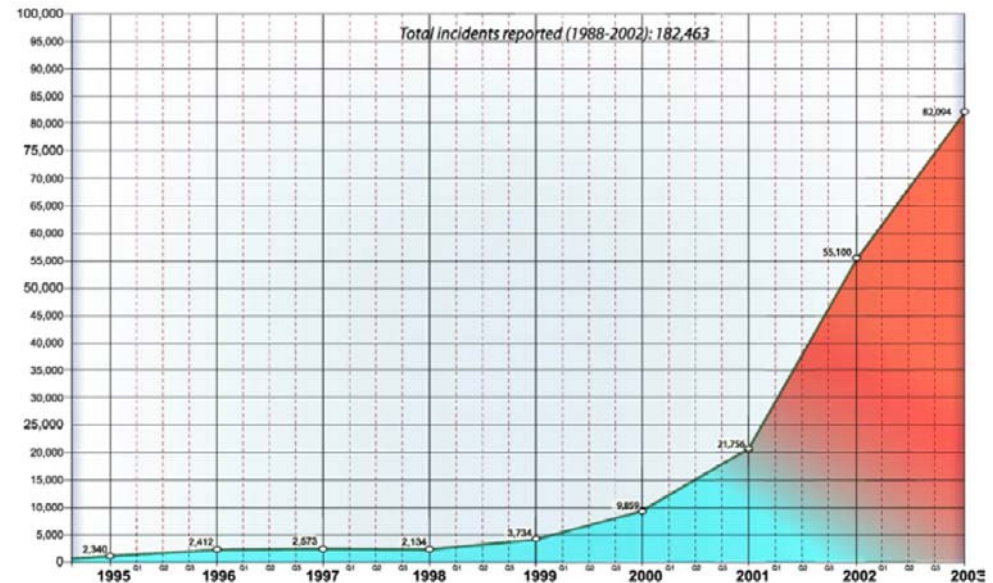


## Areas of work

- Software security
- Security awareness and handling of security breaches
- Mobile networks
- Access control and privacy protection
- Health applications
- Integrated operations – offshore oil and gas

## Projects

NFR- and EU-projects in cooperation with the oil industry, Telenor and public administration.



**Growth of Security Breach Incidents Reported to CERT/CC**

# Evaluation of Technical, Human and Organisational factors

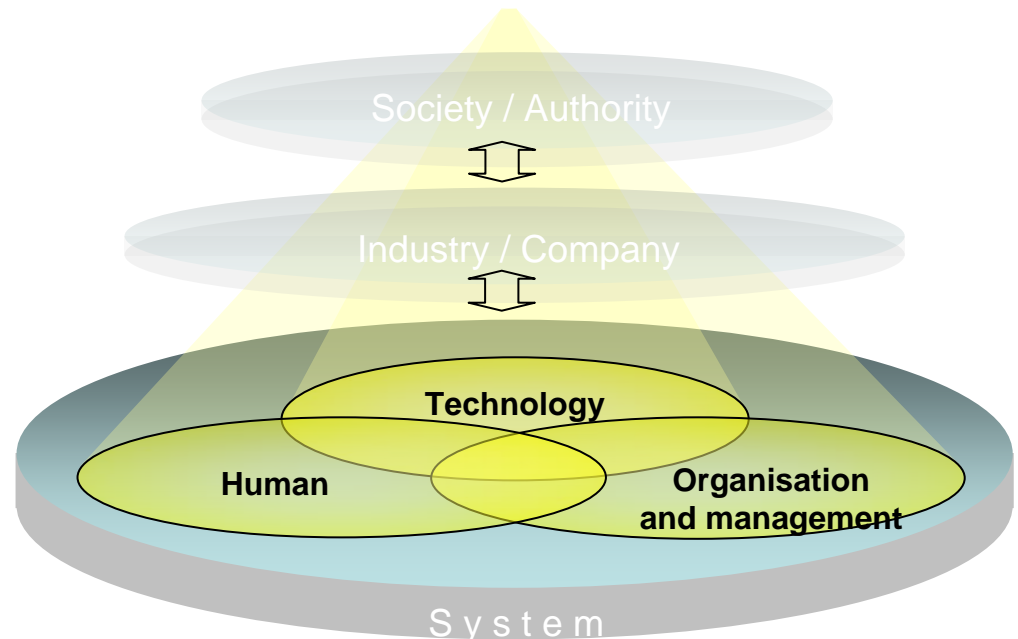
Analyse and develop new knowledge on the interaction between people, technology, organisation safety and security

