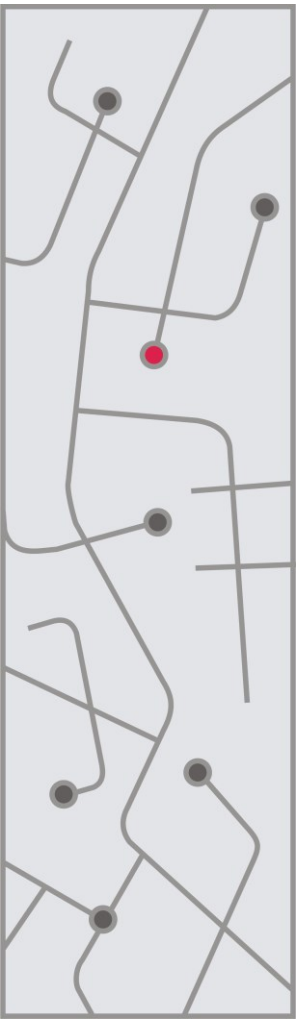

3.3 FUNCTIONAL INTERDEPENDENCIES OF CRITICAL INFRASTRUCTURES:

SIMULATION OF FUNCTIONAL INTERDEPENDENCIES IN REAL NETWORKS

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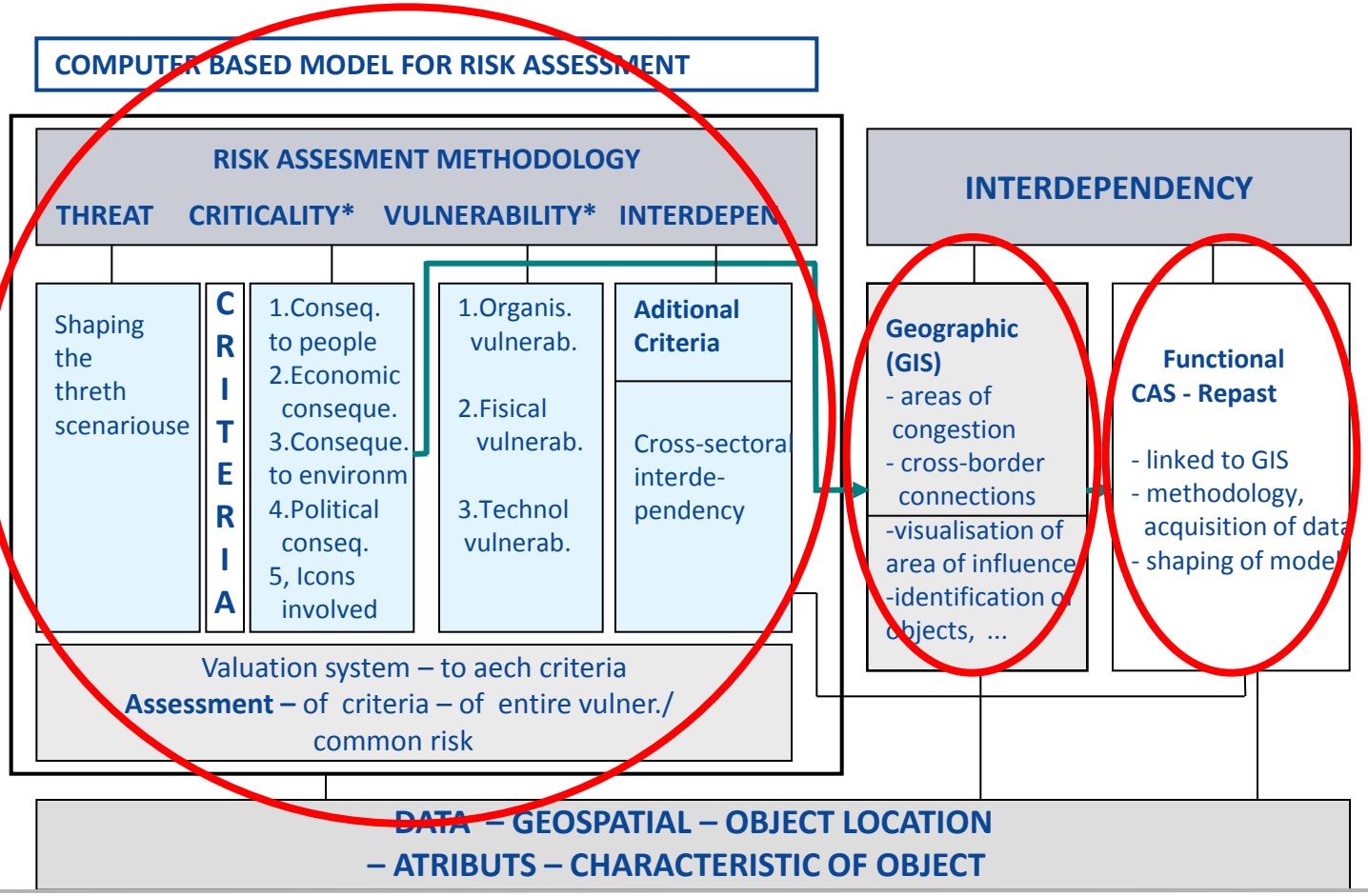
- **TOPICS**

