SMaRT-Online WDN

Online Security Management and Reliability Toolkit for Water Distribution Networks

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Optimal sensors placement on SEDIF's Network

Anne-Claire SANDRAZ
Nicolas CHEIFETZ
Cedric FELIERS

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36th month meeting

Content

- SEDIF context
  - The network
  - The tools available
- Placement strategy
  - Phase 0: pilot network
  - Phase 1: Expert-based placement
  - Phase 2: WP3-based placement
- Results & perspectives
  - Actual system
  - WP2 and futur tools

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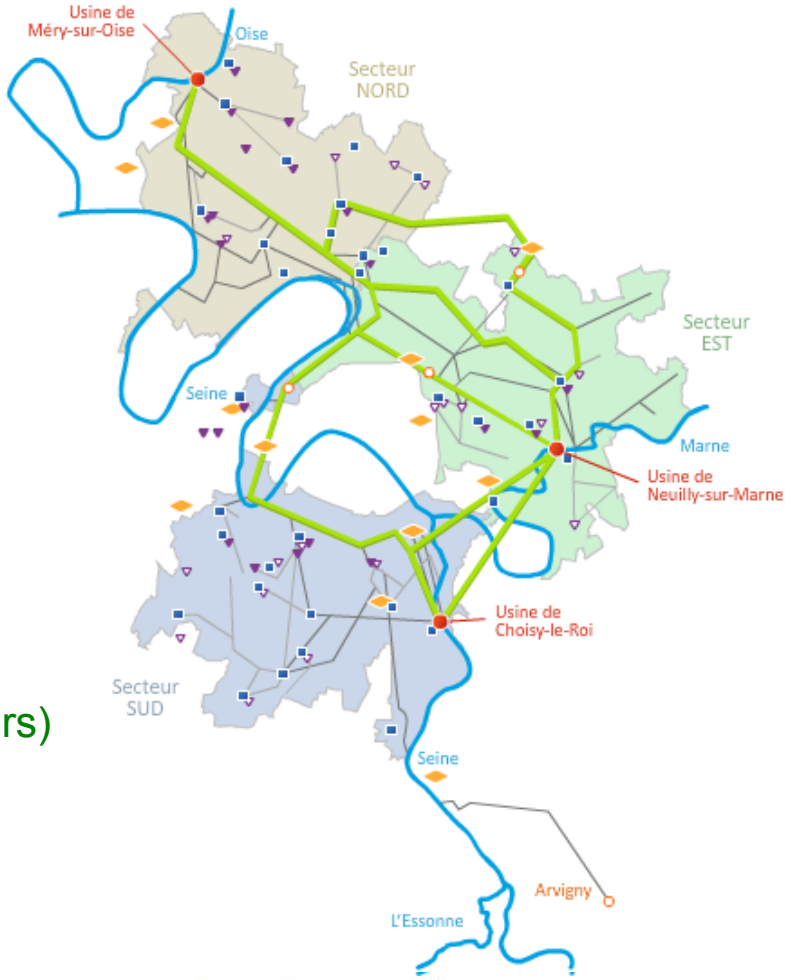
Syndicat des Eaux d'Ile de France (SEDIF)

- 4 million inhabitants
- 3 main DWP (750 000 m3/d)
- ≈ 8 700 km of pipes
- 45 pumping stations
- 39 tanks (≈ 650 000 m3)

- On-going instrumentation:
  - Automatic meter reading (≈ 500 000 meters)
  - Leakage detection (1 000 noise loggers)
  - 200 water quality sensors



