Model-driven software tool for on-line leakage localization

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Outline

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2. Objectives
3. Leakage localization in water networks: pressure sensitivity methodology
4. On-line leakage localization: web-based software tool
5. Pilot implementation
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Context

- Water leakage rate is high and causes financial loss and worsens public reputation to water utilities
- Whole leakage localization process carried out with the most widely used techniques may still require long periods
- To avoid these inconveniences, model-based leakage detection and localization may be used (Brdys and Ulanicki, 1994)
- Model-based leakage localization presents a certain degree of complexity which limits their use to people with a high expertise in this modeling field

Motivation and Objectives

Motivation

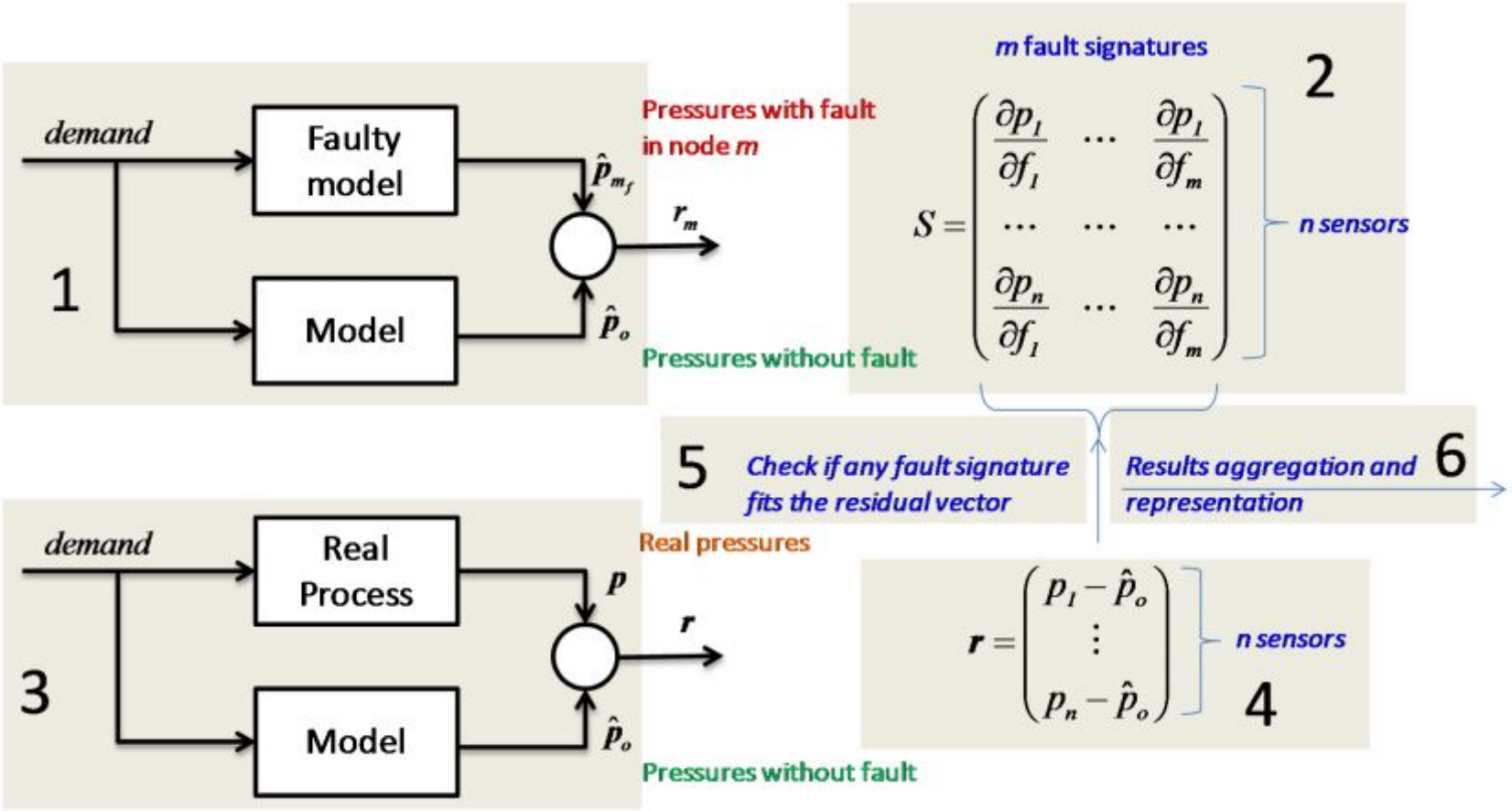
- if computer-based leakage localization models were integrated into a model-driven DSS (Power et al., 2007), this type of models could be used for water network managers as support systems in decision-making processes

