Meteorology of Critical Infrastructure

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One need only think of the weather,
in which case the prediction
even for a few days ahead
is impossible.

Albert Einstein; 1937

Definition

- Critical Infrastructure (CI)

….. an asset, system or part thereof essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being, and the destruction or disruption of which would have a significant impact in a Member State as a result of the failure to maintain those functions

Directive 2008/114/EC

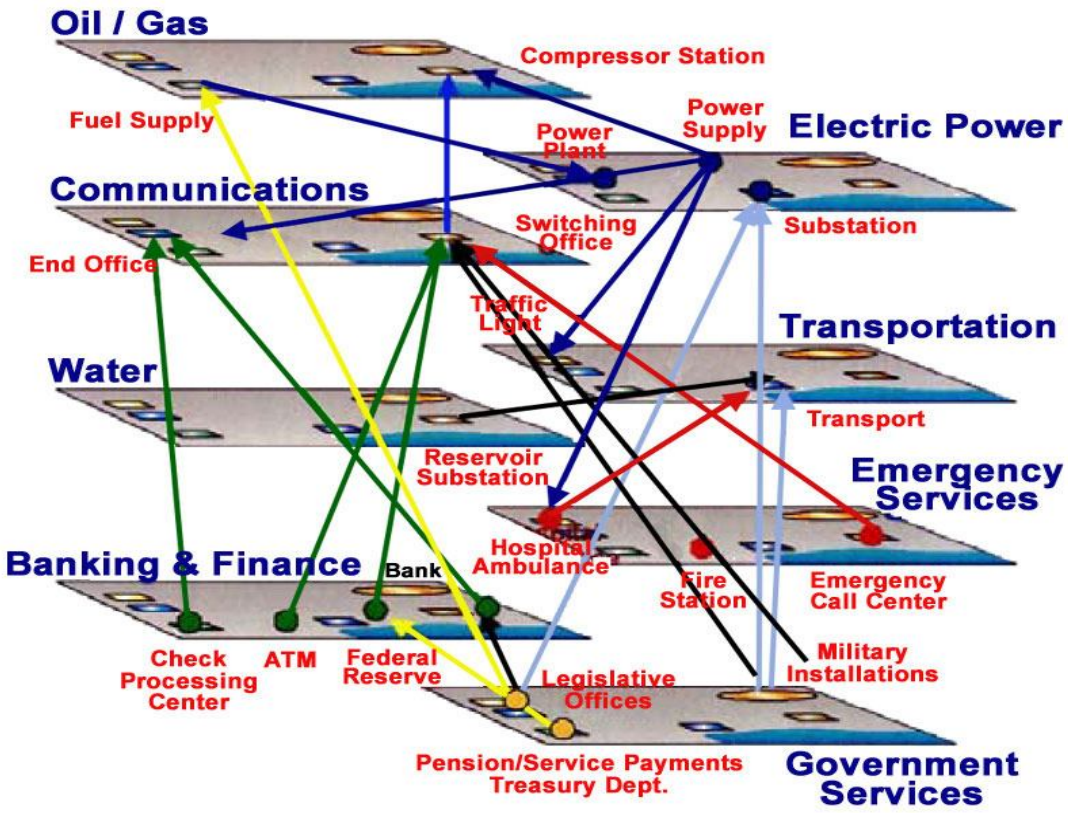
Interdependencies of Critical Infrastructure

