GR²ASP tool for mapping interdependencies

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European Commission, Joint Research Centre

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Joint Research Centre at a glance

- 2800 staff
- 75% scientists and researchers
- Headquarters in Brussels and research facilities located in 5 Member States

European Commission's
Science and Knowledge service

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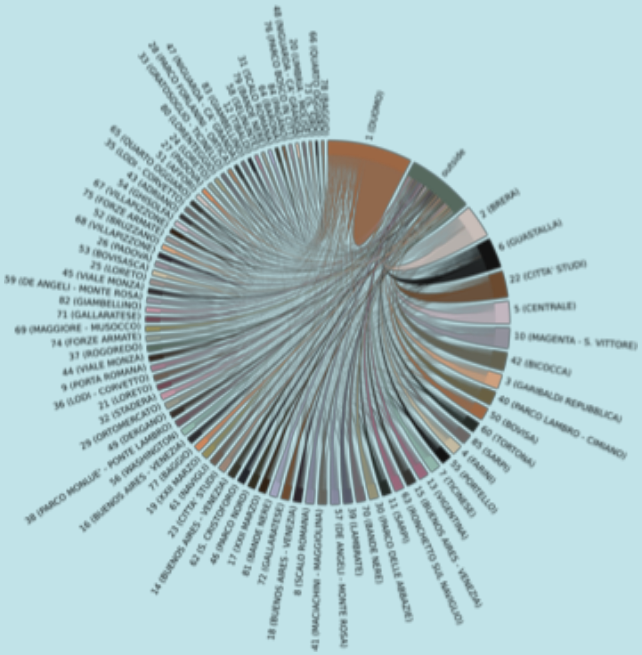
Identifying & modelling dependencies: condition towards resilience



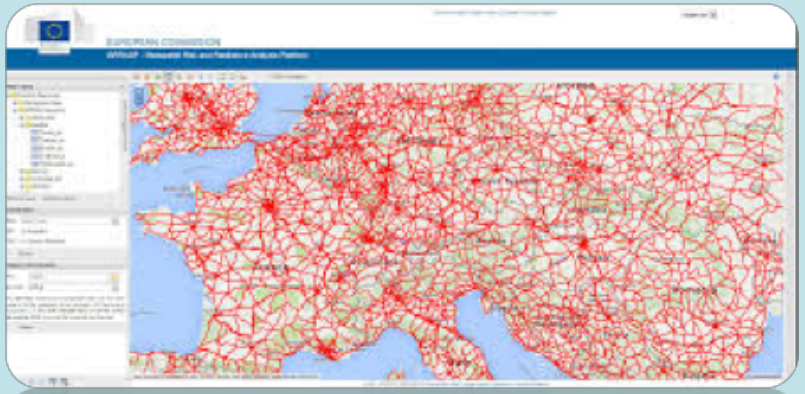
Modeling, simulation & analysis tools

Complexity

Computational Cost

Cascading effects

- within a sector
- across sectors
- cross-border



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Interdependencies at various levels

Sector

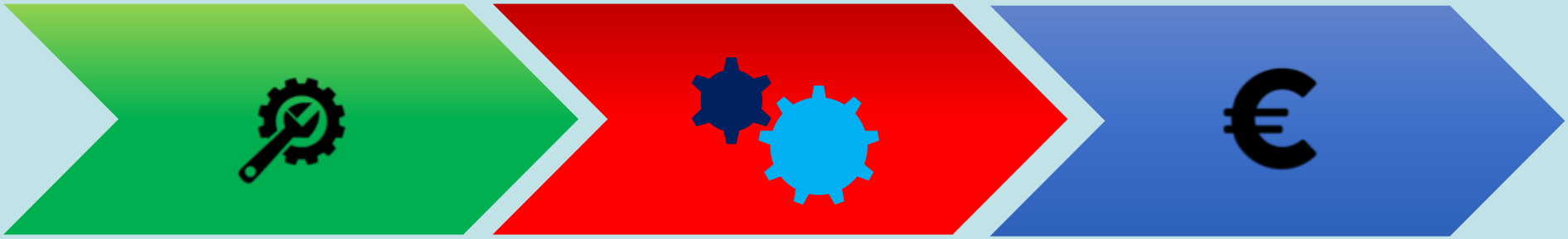
- Detailed engineering models
- Datasets not always available
- High modelling complexity but also lower uncertainty

Cross - sector

- Mainly service-based models
- Datasets can be obtained from open sources
- Lower modelling complexity but also higher uncertainty

Economic

- Interdependencies among economic sectors
- Input from engineering models is necessary to improve their accuracy