- **(Cross)-sectoral interdependency – key element of criticality**
- **Challenge of simulation of the processess and interdependency including related important objects**
- **The case of simulation of electrticity distribution system**

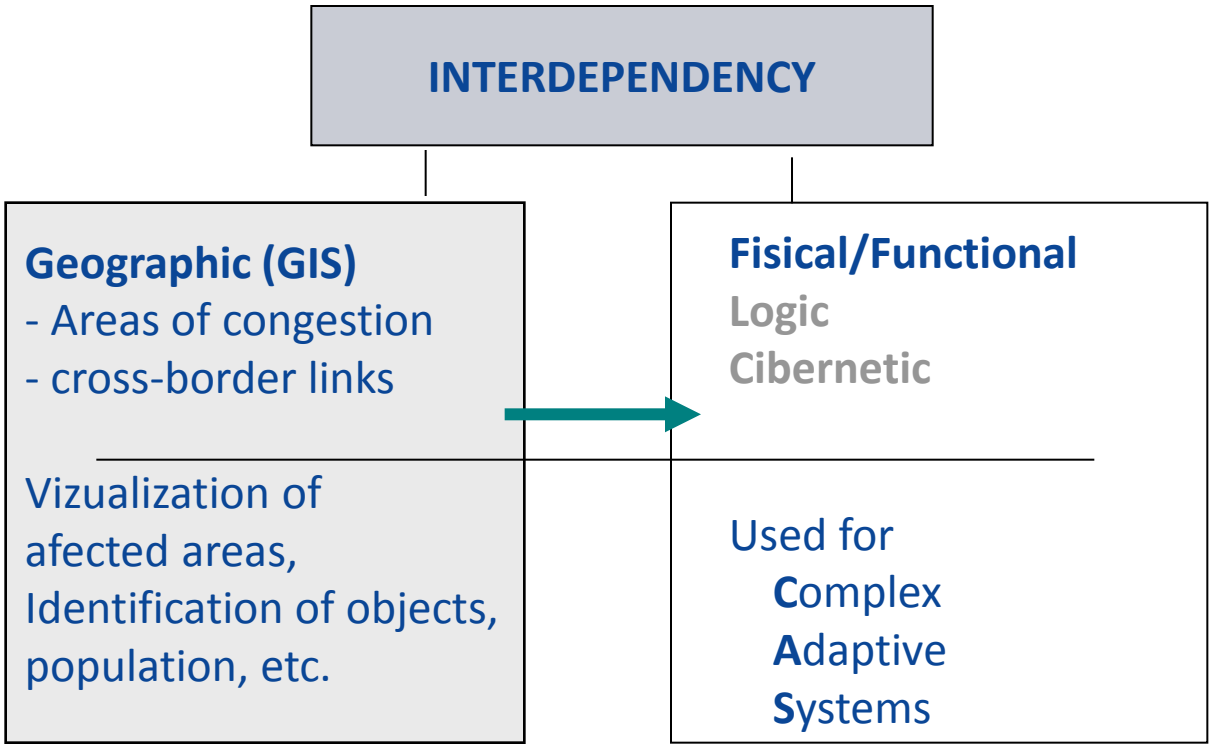
C1 interactive integrated system for risk assessment based on GIS