System of Systems

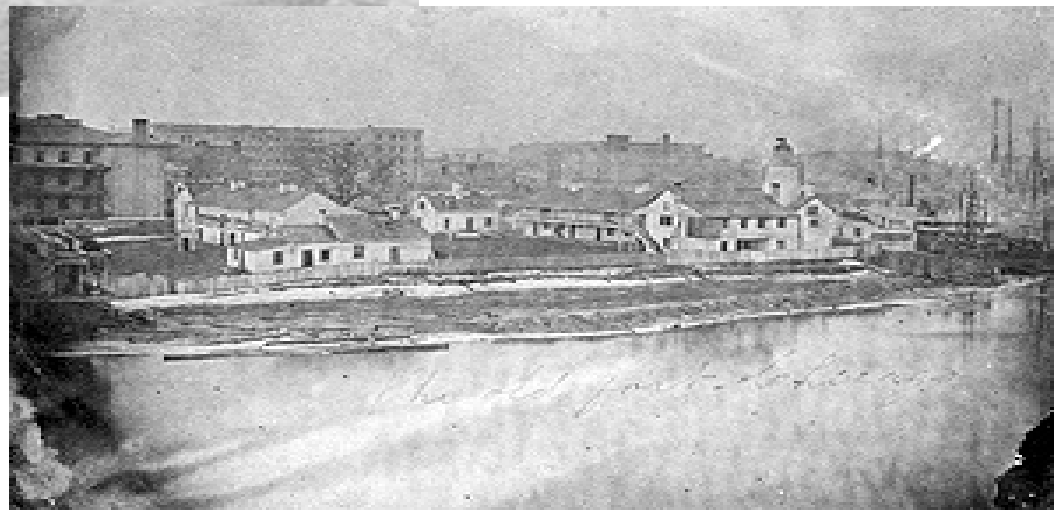
Emergent Services

Disruption of services

All are based on ICT as key enabling technologies

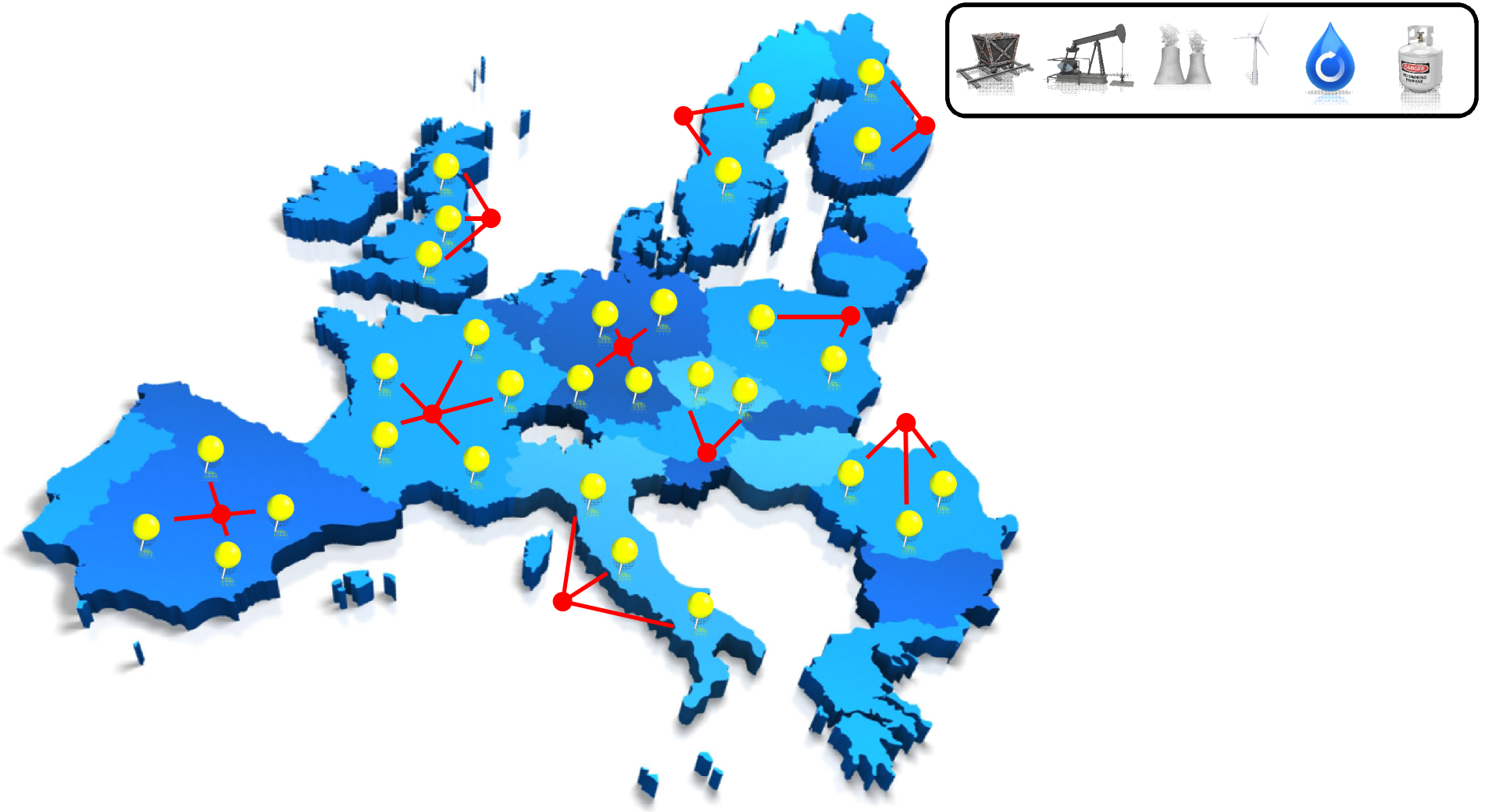


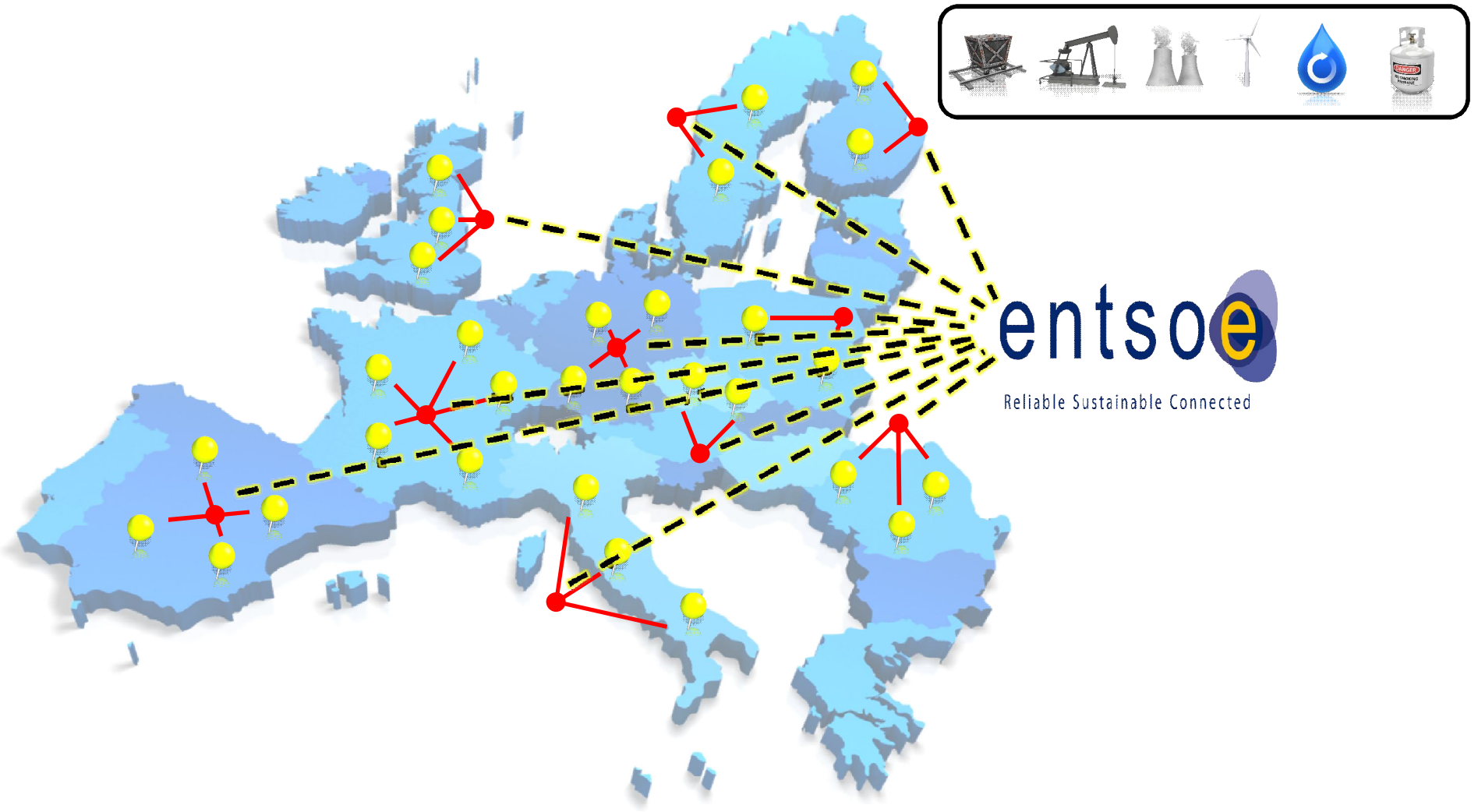
Chicago