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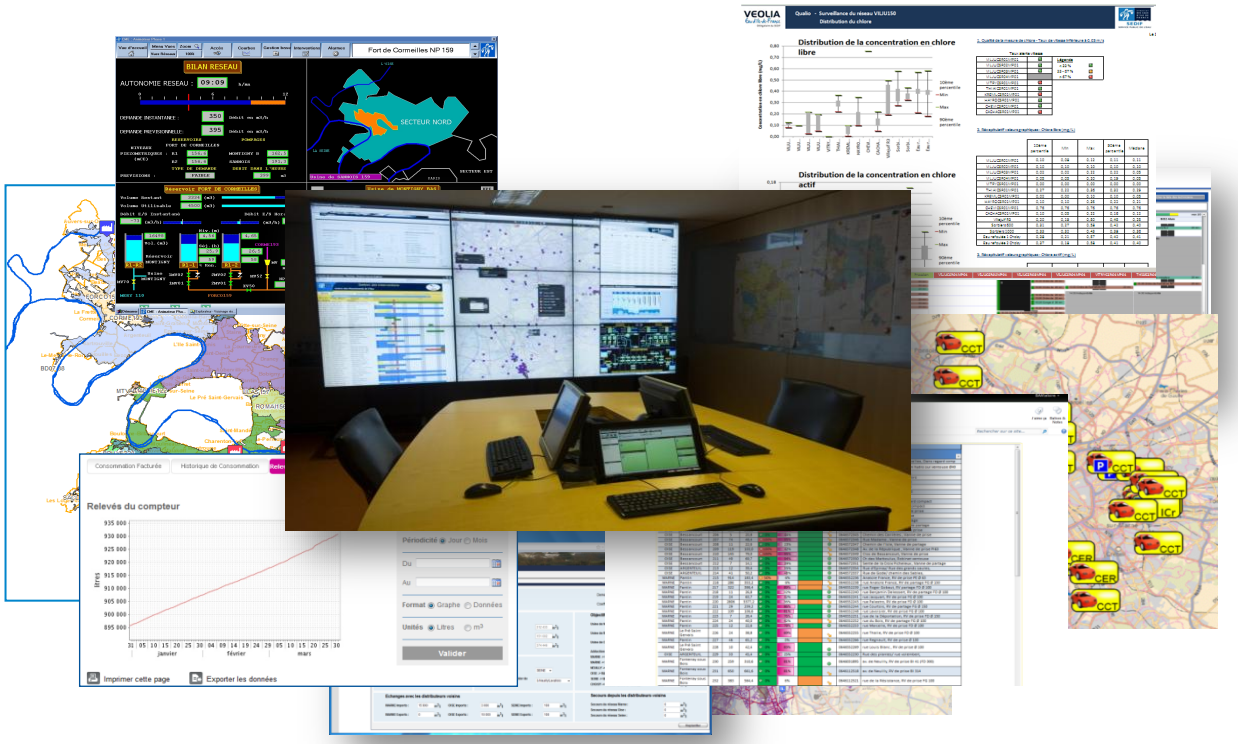
SEDIF tools

- GIS, Hydraulic model, On-line supervision (SCADA)…



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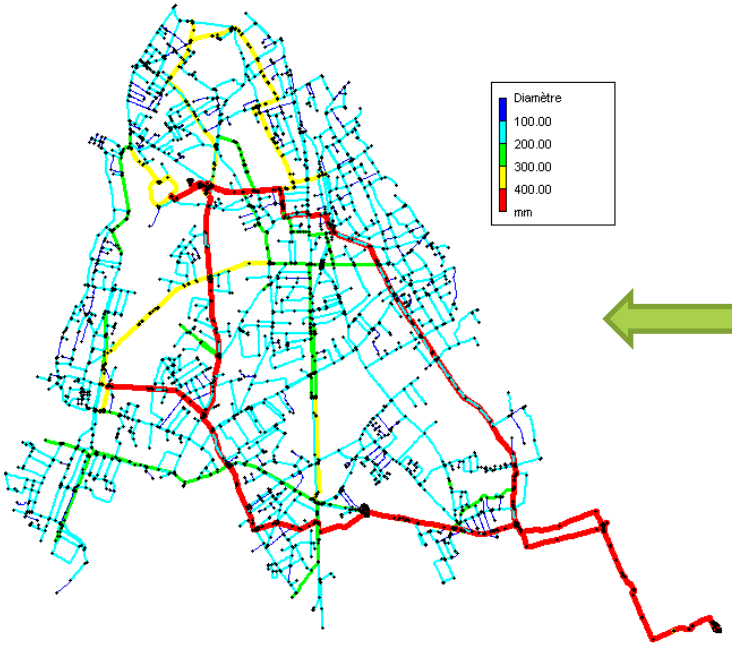
Placement strategy

- 2012: Pilot network: 10 sensors
  - Expert-based placement
  - 1st pool of data



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Placement strategy

- 2013: Whole network: 90 sensors
  - Expert-based placement: definition of zones to monitor (entrance of the network, tanks, chambers located in specific area…)
  - 2nd pool of data

- 2014: Whole network: 200 sensors
  - Optimized placement: WP3 module
  - Needs:

    - Adapt the module to SEDIF's tools
    - Run the optimization
    - Launch works and installation

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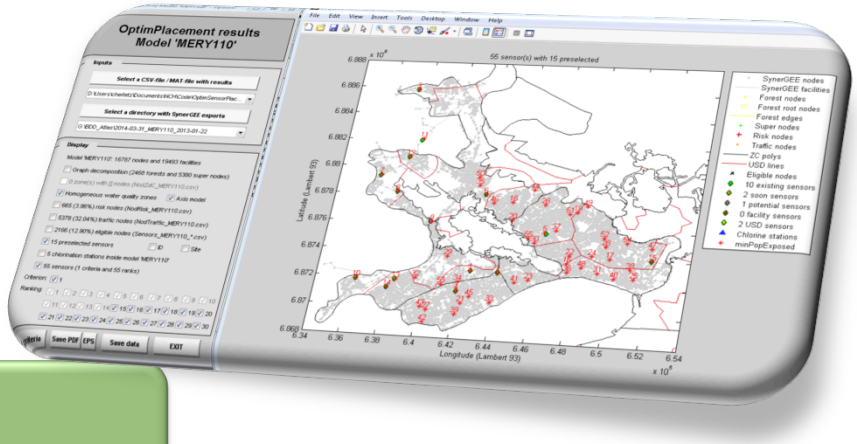
Placement strategy