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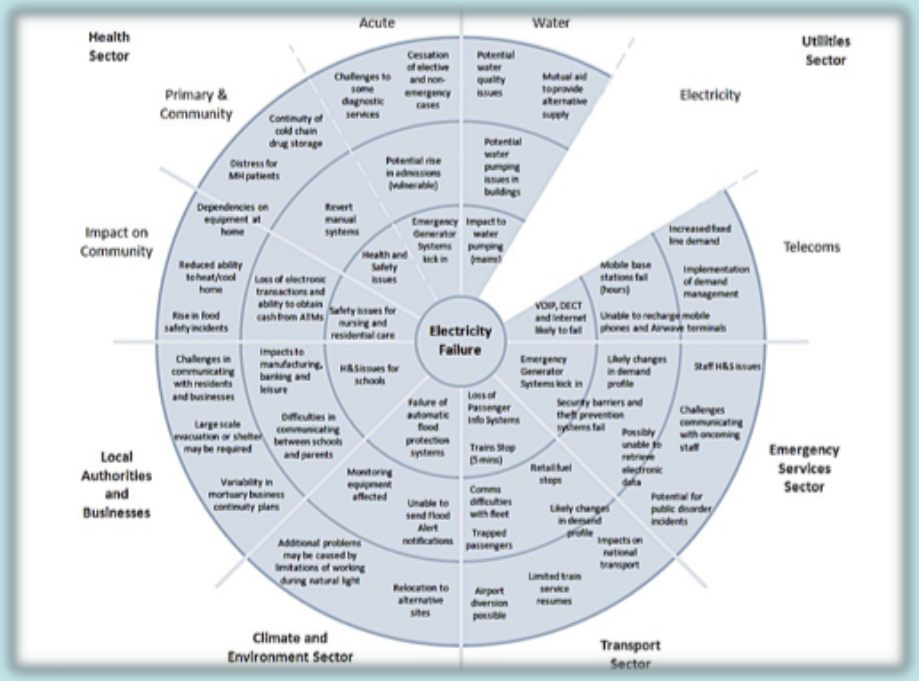
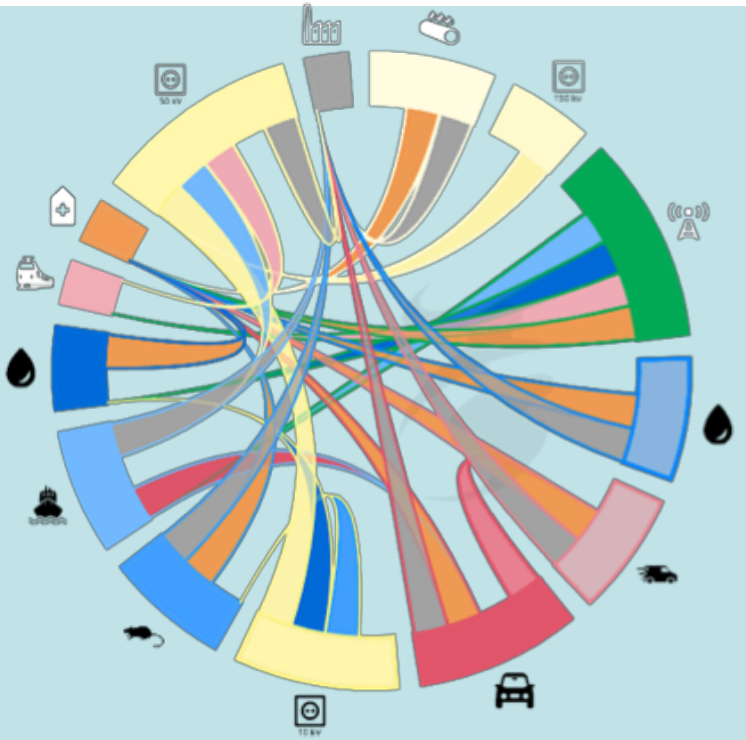
Where to start?
Table-top exercise or brainstorming session



Hogan M., Anytown: Final Report, London Resilience Team, 2013. Available at: http://climatelondon.org/wp-content/uploads/2016/11/Anytown-Final-Report.pdf.