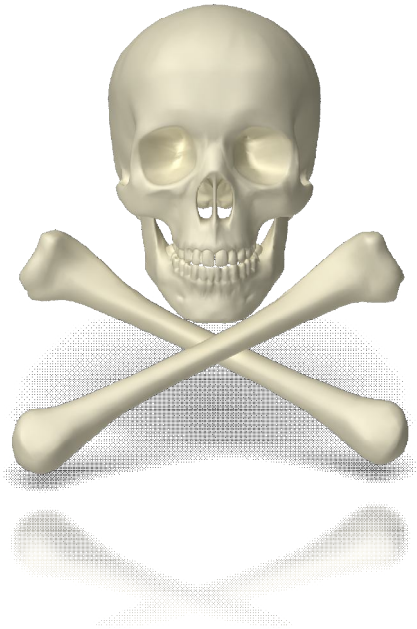


1850

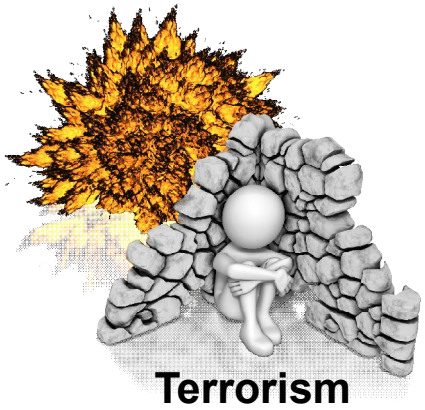
1910




entsoe
Reliable Sustainable Connected



Growing Complexity



Terrorism

Natural Hazards

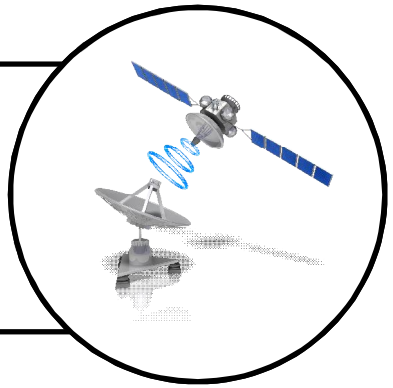
Human failure

Cyber attacks

To be continued…

