SECURITY AND RESILIENCE OF SNCF RESEAU, THE FRENCH NATIONAL RAILWAY INFRASTRUCTURE MANAGER

OECD-JRC Workshop on "System-thinking for critical infrastructure resilience and security"
SOME MAJOR EVENTS

Fire of an electric transformer of an energy provider ...

... provoke the freeze of train operations in Gare Montparnasse. July 2018
SOME MAJOR EVENTS

Flood of the Seine river …

… provoke the freeze of train operations of underground RER line. Juin 2016 and January 2018.
THE NETWORK

15000 TRAINS/DAY

5 MILLIONS OF PASSENGERS

30 000 KM OF LINES
RISKS AND STATE OF THE SYSTEM

HAZARDS  SYSTEM  CONSEQUENCES

Dysfunctions
(Vulnerabilities)

State

Normal State
Degraded state
Failed state

Time

Performance threshold
Dysfunction threshold
Failure threshold

Domino effects
CHARACTERIZATION OF RAILWAY CRITICAL INFRASTRUCTURE

Infrastructures

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Functions

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Missions

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System characteristics

Used resources

- Energy
- Telecom
- Information
- Connections
- Train
- People
- Regulation

Provided resources

- Trains on time
- Information

Information
VULNERABILITIES ANALYSIS

- Environment
  - Downstream vulnerability
  - Continuous improvement
  - Monitoring

- System
  - Internal vulnerability
  - System needs
  - Uphill vulnerability
FLOOD - INTERNAL VULNERABILITY

- Tracks
- Signalling devices
- Power supply

Diagram shows connections between flood, tracks, signalling devices, and power supply.
FIRE – UPHILL VULNERABILITY

Energy → Tracks → Signalling devices → Power supply → Tracks

Electrical substation
RESILIENCE OBJECTIVES

- Performance
  - Energy: redundancy
  - Flood: dams

- Hazard
  - Avoid
  - Absorb
  - Survive

- Robustness
  - Restore

- Hability to recover
  - Evolve

- Time
  - Ressources mobilization
Jean-Luc Planchet – Defense and security officer
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