Smart Water Networks strategies for Resilient Cities. Experience Sharing. From Innovation to Practice

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Canal de Isabel II gestión

It is a public company responsible for managing the whole water cycle in the region of **Madrid** in Spain

6,238,000

Inhabitants supplied

17,500 km

Distribution Network

177

Municipalities

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There are many ways to understand

RESILIENCE

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RESILIENCE

- The capacity to cope with fails within certain damages, costs, impacts and time

THREATS

DAMAGES

VICTIMS

(Citizens)

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Many kind of

THREATS

Lack of enough resources

Asset failures or damages

Intrusive substances

Unforeseen consumption

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MAINE DAMAGES TO CITIZENS

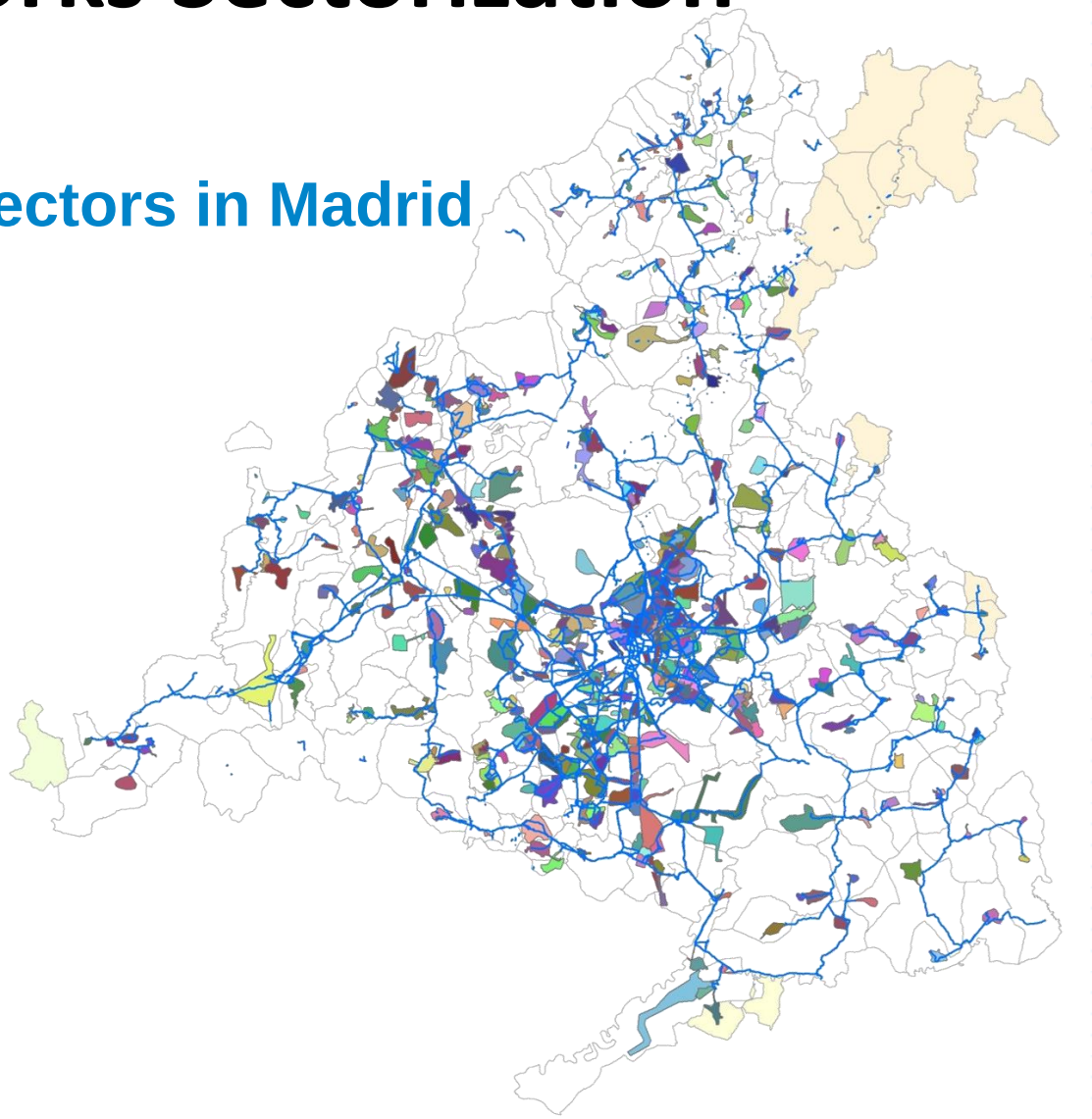
- Service
  - Hydraulic problems
  - Lack of water
- Health