Clrcle diagram of dependencies.
Available at: https://circle.deltares.org/

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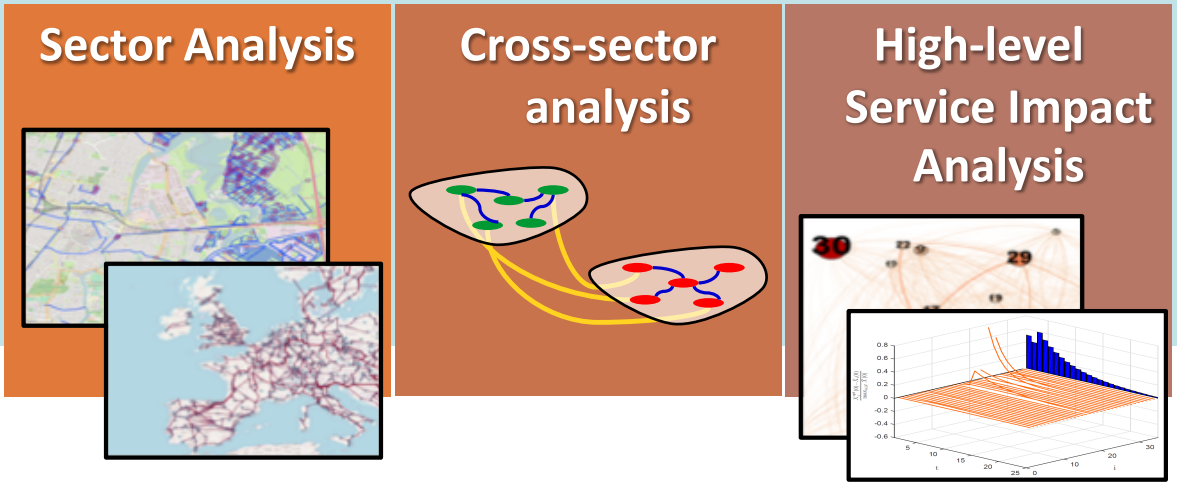
GR²ASP

Geospatial Risk and Resilience Assessment Platform

- A **webGIS-based** platform for **analysis** of infrastructures and services
- **Maps services** based on **proprietary resources** & **open source data**
- **Models for simulation**



GR²ASP

https://ec.europa.eu/jrc/en/grrasp

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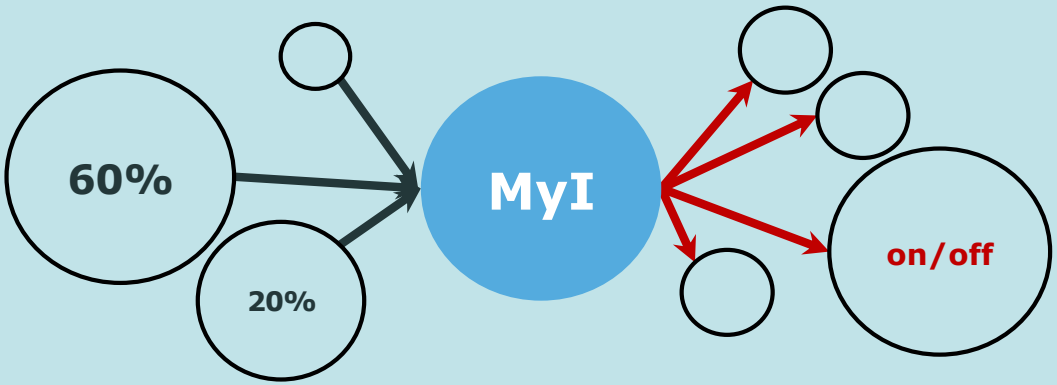
Key questions for OES and DSP: Exercise

Q.1 To what extent, for a given scenario, is my infrastructure (MyI) able to provide services?

➔This depends on the other operators/sectors MyI relies upon and its own resilience measures



Q.2 How quickly will the recovery process start? How long will it take?

Q.3 Will recovery start independently of other operators?

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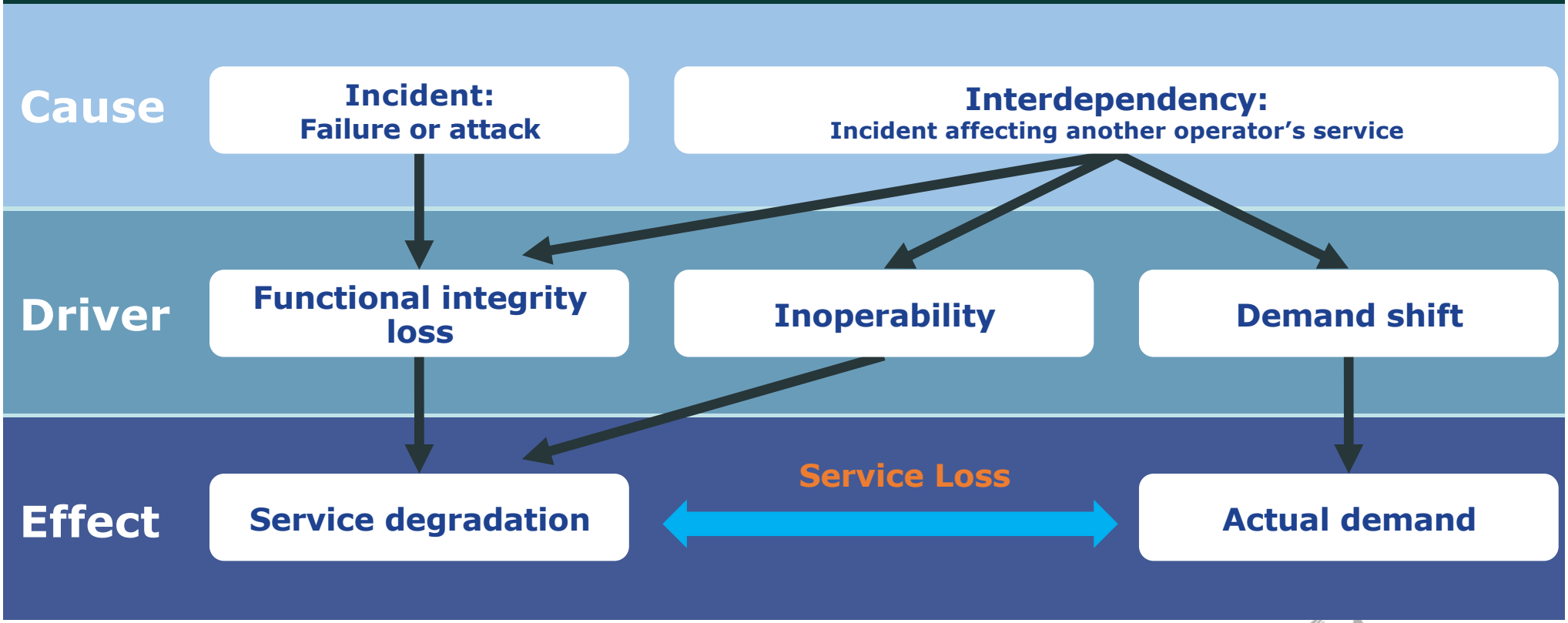
Service-oriented analysis