Objectives

- To describe a model-driven DSS prototype for leakage detection and localization in water distribution networks

- To show a straightforward approach which takes benefit from the existing hydraulic models used by the water network operators

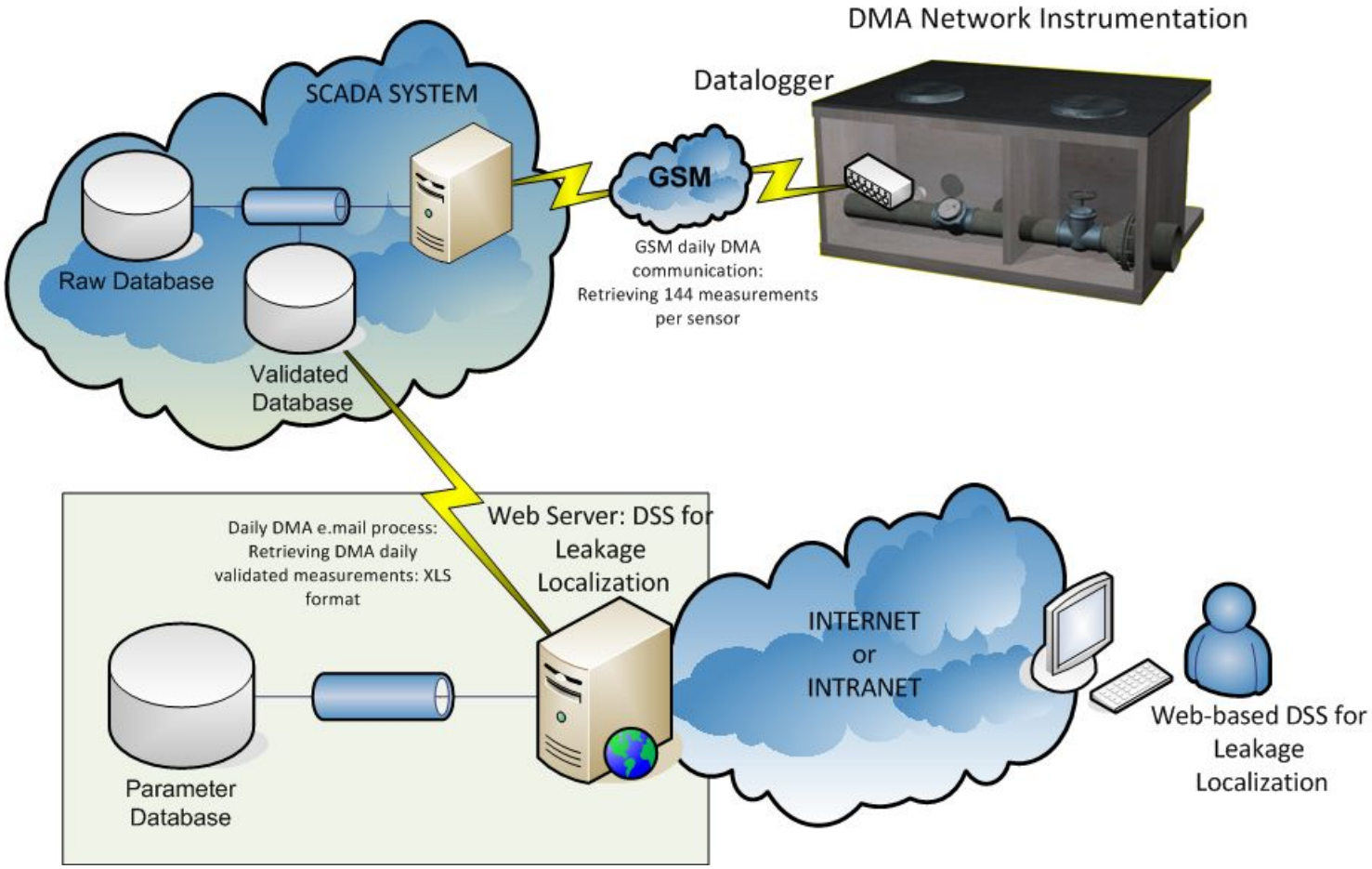
Model-based Leakage localization in water networks: *Pressure sensitivity methodology* *(Quevedo et al., 2011)*