RESILIENCE MANAGEMENT

- **Structural characteristics**
- **Trained staff**
- **Reliable protocols**
- **Observability. *Monitoring systems***
- **Episodes Resolution capacity. *Crisis management systems***

Networks Sectorization

870 sectors in Madrid



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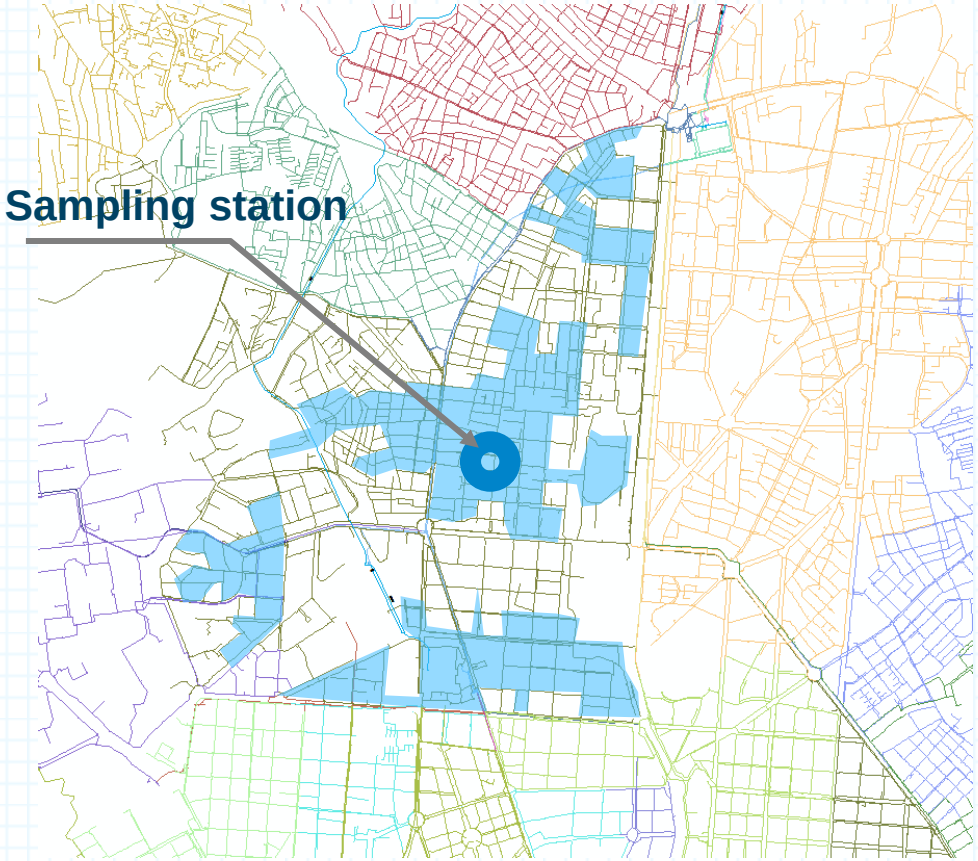
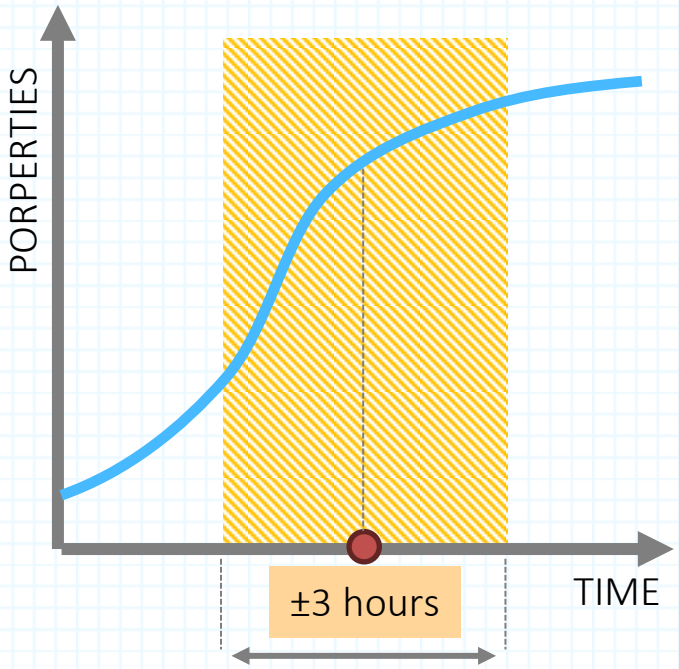
OBSERVABILITY AIMS