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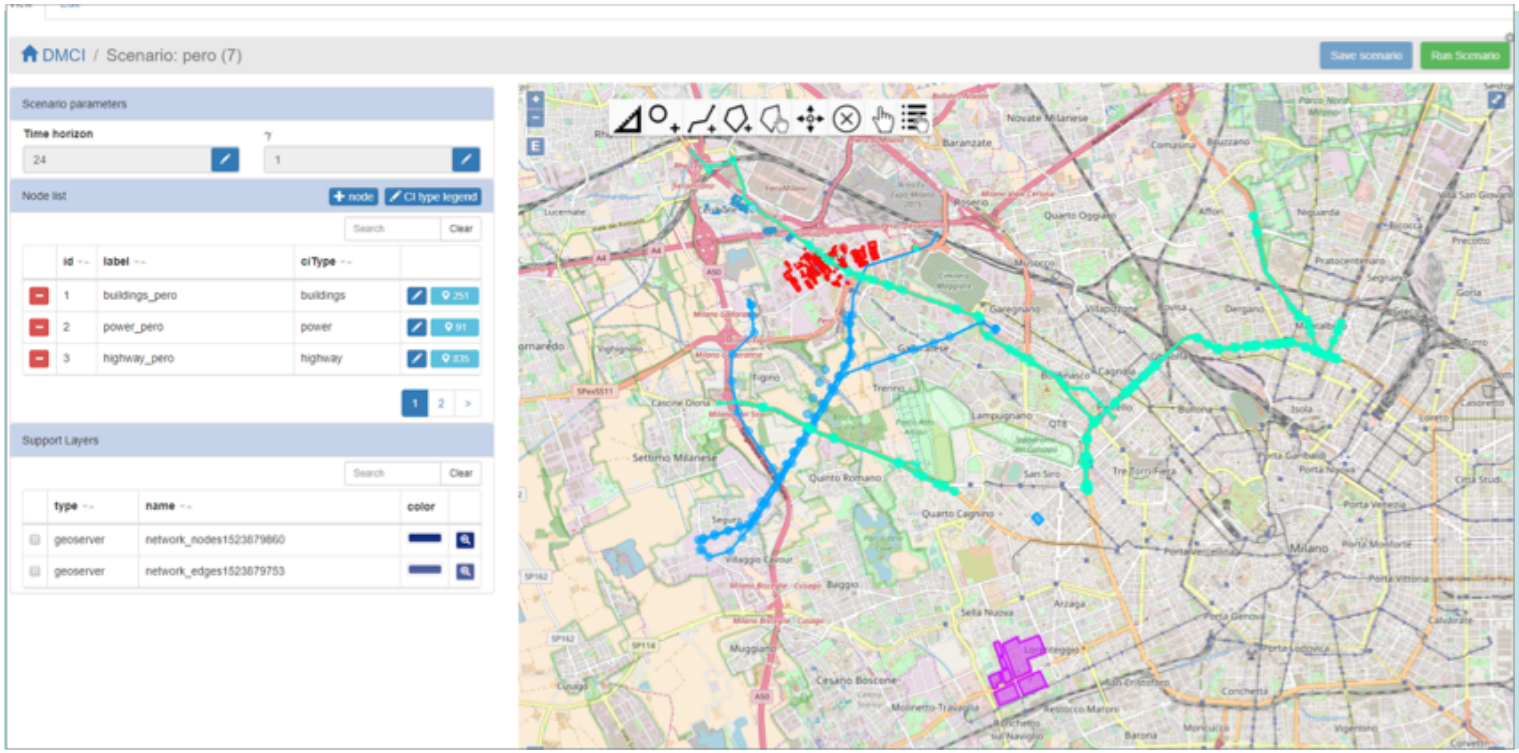
A scenario using GRRASP