NATECH accidents

Extreme space weather




Floods, Czech Republic, 2002


Earthquake, China, 2008


Hurricane, USA, 2005

NATECH accidents

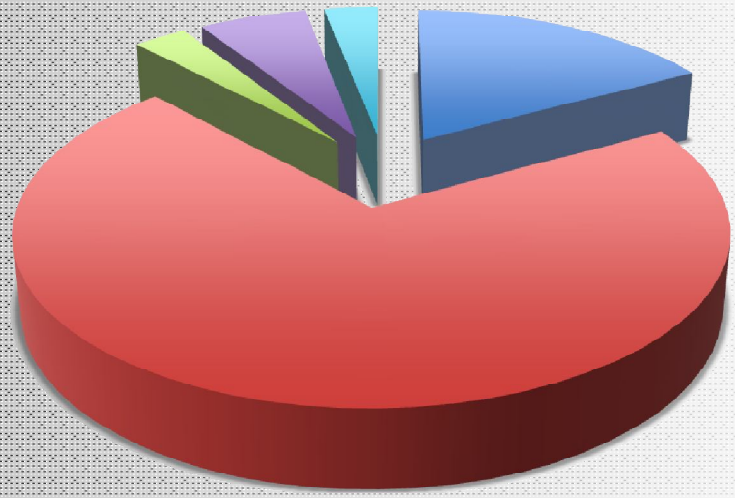
Chemical Accident

caused by

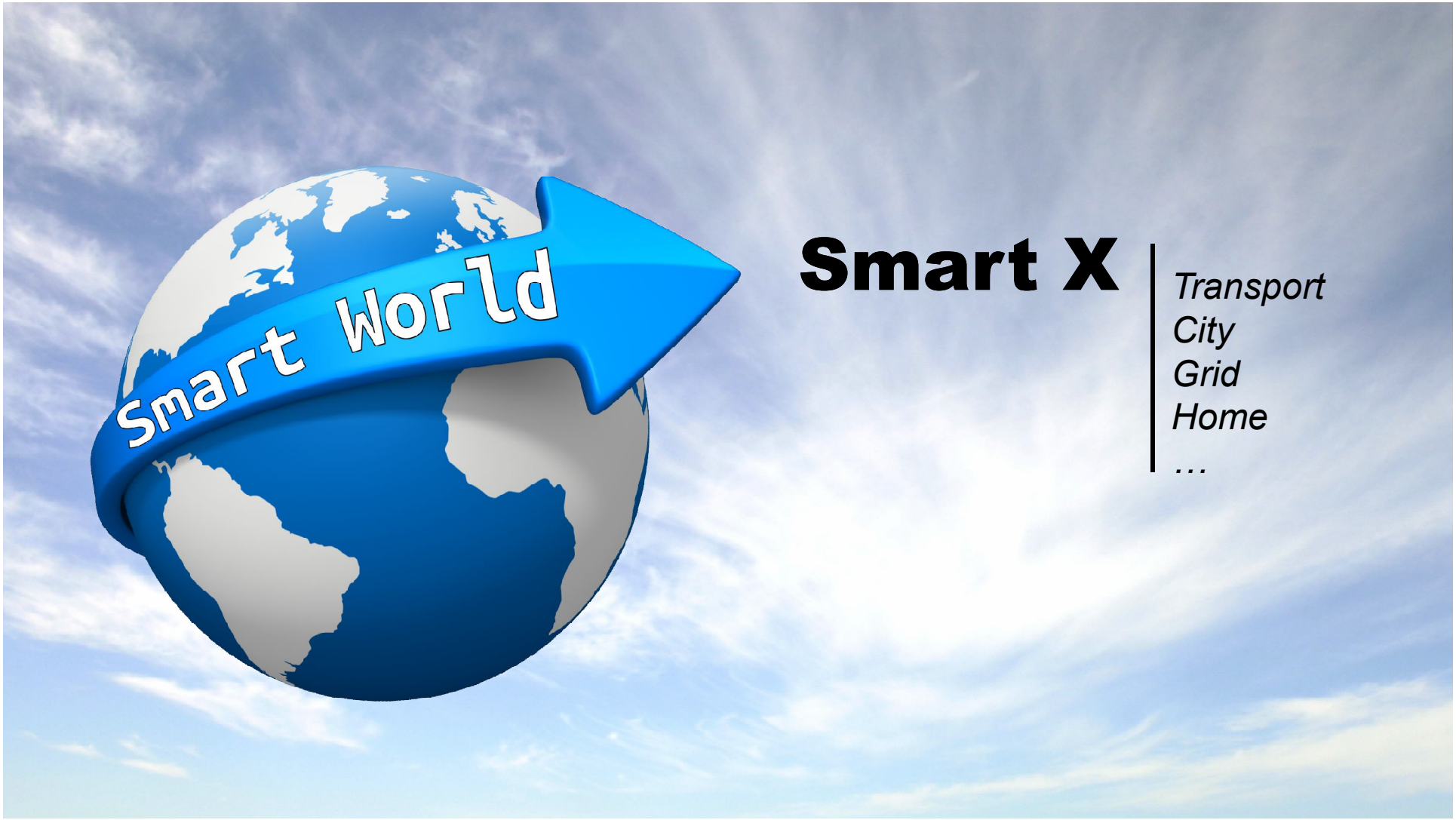