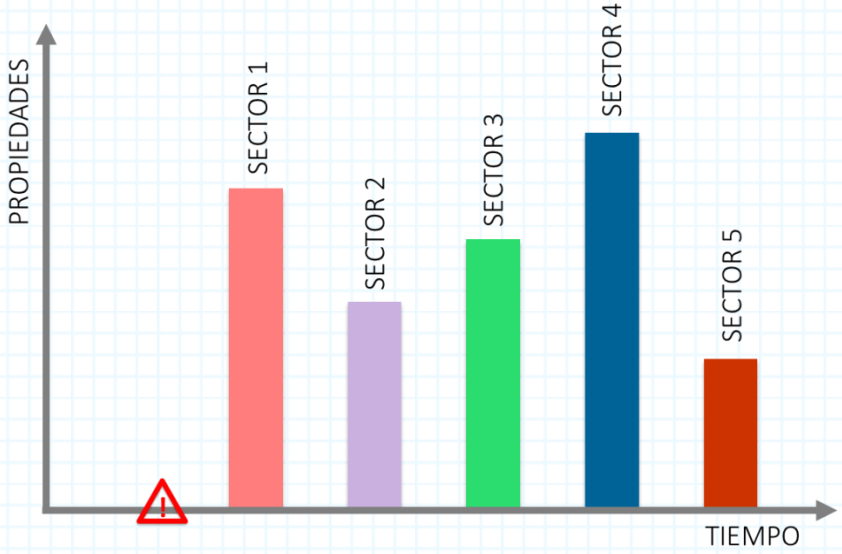
- Detection of anomalies
- Representativeness in terms of properties or citizens
- Properties downstream an anomaly
- Follow up and Forecast evolution of problem
- Assess Reaction times
- Options to warn and inform users