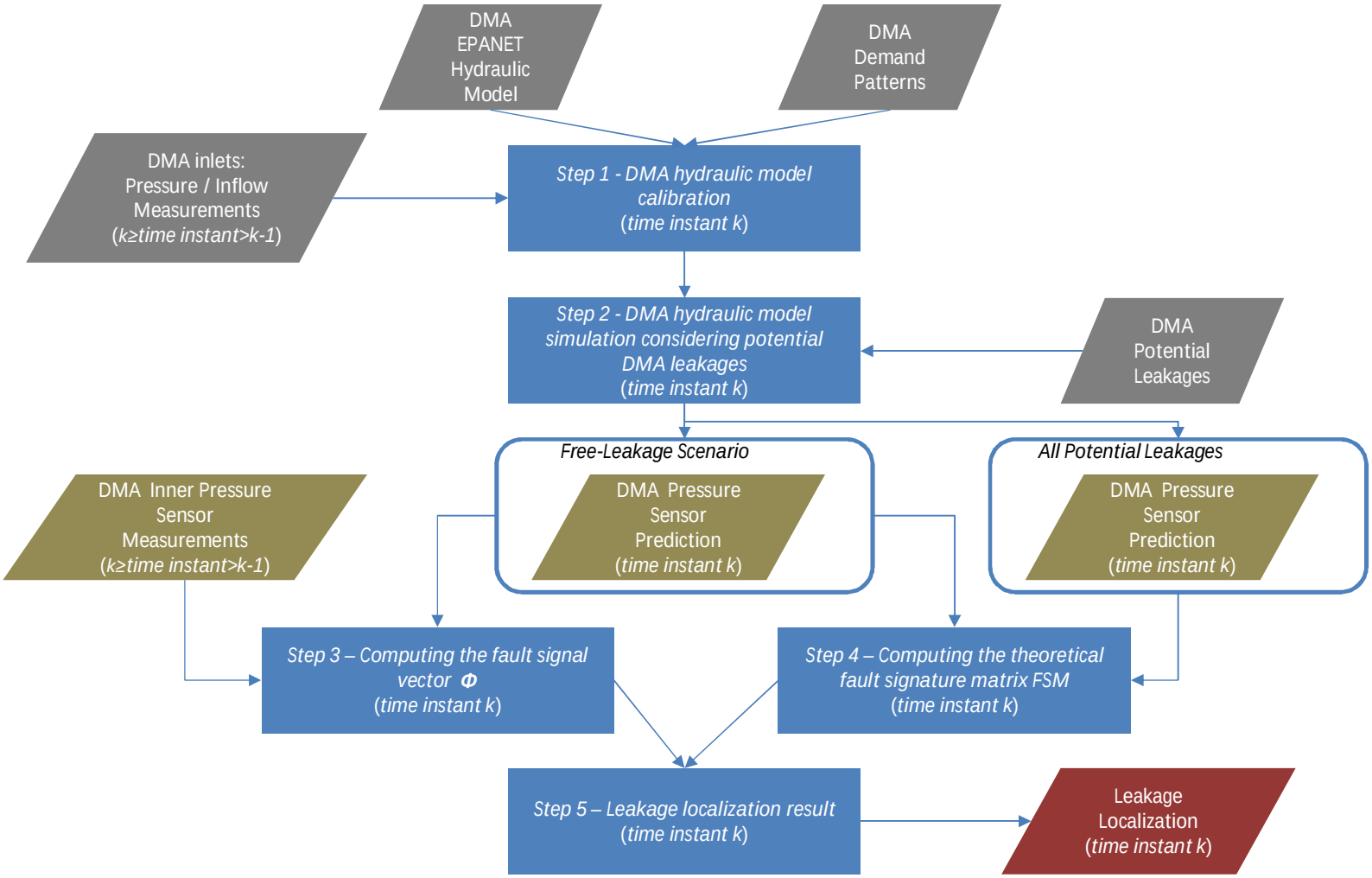
On-line leakage localization: web-based software tool Requirements

- To provide an easy access to model-based leakage localization techniques for users which are non-specialist
- Integration of the measurements coming from the instrumentation deployed in the DMA water network with the leakage localization DMA water network model
- To avoid the need of complex coding to set up the leakage localization analysis in a new DMA network
- To provide an intuitive Graphical User Interface