3 types of OES

- Road Transport
- Electricity
- Digital/Telecom (buildings & data centre)

All infrastructures (of 3 operators) are interdependent

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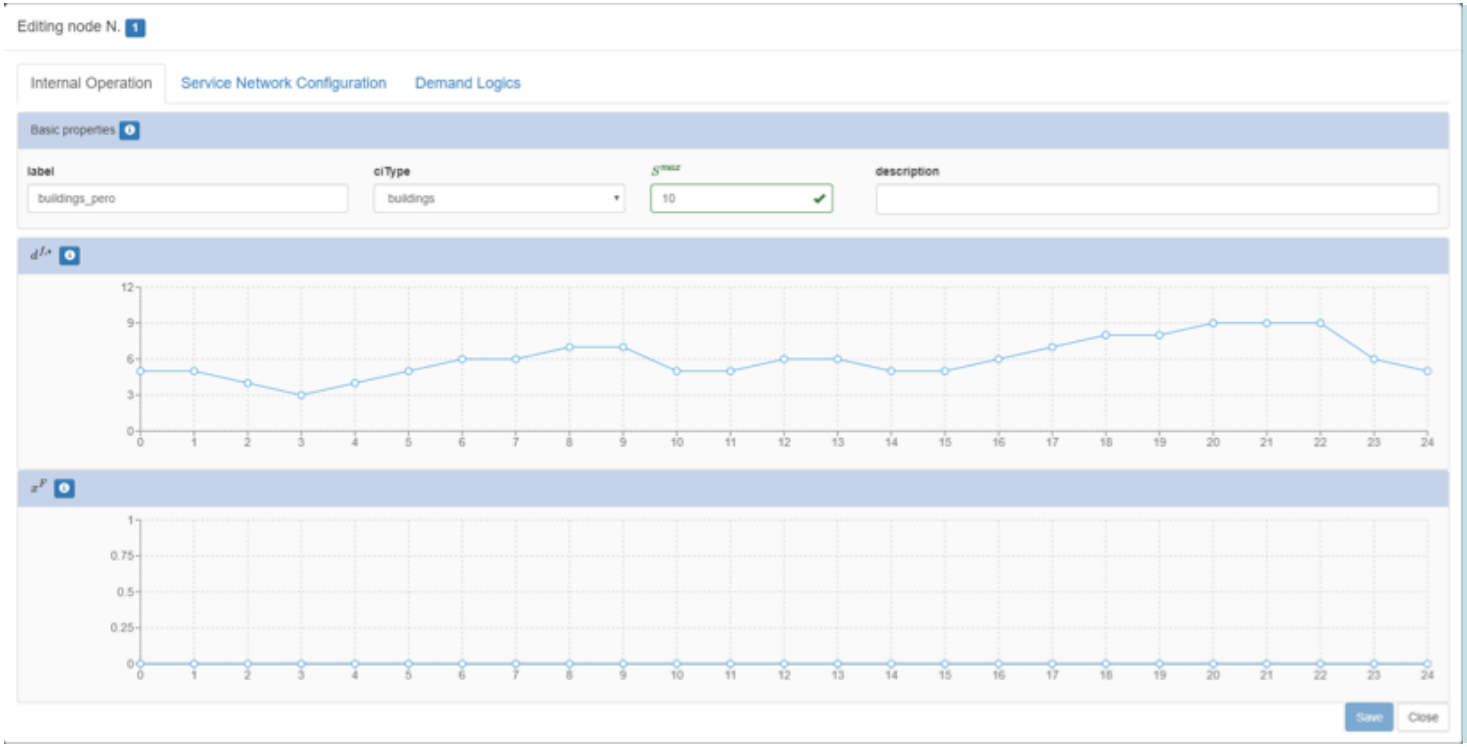
Data Input (OES/DSP expertise)