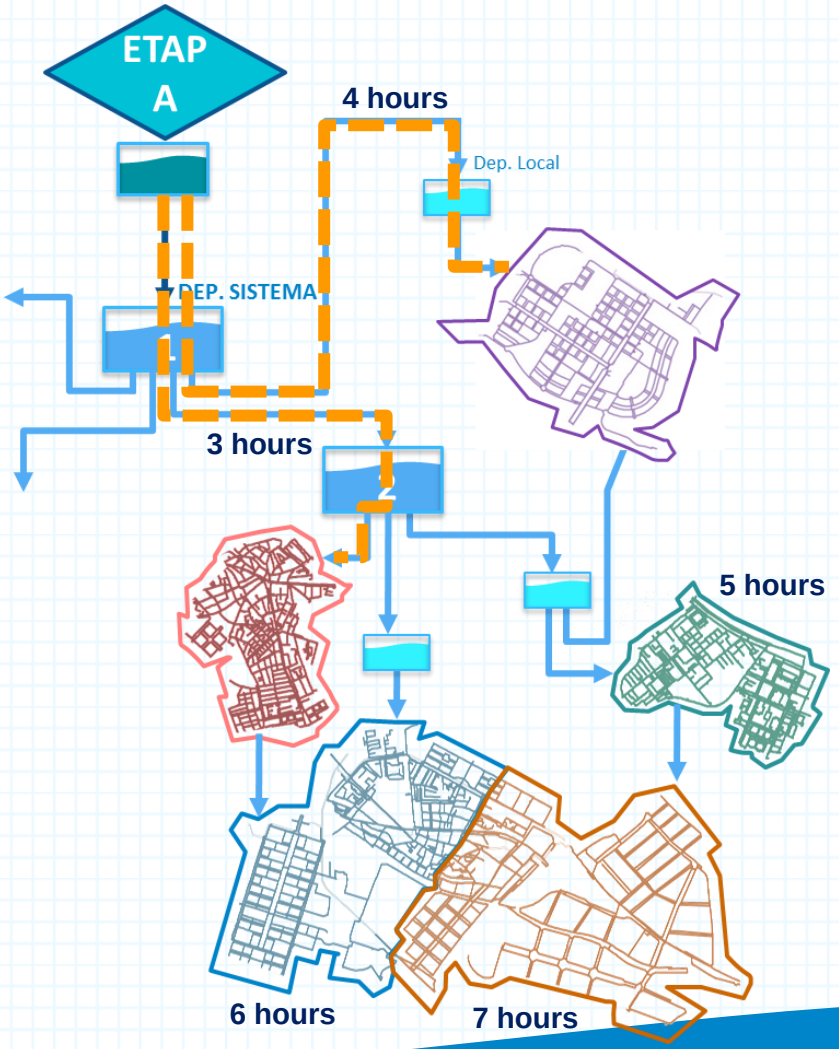
Representativeness of monitoring





Sensoring for anticipation





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