

LUND UNIVERSITY 350

## Risk to critical infrastructures and technical systems

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## What does critical infrastructures and technical systems mean?

SYSTEMS AND ASSETS THAT ARE ESSENTIAL FOR THE FUNCTIONING OF A SOCIETY

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## What does critical infrastructures and technical systems mean?

Serving 64.000 persons in Kungälv  
Using 160 liter per person and day

700 km water pipes

18 pressure pump stations

A water tower

+ MORE...

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## What does critical infrastructures and technical systems mean?

WE OFTEN DO NOT THINK OF ALL THE THINGS GOING ON "BEHIND THE SCENE"

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## The structure and growth of critical infrastructures

THEY ARE BECOMING MORE AND MORE CONNECTED TO EACH OTHER FORMING SO CALLED "SYSTEM OF SYSTEMS"

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## Increased interconnectedness can be both "good"...and "bad"

- So what's the problem?
  - I like controlling my fridge over the internet...
  - ...and I want to have access to films/music, banking, travel services, etc. "on demand"...
  - ...and why should we have large warehouses when we can deliver "just in time"?

TRANSBOUNDARY CRISES

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## Cascading effects – the domino of critical infrastructures

### • Example: The blackout of the northeast US in 2003

- 50 million people
- Ohio, Michigan, Pennsylvania, New York, Vermont, Massachusetts, Connecticut, New Jersey and the Canadian province Ontario
- 4 days to restore power
- \$ 4-10 billion
- “The North American Power Grid Is One Large, Interconnected Machine”\*



\*Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations, U.S.-Canada Power System Outage Task Force, 2004, p. 5



## Critical infrastructures are not only “technical”

### • Critical infrastructure sectors (in Swedish: samhällsviktig verksamhet)



## The challenges of managing risks in critical infrastructures

- Development of risk management
  - Insurance, nuclear, banking, aviation, etc.
  - Now: Risk management is everywhere

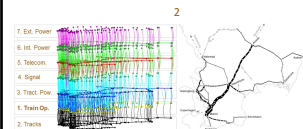
“old” risk management

“new” risk management



## Current research addressing the challenges (1)

- Modelling of critical infrastructures to understand cascading effects
- Identify vulnerabilities
- Support decision making and risk management



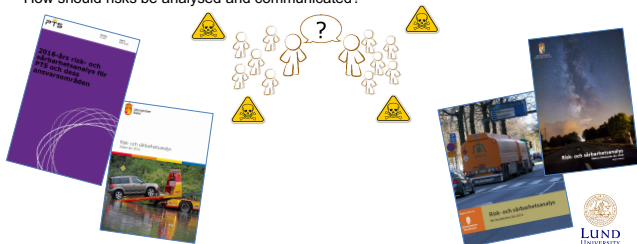
© Mankowitz, W., Barlow, J., Johnson, J., Doraj, M. (2010). Component Interdependencies for North American Network: Application to the Swedish Energy System in the context of power.

© Johnson, J., Johnson, J., Doraj, M. (2010). Integrated Modelling Approach for Critical Infrastructures and Local Consequences: Migration Decisions from a Power System and Electricity Heat-Change Perspective. Submitted to International Journal of Critical Infrastructures.



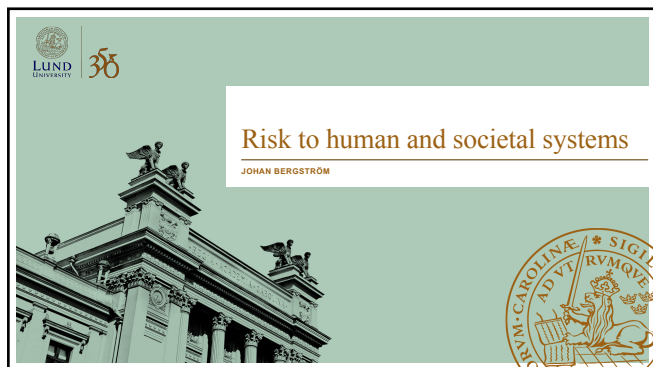
## Current research addressing the challenges (2)

- How should risks be analysed and communicated?



## Is this still a technical problem?





### Three trends

1. Safety and Security have become the same thing
2. Resilience celebrated as the solution
3. Risk is now a problem of governance

The diagram depicts a group of stylized human figures standing around a central square containing a question mark. Four yellow warning triangles are positioned at the corners of the square, suggesting a state of uncertainty or risk.