natural hazard or disaster

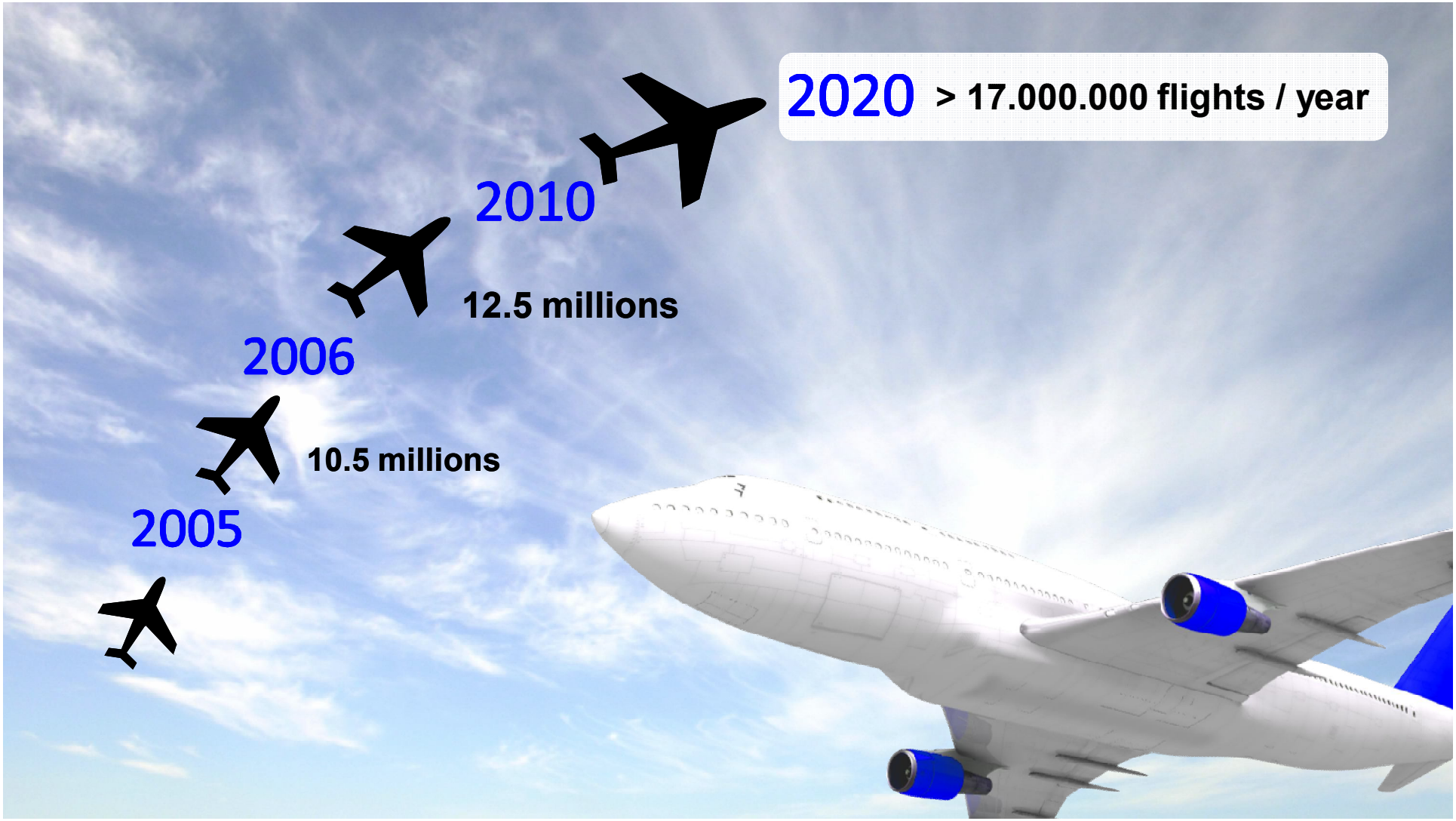
NATECH accidents

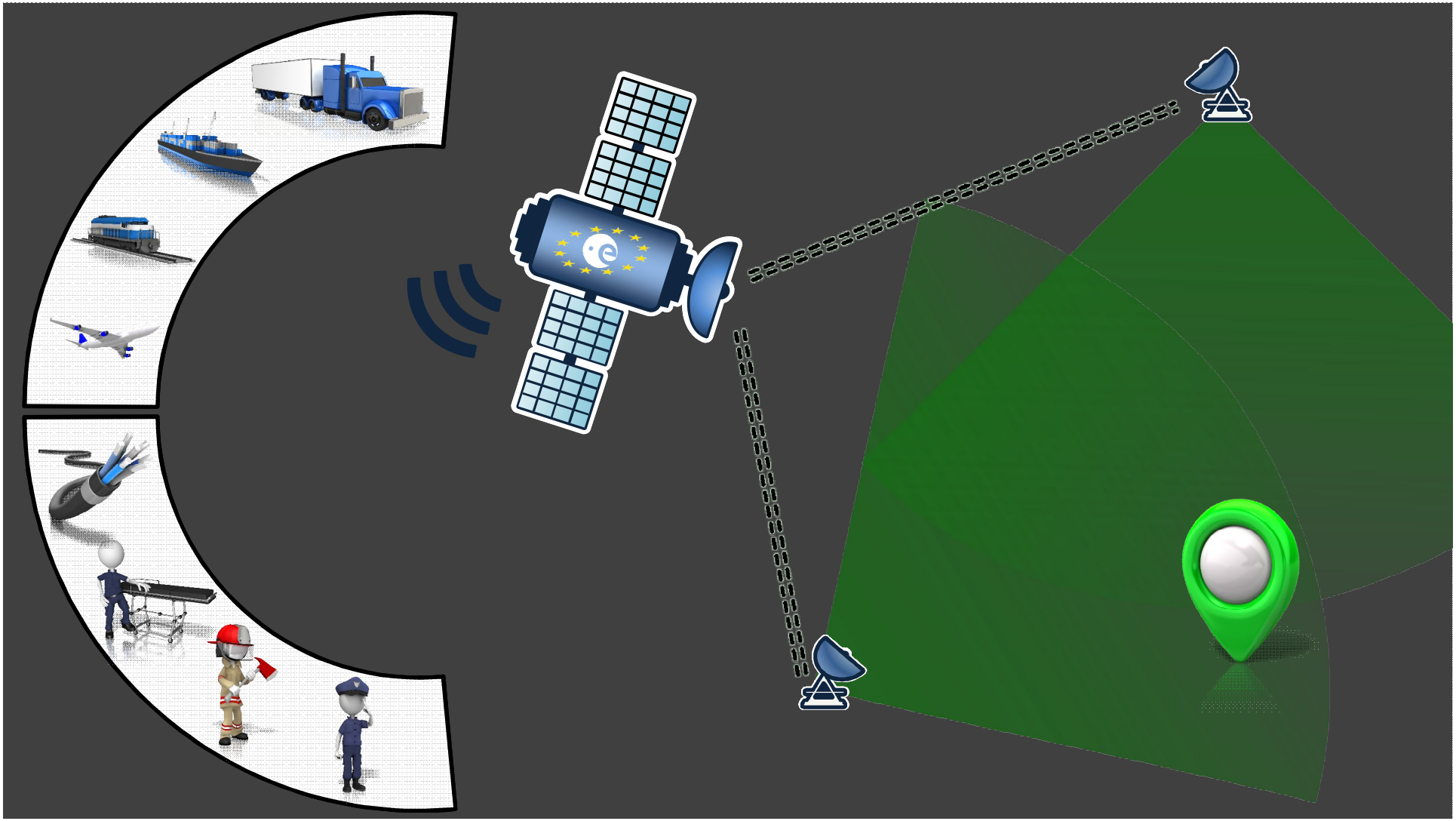
Downtime of analyzed facilities



- > 1 week / ≤ 1 month
- > 1 month / ≤ 6 months
- > 6 months / ≤ 1 year
- > 1 year
- unknown