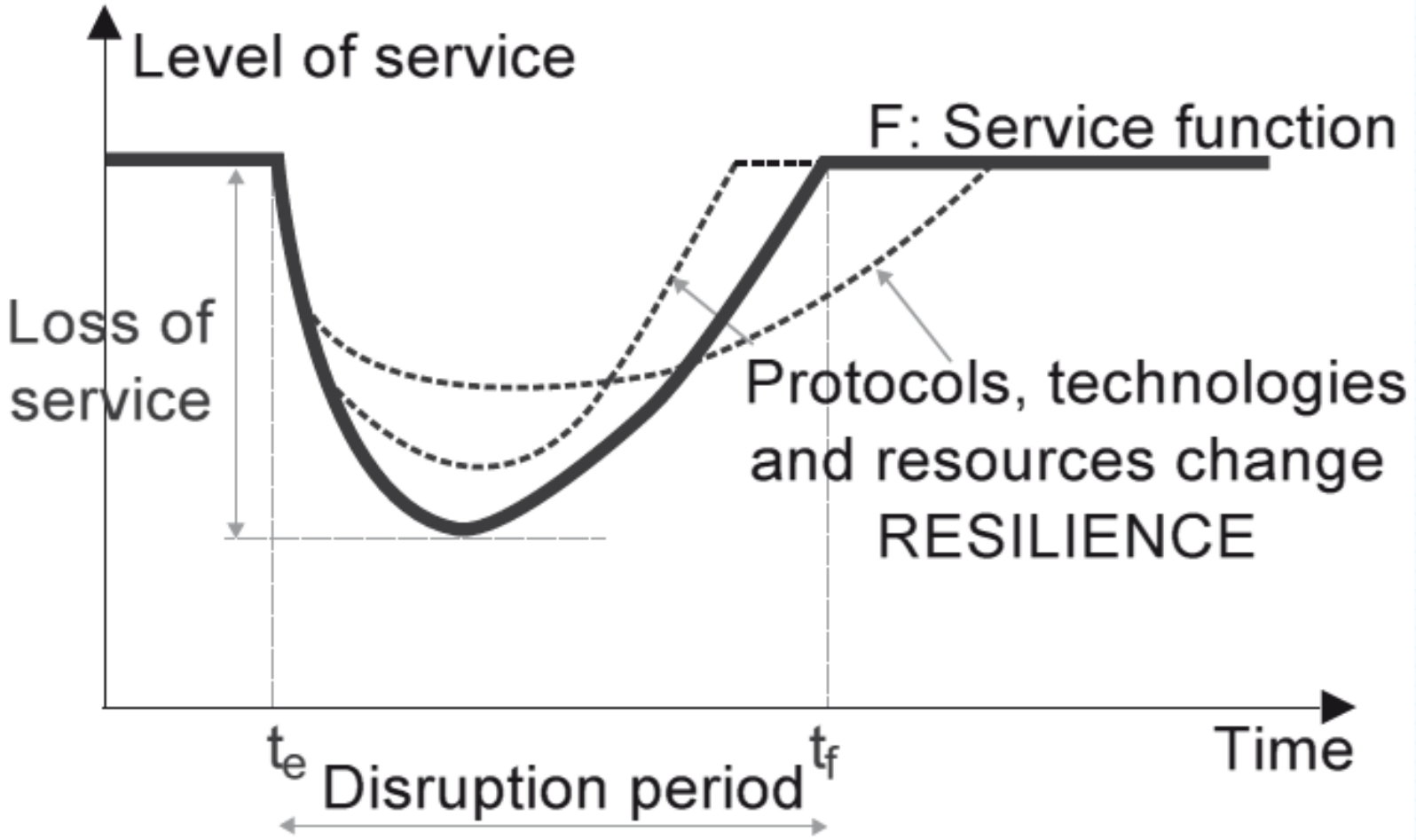
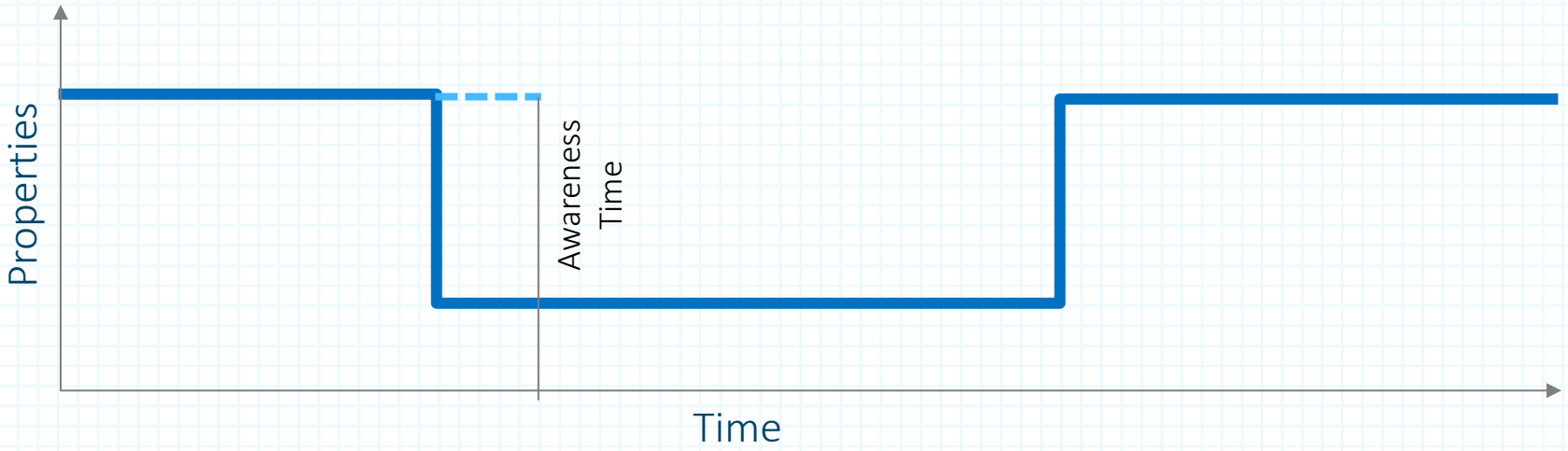
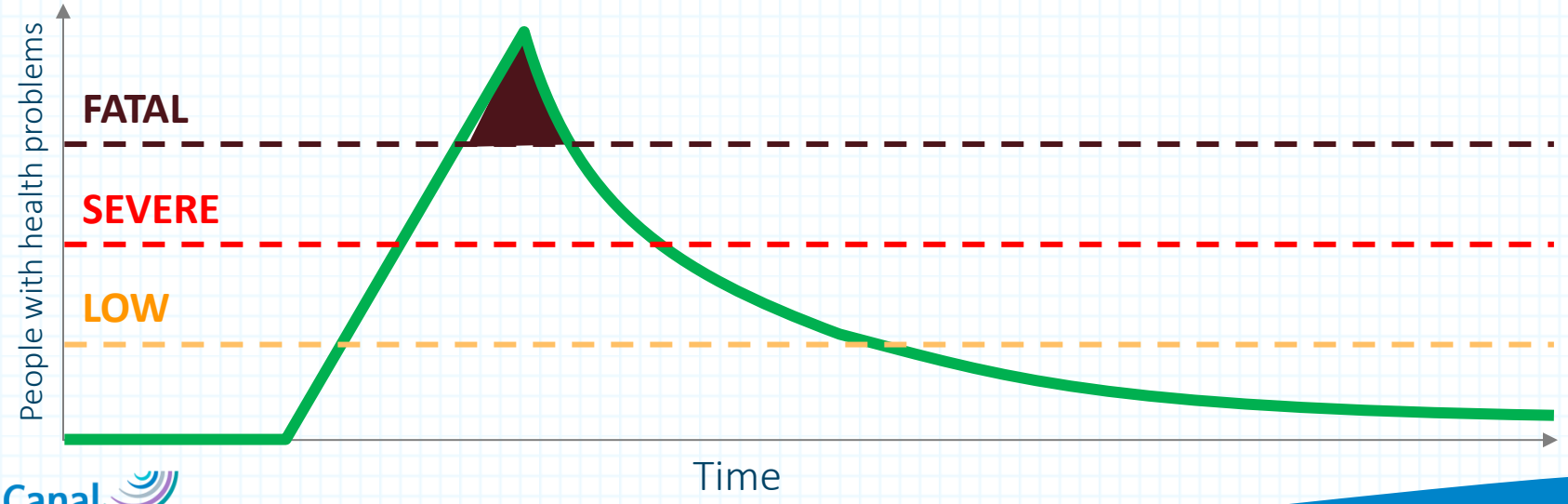
RESILIENCE IS LOSS OF FUNCIONALITY