Service demand profile over time

Functional Integrity loss

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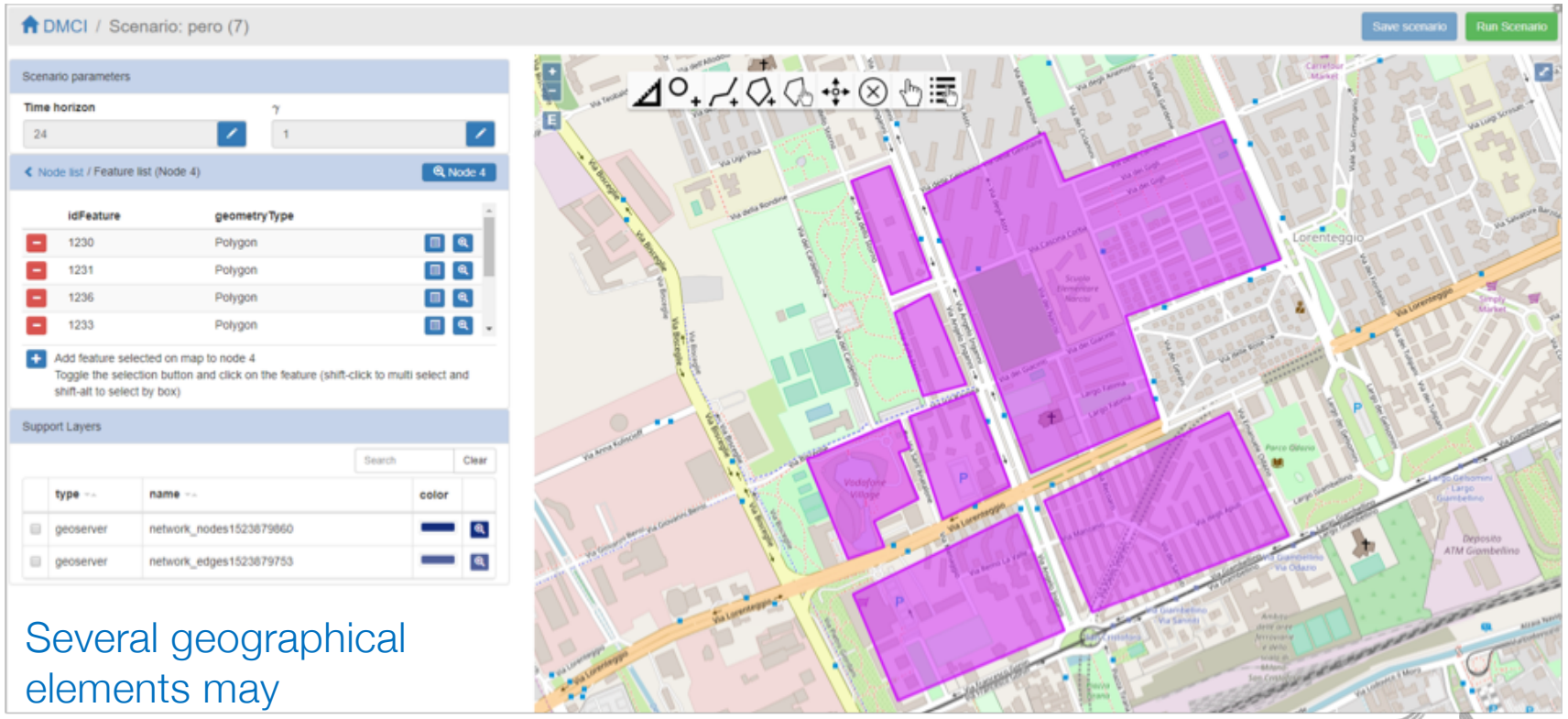
Data Input (open-source, geographical)



Several geographical elements may comprise a node!