- **SHAPING OF ASSESSMENT MODEL**

C2 simulation tool for interdependency-based criticality and risk assessment



SHAPING OF ASSESSMENT MODEL



- **starting point - space**
- **oriented to object**

- **focus sector/subsector**
- **oriented to PROCESS**
- **ability to ident a object**

INTERDEPENDENCY ANALISYS - APPROACHES

- ANALITICAL METHODS – with complexsity of system number of used methods increase

- SIMULATION OF SISTEMS – method of experimentation using computer model

COMPLEX SISTEMS → SIMULATION USING AGENT MODELS

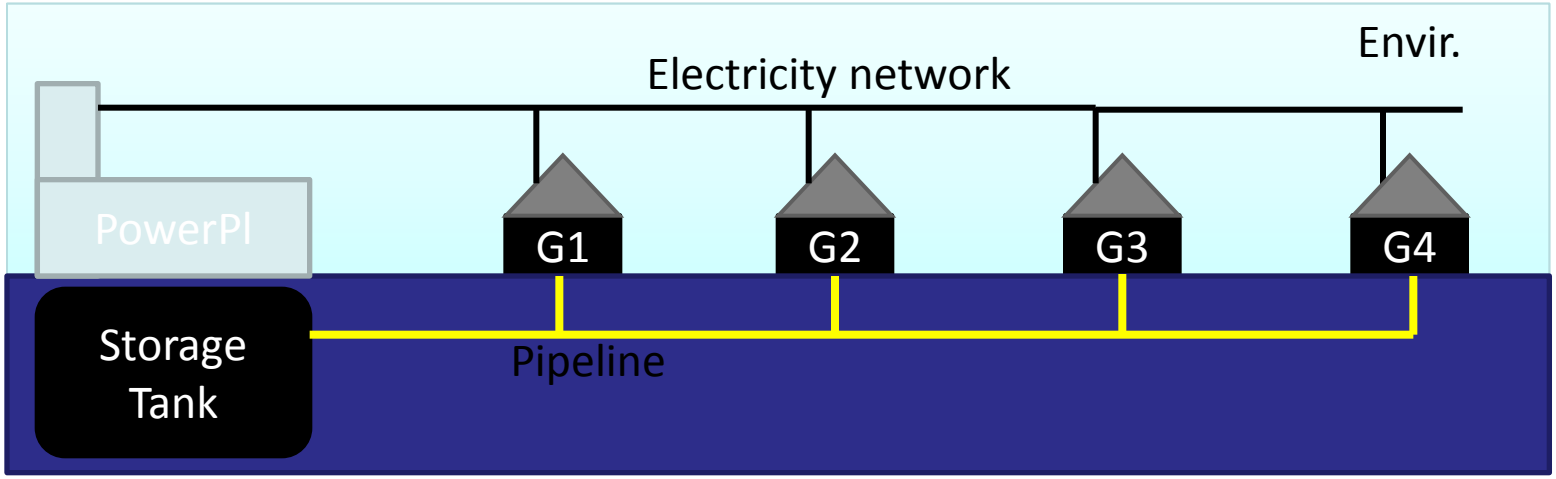
(Study: Laboratory for Safety Analysis, Zurich, 2008)

THE PURPOSE OF SIMULATION

- Study of connectivity of the system widgets
- Operation of the system
- Simulation of changes, malfunctions, failures of the widgets
- Study system vulnerability
- Development of mitigation procedures in case of system malfunctions