Lack of appropriate water quality



Quality damage



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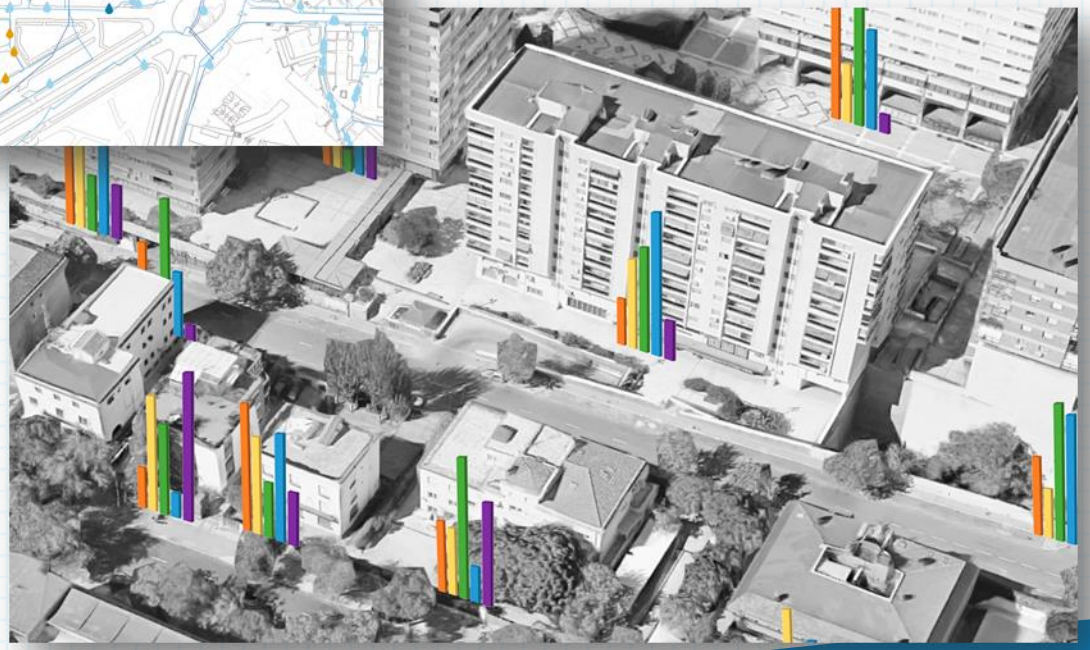
Quantifying properties resilience

- ✓ Properties and time without appropriate level of service.
- ✓ Persons with health problems. Different severity

- ✓ Per property. Assessment of its risk to service (likelihood of damages – time & loss of service)