Hydraulic model (Synergi tool)

Contextual data (GIS,…)

Expert knowledge (existing sensors, monitoring networks…)

Contamination simulations (in-house tool to proceed to contamination scenarios)



Preprocessing

- Contamination matrixes
- Existing sensors
- Number of sensors
- Optimizing criteria

Greedy algorithm (WP3)

Sensors Placement

Evaluation of placement

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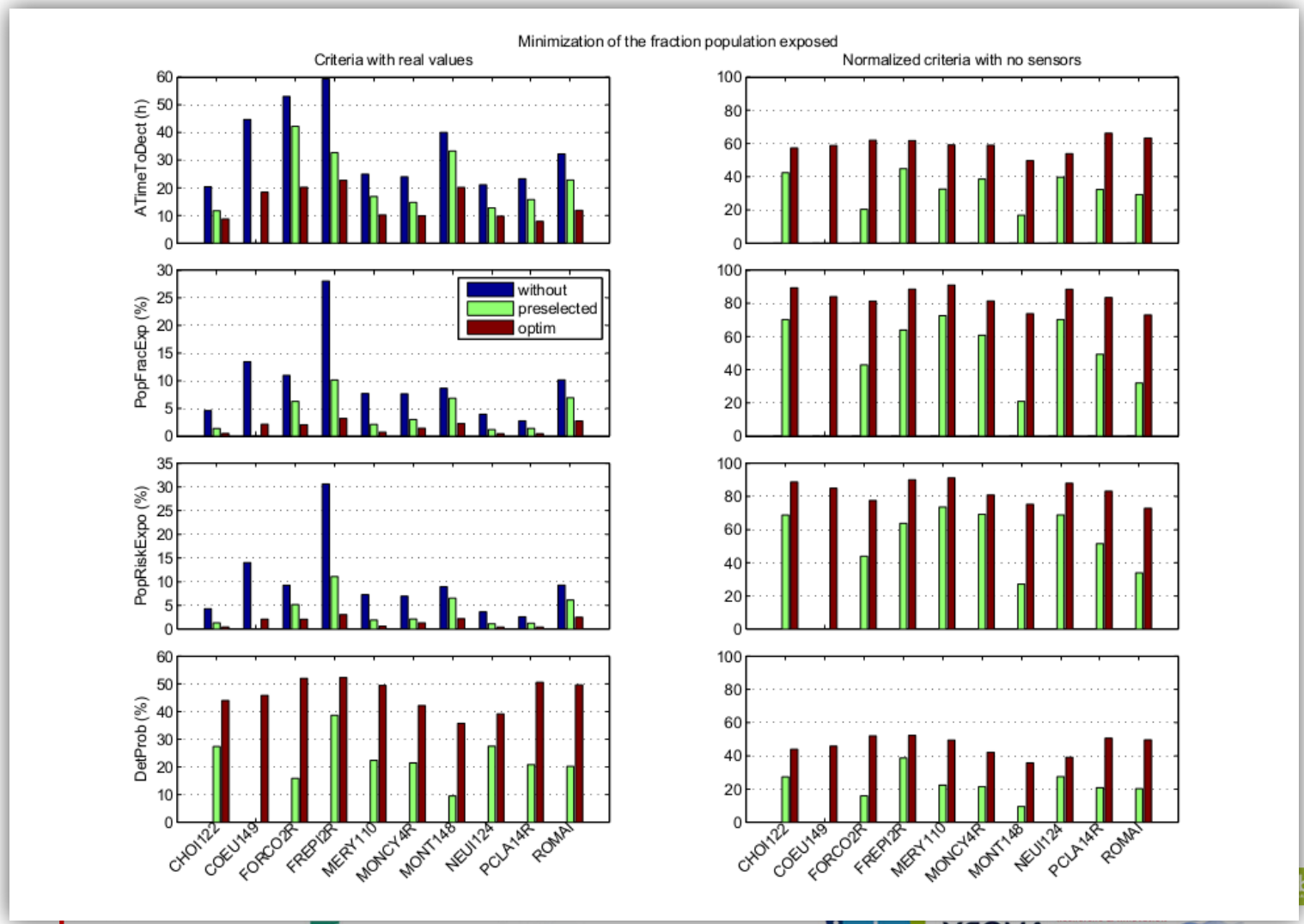
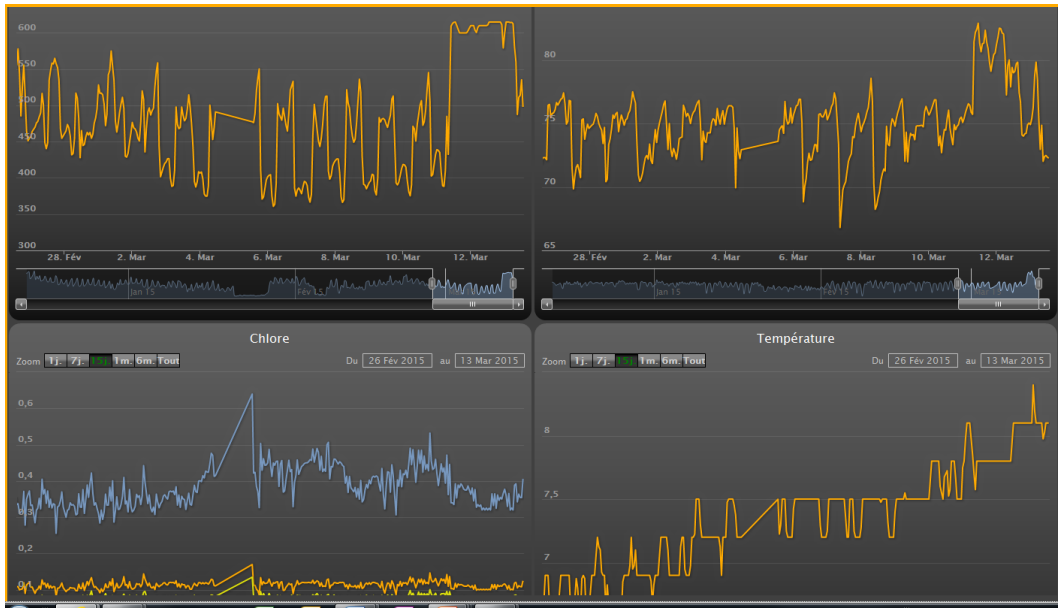
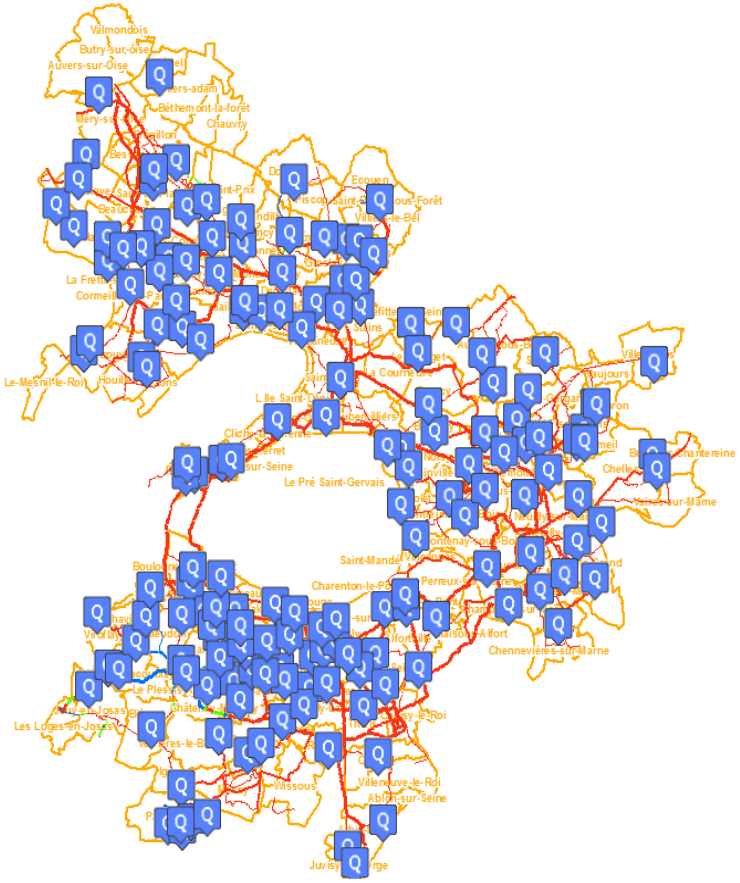
Placement strategy



Results & Perspectives





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Results & Perspectives

- Quality data: 200 x 4 x 12 ≈ 10 000 data/hour
- Completed with hydraulic, AMR and leakage sensor data
- Completed with operation data (plants, pumping stations…)

A BIG DATA ISSUE !

- WP2 module (Alarm generation module: a 1rst answer)
- Needs to be upgraded
- Must be implemented in operation (limit false positive/negatives, improvement of diagnostic…)

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