Smart World
Smart X
Transport
City
Grid
Home
…

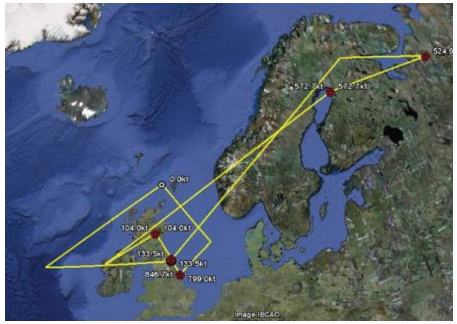

2020 > 17.000.000 flights / year
2010
12.5 millions
2006
10.5 millions
2005



JAMMERS

JAMMING: Three Examples

- San Diego – January 2007
  - US Navy ships doing communications jamming tests
  - Their own GPS stopped working
  - Jammed the whole San Diego harbour region
  - Stopped phone systems, cell-phones, hospital paging
  - It took NAVCEN 3 days to finger the culprits!
  - GPS jamming was unintentional



- UK – 2009
  - General Lighthouse Authority jamming trials

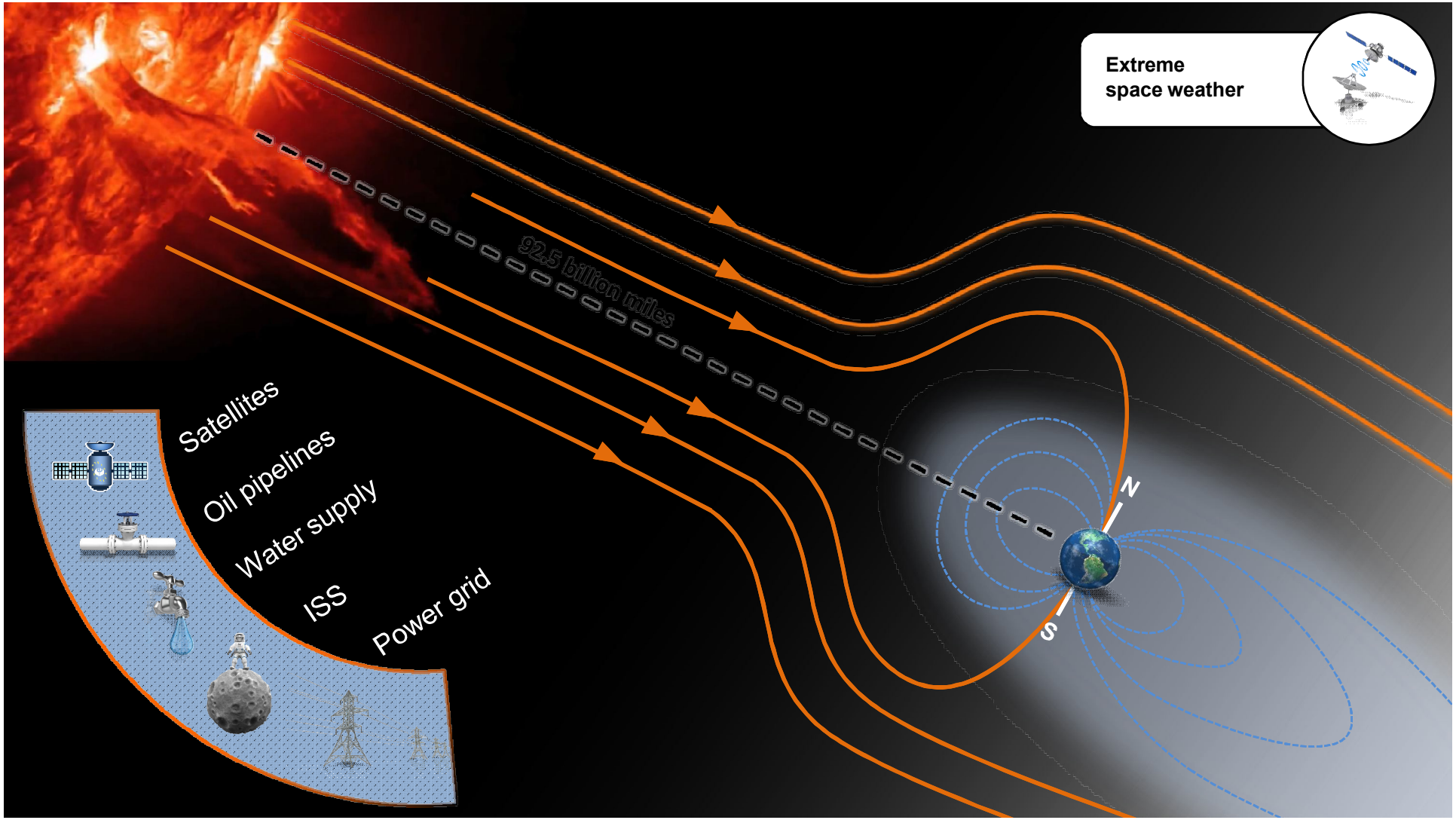
  –showed that GPS receivers may visit “exotic locations”

- Newark Airport 2010
  - A GPS jammer in a truck interfered severely

  –a GPS-based aircraft landing system. The FAA needed

  –four months to identify the source of the jamming

  –attack


Extreme
space weather
92.5 billion miles
Satellites
Oil pipelines
Water supply
ISS
Power grid
N
S

Recommendations (*based on ESRIF*)