On-line leakage localization: web-based software tool Structure (1/2)



On-line leakage localization: web-based software tool Structure (2/2)

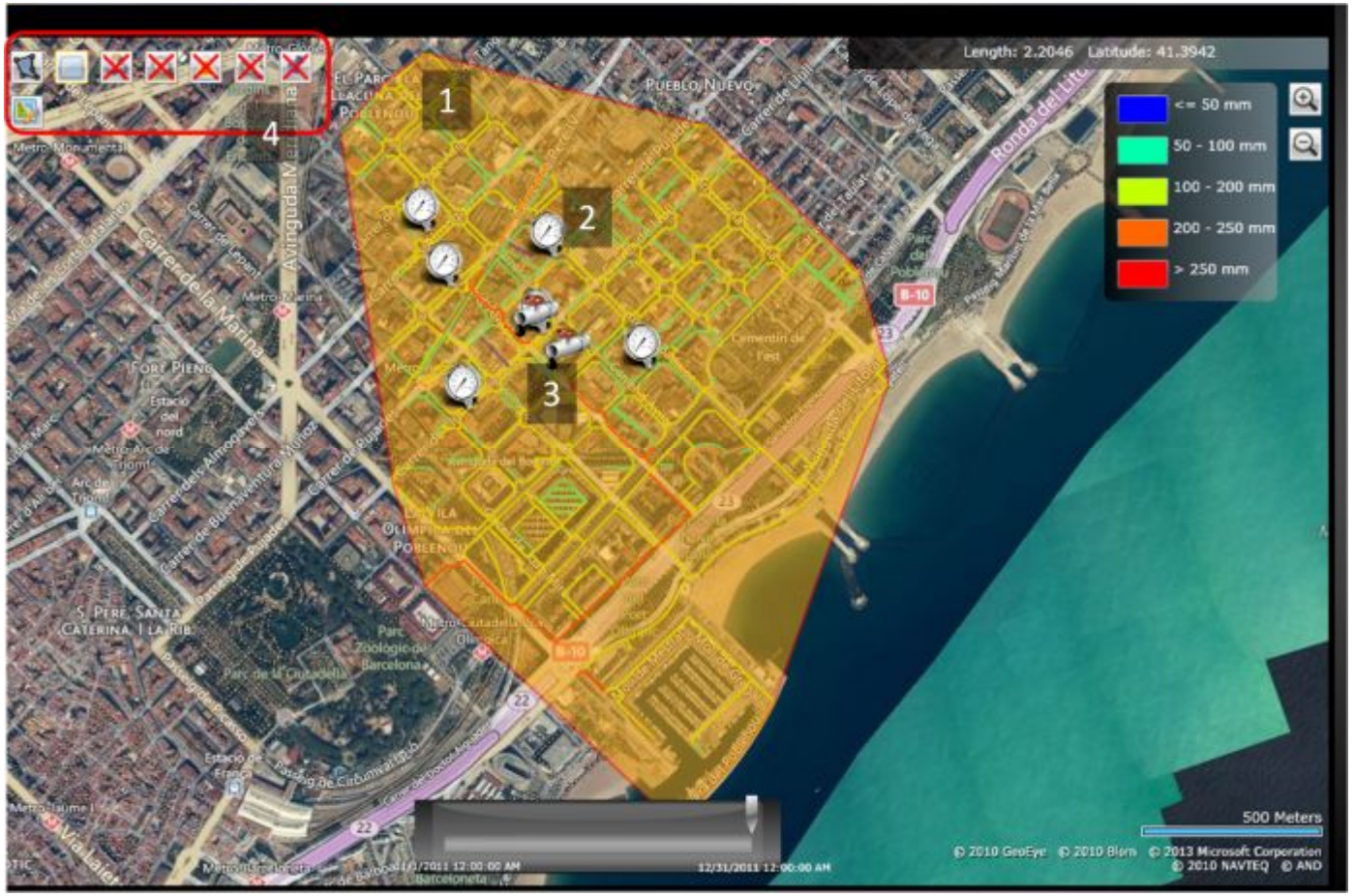


On-line leakage localization: web-based software tool Main features (1/2)

Scenario creation toolbar:

