

# Risk and Vulnerability Analysis – Applied in Crisis Management

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# Kurt Petersen

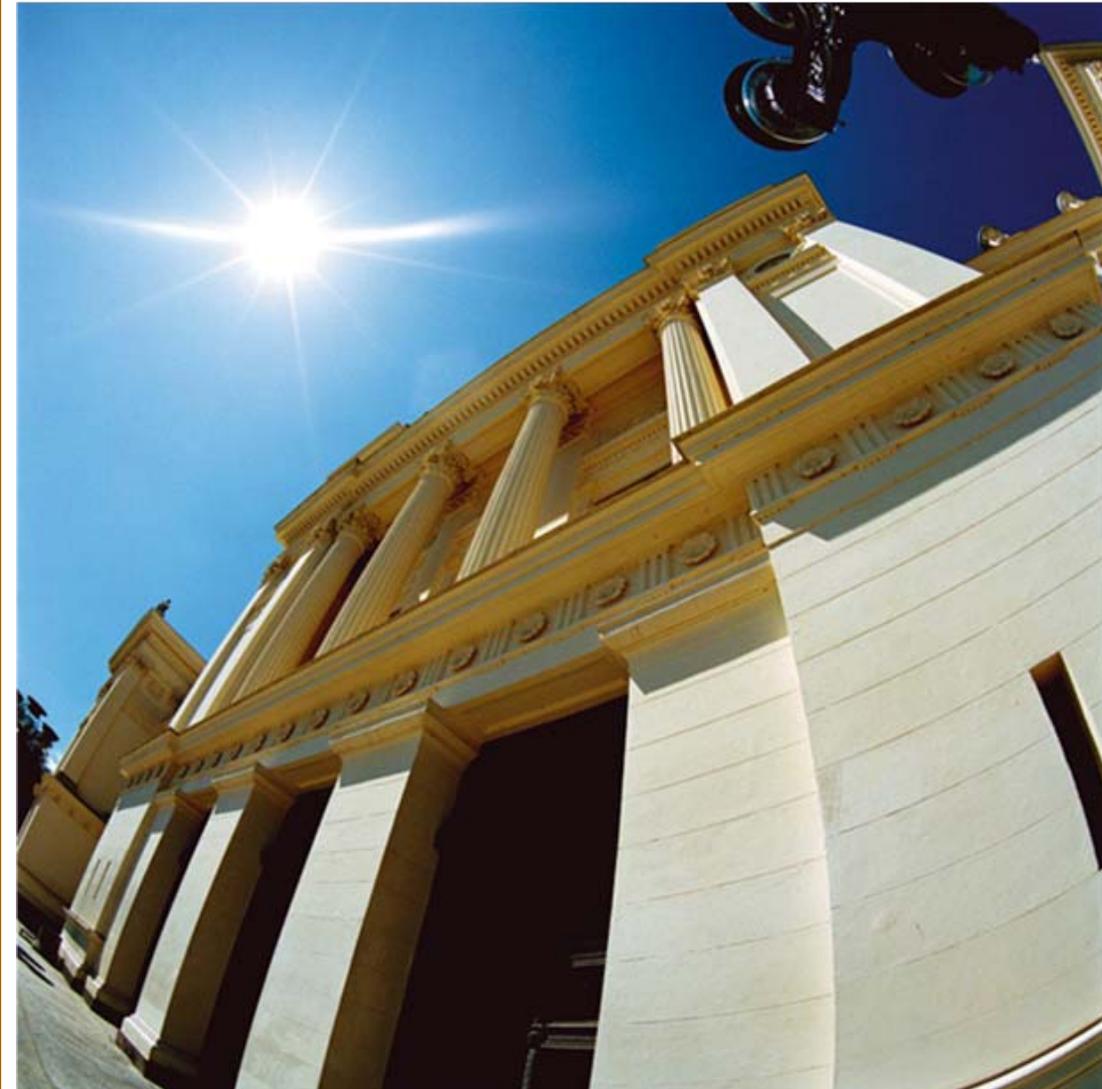
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- **Lund University – Professor, Risk Analysis and Management**
- **President of LUCRAM, Lund University Centre for Risk Analysis and Management**



# Lund University

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



# Lund Technical University

- 13 Civil engineering programs
- 7000 students
- 19 Institutions
- 75 thematic areas



# Education in Risk Management

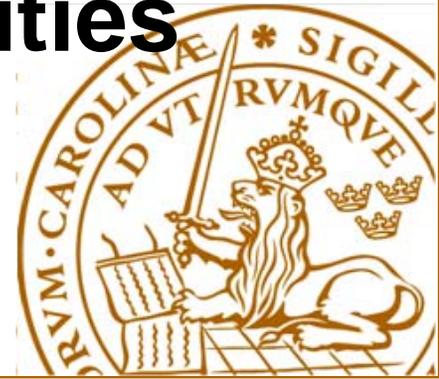
- Master programmes
  - Copenhagen University – Master of Disaster Management (2008)
  - Civil Aviation School, LTH – Making Progress in Systems Safety
- Master in societal aspects of crisis management
- Fire Safety Engineering (since 1986)
- Civil engineer in Risk Management (since 2001)
- External courses (Räddningsverket, Luftfartsstyrelsen, Kammarkollegiet)
- Ph.D. courses (examples):
  - Complex Adaptive Systems och Crisis Management
  - Accident management and crisis response



# LUCRAM

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- **Lund University Centre for Risk Analysis and Management**
- **Network at Lunds University**
- **Coordination of research on risk management**
- **Contact point for external activities**



# Situation in Sweden

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



# New legislation

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- 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**



# Risk Approach

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- Risk = f (E, F, Q)
- E = events, hazards
- F = frequency, likelihood
- Q = consequence



# Vulnerability Approach

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- Risk given a specific event, situation or conditions
- Capability/Ability



# 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 Subprojects

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- **DP2: Risk and vulnerability assessment methods for analyses of critical interdependent infrastructures**
- **DP3: Crisis management: preparedness, response and recovery**
- **DP4: Crisis management and social vulnerability**
- **DP5: Proactive crisis management and safety culture**



# FRIVA Subprojects

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- **DP6: Regional vulnerability analysis**
- **DP7: Risk and vulnerability analysis of large scale infrastructures – electric power and drinking water supply**
- **DP8: Risk and vulnerability analysis of large scale infrastructures – tele and IT systems**
- **DP9: Statistical analysis and simulation of extreme events**



# FRIVA II

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



# Some Findings

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- **Methods**
- **Practical exercises at community level**
- **Process rather than plan**



# Findings

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- **Scenario based methods**
- **System modelling based analytical methods**



# Findings

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- **Broad scope**
- **Broad participation**
- **Implementation processes**



# Emergency Response System

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- Risk and vulnerability
- ERS plan
- Function for dissemination of ERS within organisation
- Function for dissemination of ERS between organisations
- Function for continuous learning



# Emergency Response Systems

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- **Utilise emergent behaviour**
- **Utilise adaptability**