CIP requests on

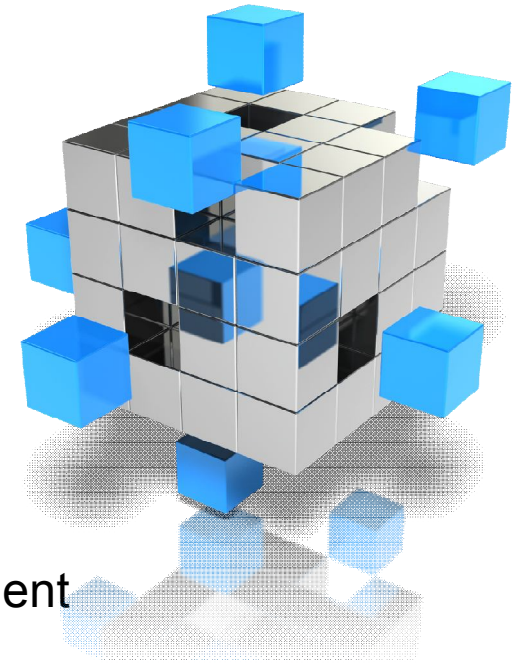
- Local
- Regional
- National
- European

level

Common risk assessment

Requests Standards for

- Prevention
- Protection
- Disaster Management



Risk Assessment

Risk = (probability of the accident occurring) x (expected loss in case of accident)

Passau & Burghausen

Passau (Donau)

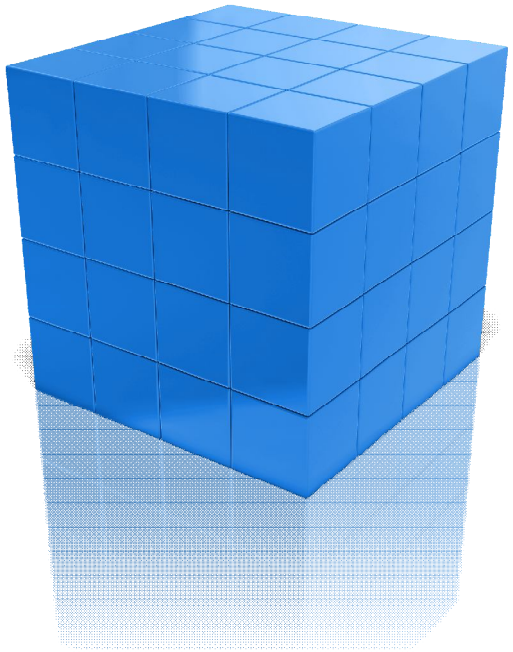
June 3, 2013
Water level at 12.89 m
2nd highest in recording

Burghausen (Salzach)

between 1961 and 1971
Construction of
a water protection wall

Burghausen (Salzach)

Risk mitigation based
on meaningful risk assessment?



Exchange between Stakeholders

+

Realistic Threat Scenarios

CIP – Key Factors

Protection - address hazards and threats (natural, intentional, unintentional)

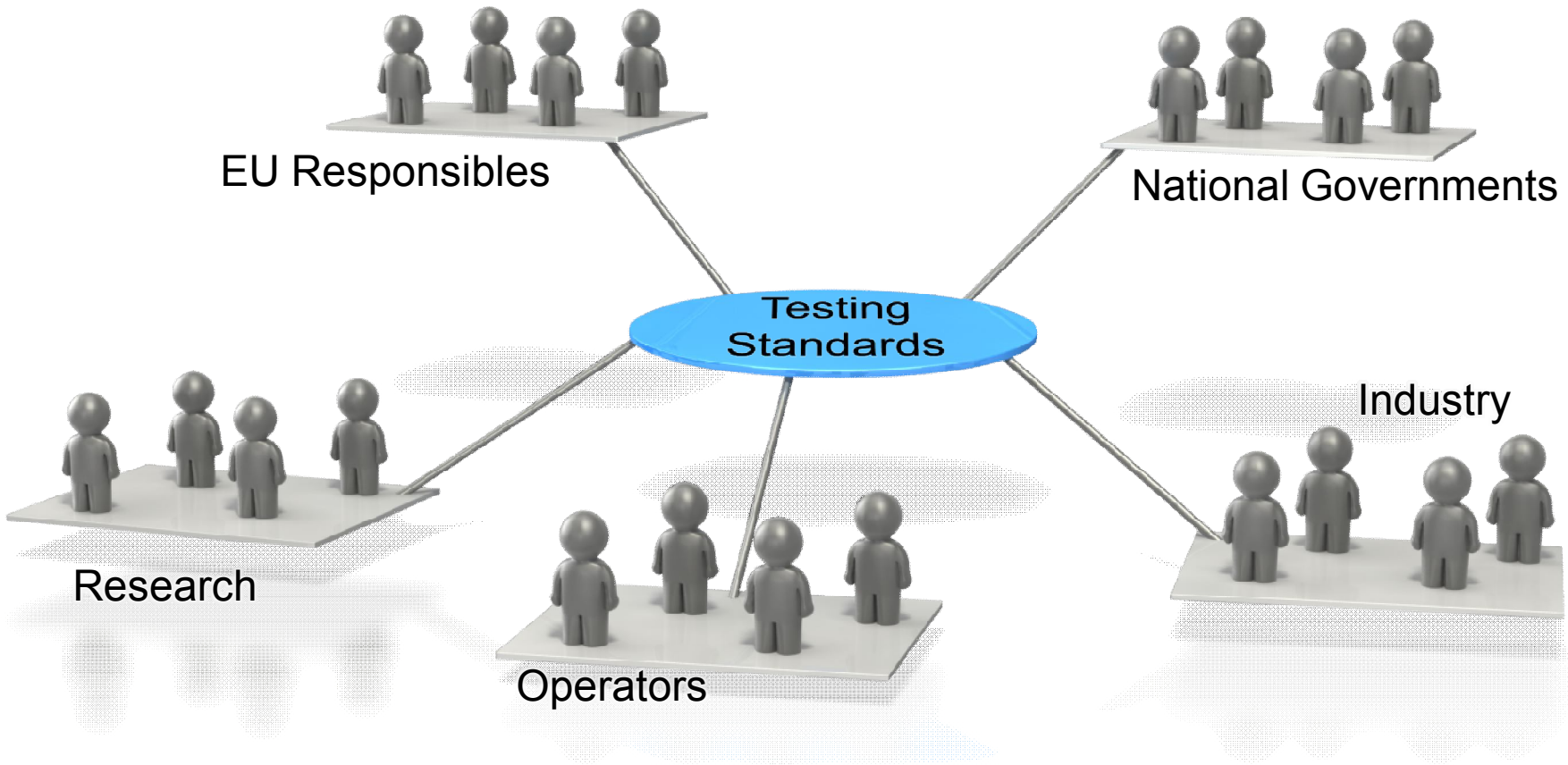
Resilience - preserve societal functions