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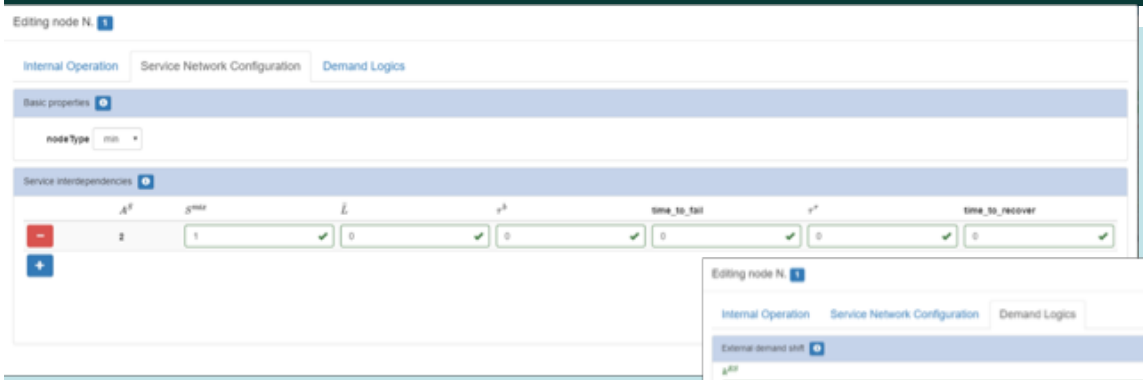
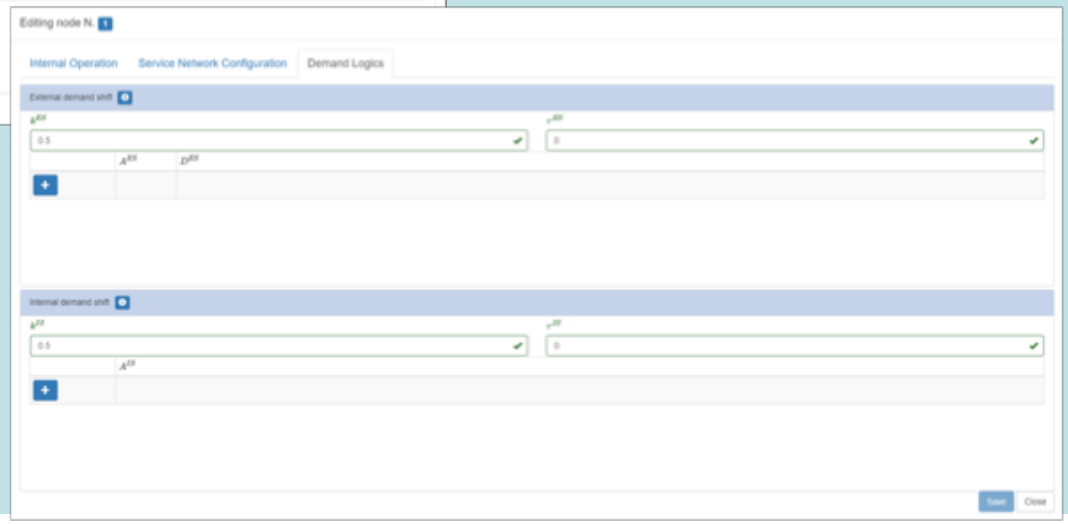
Data Input (dependencies)



Functional dependencies

Demand shift
(optional datasets)



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Simulation output: Telecommunication node

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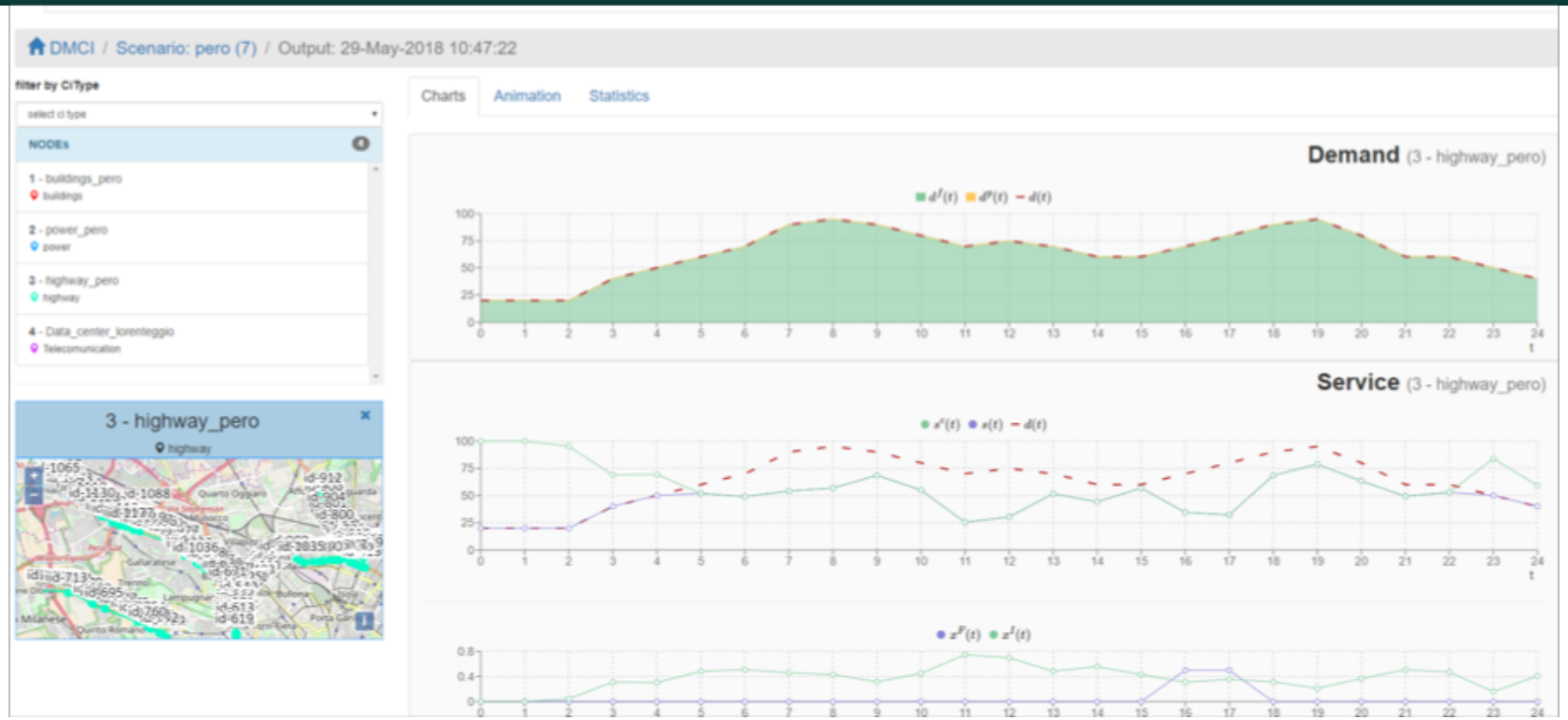
Simulation output: Road transport node