## Areas of work

- Effect of organisational changes, outsourcing and deregulation on safety and security
- Policy for change management
- Safe cooperation between different cultures

## Projects

NFR and industry projects



# Electric Power

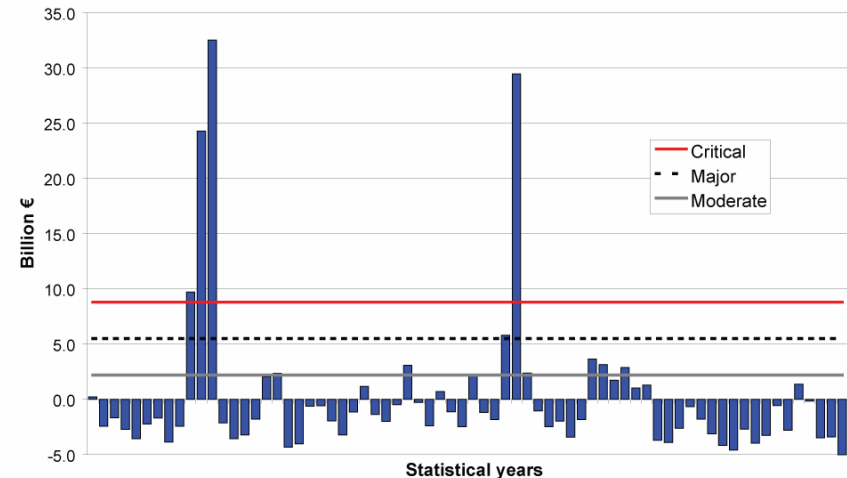
Development of indicators, methods and tools that can be used to analyse, measure and assess the level of security of electricity supply

## Areas of work

- Security of electricity supply
- Energy availability/ shortage
- Capacity availability/ shortage
- Wide-area interruptions (blackouts)
- Risk and vulnerability in power grids
- Power system security and reliability
- Market modelling and analysis

## Projects/clients

NFR and EU-projects in cooperation with the electricity industry, energy authorities and system operators



Consumer loss caused by high prices  
(Example Nordic system study)

# Water Supply and Sewage

Development of indicators, methods and tools that can be used to analyse, measure and assess the level of security of water supply

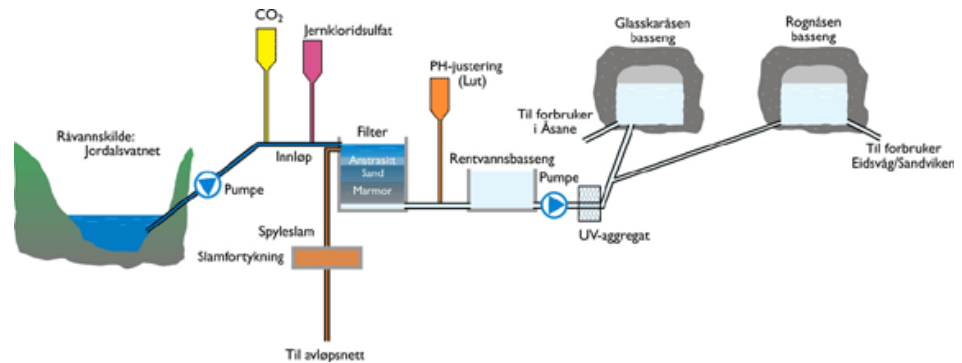
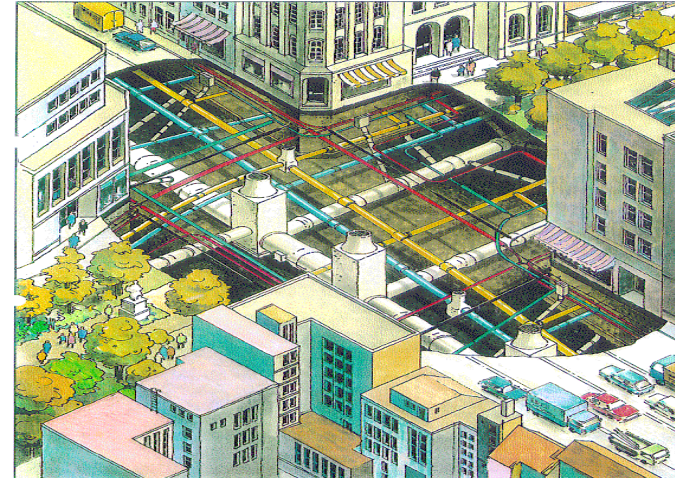
## Areas of work