Private public partnerships (**PPP**)

Risk assessment/management (security & safety)

All hazards approach

Verification – effectiveness?


EU Responsibles
National Governments
Testing Standards
Research
Operators
Industry

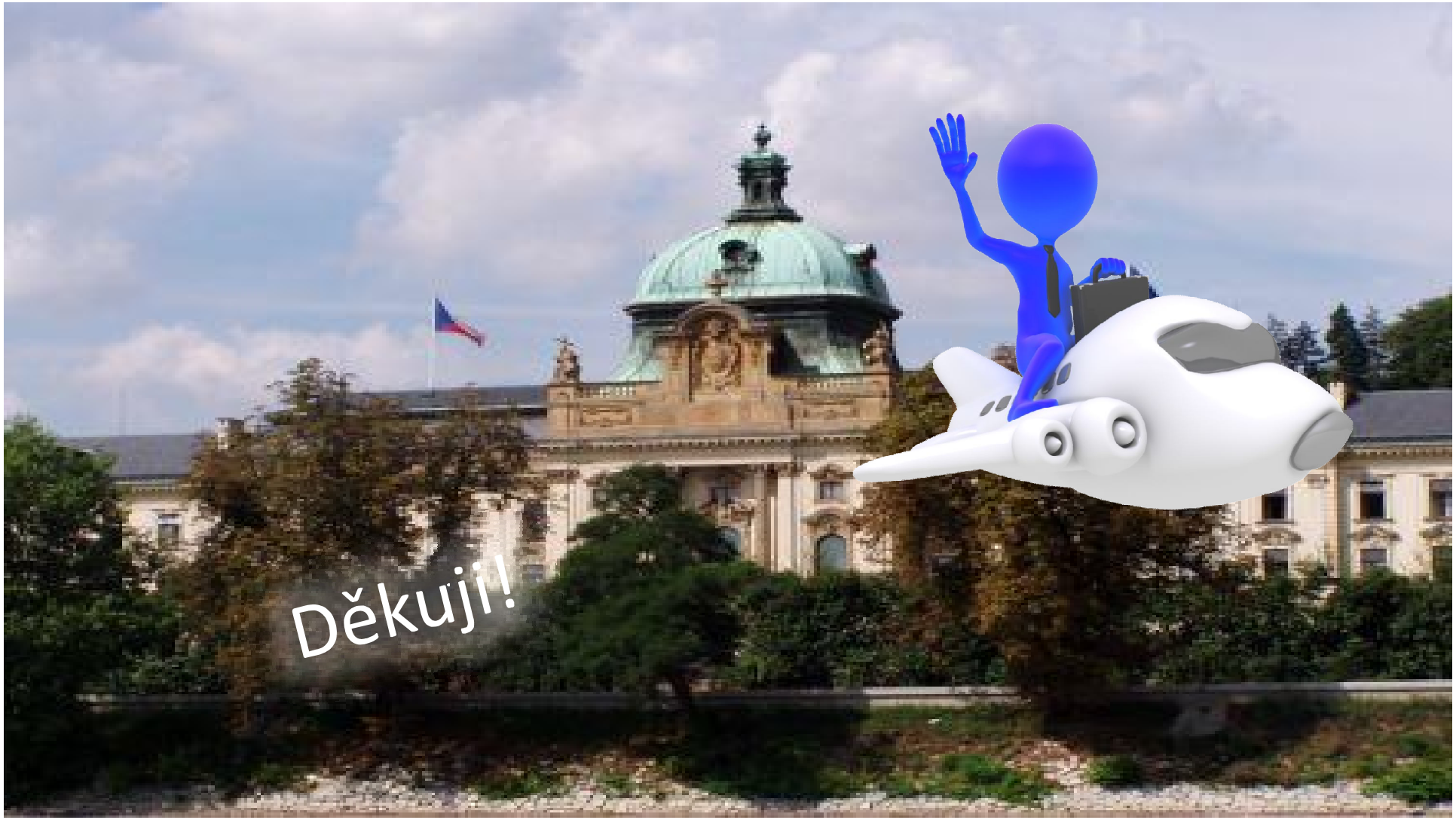
World Economic Forum

Published in 2014 a study on ten Risks of Highest Concern in 2014

- Fiscal crises in key economies
- Structurally high unemployment/underemployment
- Water crises
- Severe income disparity
- Failure of climate change mitigation and adaptation
- Greater incidence of extreme weather events (e.g. floods, storms, fires)
- Global governance failure
- Food crises
- Failure of a major financial mechanism/institution
- Profound political and social instability

How to tackle these risks?

- Trust between stakeholders
- Long-term thinking
- Collaborative multistakeholder action
- Global governance


Děkuji!