

# Adaptation as an Element in the Design of Emergency Response Systems

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# Kurt Petersen



- **Lund University – Professor, Risk Analysis and Management**
- **President of LUCRAM, Lund University Centre for Risk Analysis and Management**



# Lund University



- **Founded 1666**
- **41 000 students**
- **2 500 ph.d. students**
- **5 500 employees**
- **581 professors**
- **8 faculties**
- **5 160 MSEK turnover**



# Emergency Management in Sweden

- **New legislation on extreme events**
- **Swedish Emergency Management Agency**
- **Implementation national, regional and local**
- **Research**



# New legislation



- **Risk and Vulnerability analysis**
- **Capability/Ability Assessment**
- **Training and Exercises**



# International disasters

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- **Terrorism, New York, London, Madrid**
- **Flooding, Central Europe, Asia, Sweden**
- **Earthquakes, South Europe, Asia**
- **Forest fires, South Europe**
- **Wind storms, Europe, Sweden**



# International disasters

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- **Accidents at sea, Estonia, Herold of Free Enterprise**
- **Accidents at land, Bhopal, Seveso**
- **Diseases, pandemi, bird flu, SARS, MCD**





# Case 1: Railway Safety

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- **EU Research Project**
- **Rule Management**
- **Case studies in four countries**
- **Goal: to improve safety management, rule management processes**
- **Weaknesses, mistakes, etc.**



# Case 1: Railway Safety

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- **Semi structured interviews**
- **Vertical approach**
- **Findings in order to improve rule management**
- **Implementation on-going**



# Case 1: Railway Safety

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- **Findings**
- **Violation of rules continuously**
- **Impractical, wrong, inappropriate, ineffective, missing, necessary**
- **Low reporting vertically**



# Case 1: Railway Safety

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- **Findings II**
- **Utilise domain specific knowledge**
- **Utilise prior experience**
- **Utilise general competence**
- **Adapt appropriately**



# Case 2: Storm Gudrun

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- **Storm in Sweden in 2005**
- **Severe damage in a certain region**
- **Long term effects**
- **Emergency management inappropriate**
- **Event investigation**



# Case 2: Storm Gudrun

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- **Semi structured interviews**
- **Vertical and horizontal approach**
- **Findings in order to improve emergency management**
- **Implementation on-going**



# Case 2: Storm Gudrun

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- **Findings**
- **Lack of communication**
- **Vertical communication inappropriate**
- **Emergency planning processes improving**



# Case 2: Storm Gudrun

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- **Findings II**
- **Utilise past experience**
- **Utilise general competence**
- **Adapt appropriately**





# Implications for Emergency Management

- **Rare and unusual**
- **Emergent behaviour**
- **System response ad hoc**
- **Adaptive behaviour desirable**
- **Resilient system approach**



# Future Research



- **Resilience and Emergency Management**
- **Emergent behaviour**
- **Risk and Vulnerability Analysis**
- **Training and Exercising**



# Future Research



- **Requirements to an Emergency Response System**
- **Definition of successful behaviour**
- **Refinements of Risk and Vulnerability Assessment Methods**



# FRIVA – a research programme

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- **Risk and Vulnerability Analysis**
- **March 2004 until March 2010**
- **Financed by the Swedish  
Emergency Management Agency**
- **Research Capacity Establishment**
- **8 doctoral projects**



# FRIVA II



- **Risk and vulnerability analysis of complex socio-technical systems**
- **Crisis management from the perspective of the user or the victim**
- **Critical infrastructures in crises**