- Settings:
  1. Importing the DMA EPANET model
  2. Establishing Scenario settings: nr. of inner pressure sensors, mapping sensor model nodes with the variables of the SCADA validated database
- Map: it enables a set of GIS viewer options which can be applied through the different GIS layers
- Projects: it enables the creation of Leakage analyses
  1. Analysis settings: inner pressure sensors, scheduling daily leakage analyses
  2. Analysis results

On-line leakage localization: web-based software tool
Main features (2/2)



On-line leakage localization: web-based software tool Pilot implementation (1/3)

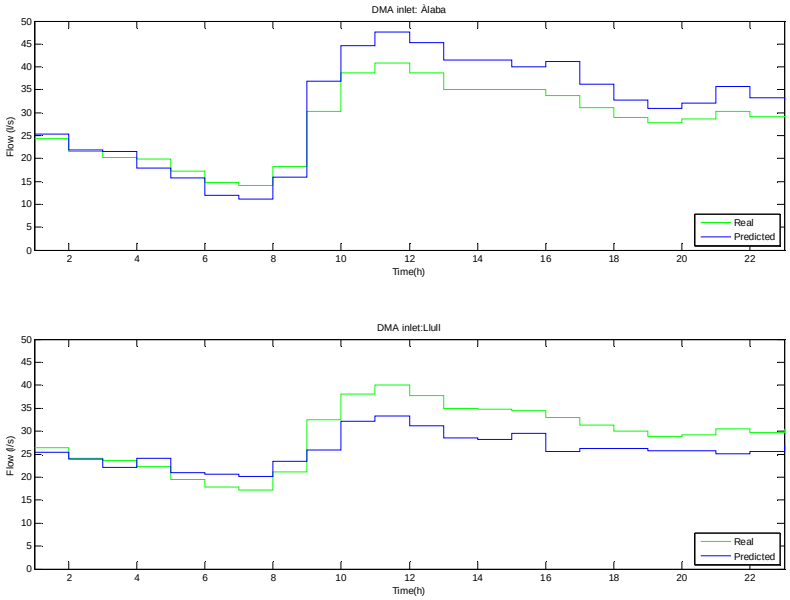
Nova Icaria DMA (Barcelona WDN).

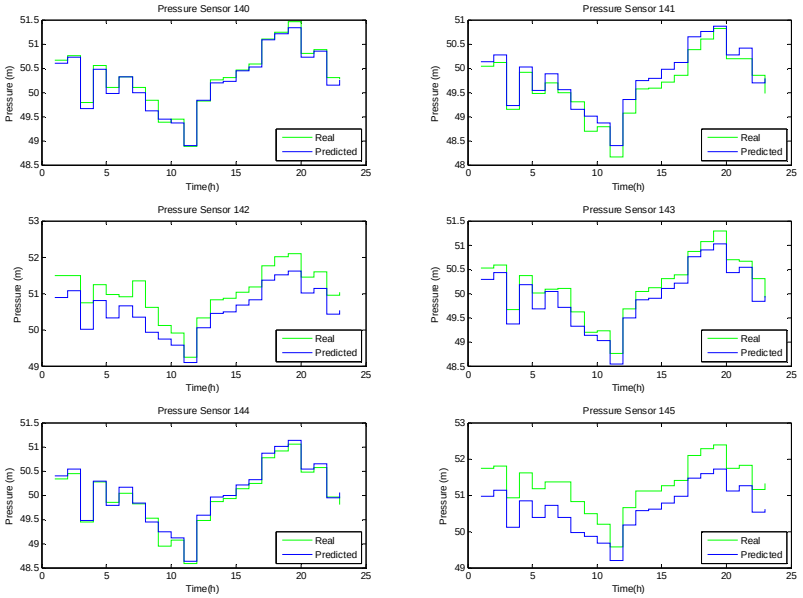
1. 1996 nodes, 3442 pipes
2. Two inlets
3. 6 inner pressure sensors
4. *10 min.*- sample time

Leakage scenario:

1. *6 l/s* leak
2. *4 l/s* distributed leak

On-line leakage localization: web-based software tool Pilot implementation (2/3)





On-line leakage localization: web-based software tool Pilot implementation (3/3)

Conclusions

- A web-based model-driven DSS tool integrating an efficient model-based leakage localization method has been described

- Using a tool of this type, the leakage detection and localization may be performed efficiently reducing meaningfully the required time

- This result is a consequence of the structure of the proposed model-driven DSS tool which allows the integration of the DMA instrumentation, the DMA hydraulic model and the model-based leakage localization algorithms with an intuitive Graphical User Interface (GUI).

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