Risks of receiving non addecuate water



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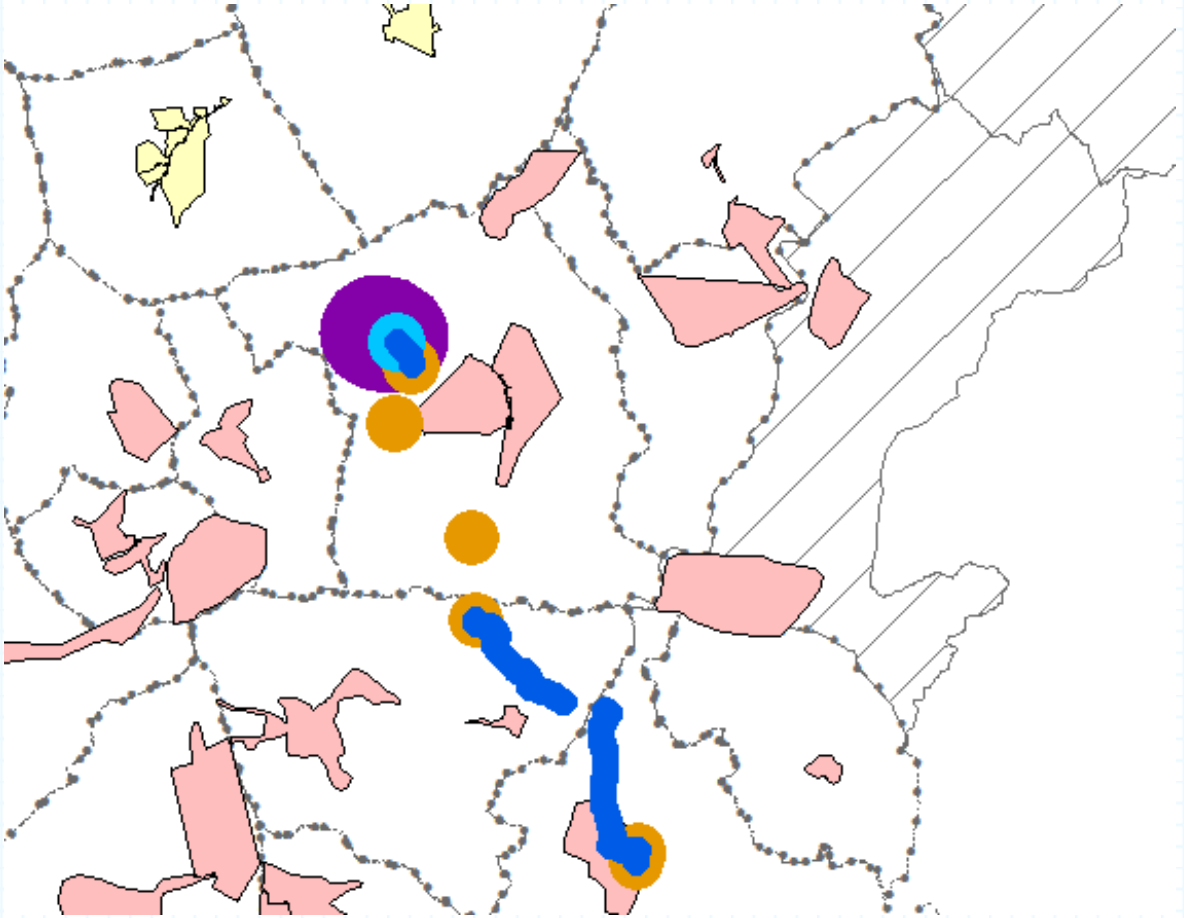
Quantifying Assets Resilience to bursts or failures

- A value for every asset (How long will last the implementation of a durable solution, and number of properties without service)

IDENTIFICATION & MANAGEMENT

of critical infrastructures



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Resilience to water quality problems

- Ability to detect , anticipate the evolution of a substance and its consequences and their resolution
- Number of properties/persons exposed to a substance , severity of it and time of exposure

SCENARIOS FOR RESILIENCE ASSESSMENT

- Current
- Planned
- Expected
- Achievable
- Accepted

NEEDS FOR RESILIENT NETWORKS

- Resilience assessment systems
- Efficient location of sensors
- Accurate and reliable measures
- Redundancy to validate measures
- Tools for forecasting evolution and impact
- Automatism to react
- Protocols to communicate
- Skills for crisis management