AGENT MODELING - WIDGETS

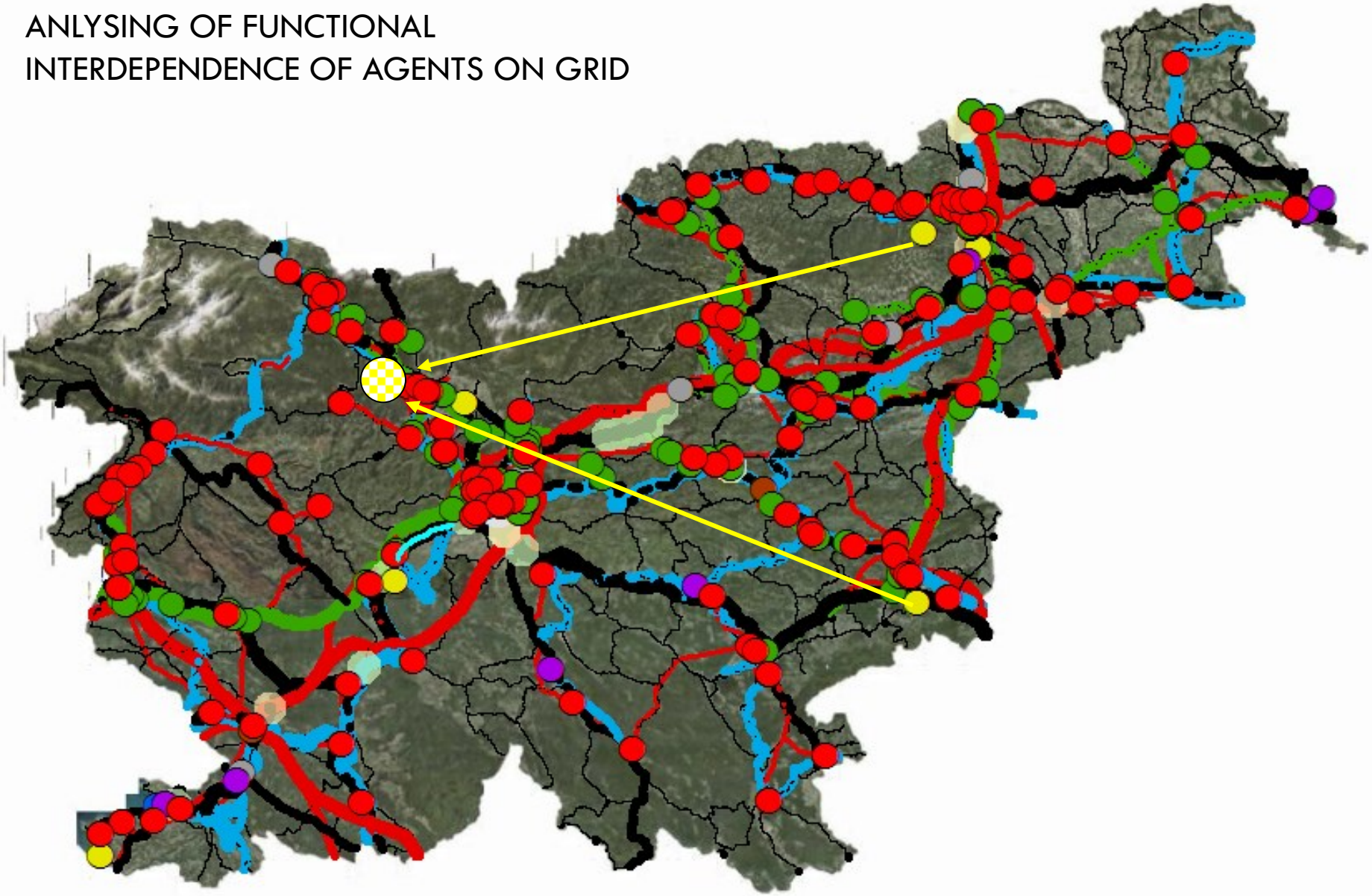
- **AGENTS**
  - Users
  - Pipeline
  - Storage Tanks
  - Eletricity network
  - Power Plant
  - Environment
- **INTERACTIONS**
  Information transfer between agents



SIMULATION ON WIDGETS OF ELECTRICITY DISTRIBUTION SYSTEM

analysing: functional interdependencies, interruptions

ANLYSING OF FUNCTIONAL
INTERDEPENDENCE OF AGENTS ON GRID



ASSESSMENT OF CONSEQUENCES ON SURROUNDING