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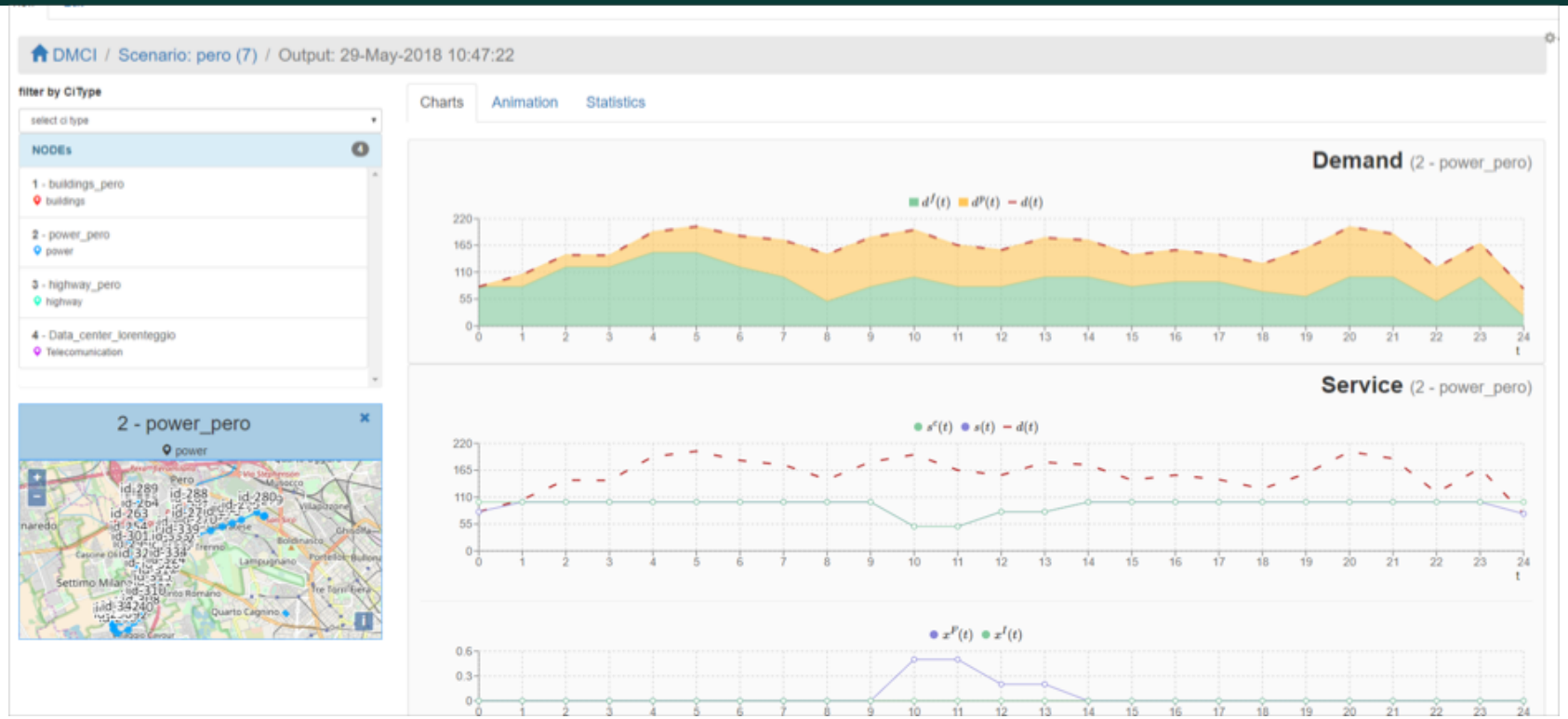
Simulation output: Electricity node



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Uses and future plans for GR^{2}ASP

- Resilience assessment:
  - within a sector or for selected sectors
  - at local or at national level
- Integration with POSEIDON:
  - From inject based exercises to interactive simulation based ("game") exercises
- Customised versions bringing closer civil and military domains

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