- New emerging contaminants and pathogens
- Aging infrastructures being vulnerable for deliberate contamination
- Shortage of good quality and readily treatable resources
- Risk assessment and risk management
- Improved treatment and monitoring technologies

## Projects/clients

EU-project: "Technology Enabled Universal Access to Safe Water"  
(TECHNEAU), 2006-2010

<http://www.techneau.org/>



# Transport

## Rail Transport

**Assessment of the safety and interoperability of safety critical systems in order to prevent undesired events that can harm life or health**

### Areas of work

- **Independent Safety Assessments**
- **Secure communications**
- **Interoperability Assessments**
- **Safe technology for rail transport**

### Projects

**Norwegian and Swedish railway administrations and European railway suppliers**



- The Centre for Railway Certification (“SJS”) is appointed as a notified body according to**
- **EU directive 96/48/EC on Interoperability of the trans-European high speed rail system.**
  - **EU directive 2001/16/EF on Interoperability of the European conventional rail system**

# Oil and gas

## Safety Instrumented Systems

Development of methods, tools and guidance on the safety and security performance of Safety Instrumented System in offshore production

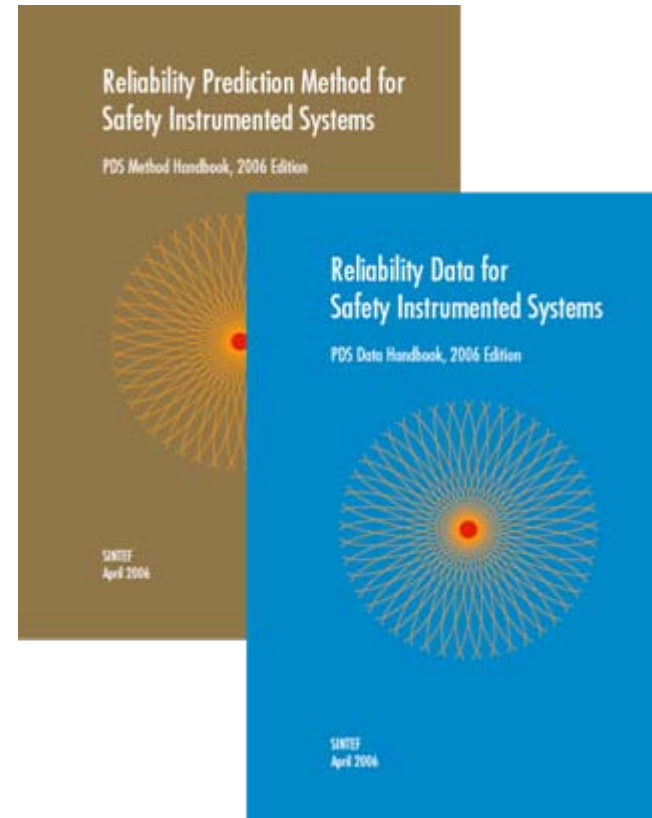
### Areas of work

- Reliability prediction handbook
- Reliability data handbook
- Maintain a professional forum for development of safety systems within the petroleum industry
- Framework for specifying security measures
- Provide practical guidance

### Projects

NFR project in cooperation with industry (oil and gas companies, vendor companies, engineering companies consultants, governmental bodies)

<http://www.pds.sintef.no>



# Research on organisational preconditions for safety

