SAFEWATER

Innovative tools for the detection and mitigation of CBRN related contamination events of drinking water

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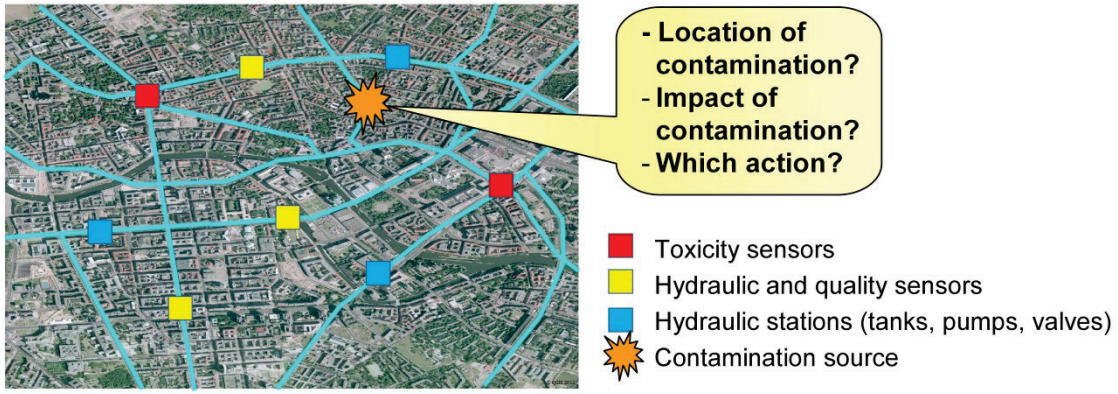
The need



- Awareness to water security is increasing.
- Water security is compromised by different threats and threat scenarios.
- Real time detection is essential for reducing impact of water security events.
- No reliable tools for real time detection are available.
- There is no end to end holistic solution available for water safety, from detection to event management of water safety event.

Development of such tools is a scientific and commercial opportunity

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Project's Objectives

SAFEWATER will develop a global generic solution for detection and mitigation of drinking water event resulting from CBRN contamination:

- By developing improved water management models for the detection of abnormal behaviour in drinking water systems; improving contamination alert systems of large water drinking systems
- By the development of spatial detection models and simulators to determine the contamination's source and spread
- By developing new water quality sensors to add to the existing ones
- By testing the system in three water utilities simulating 6 different usage cases

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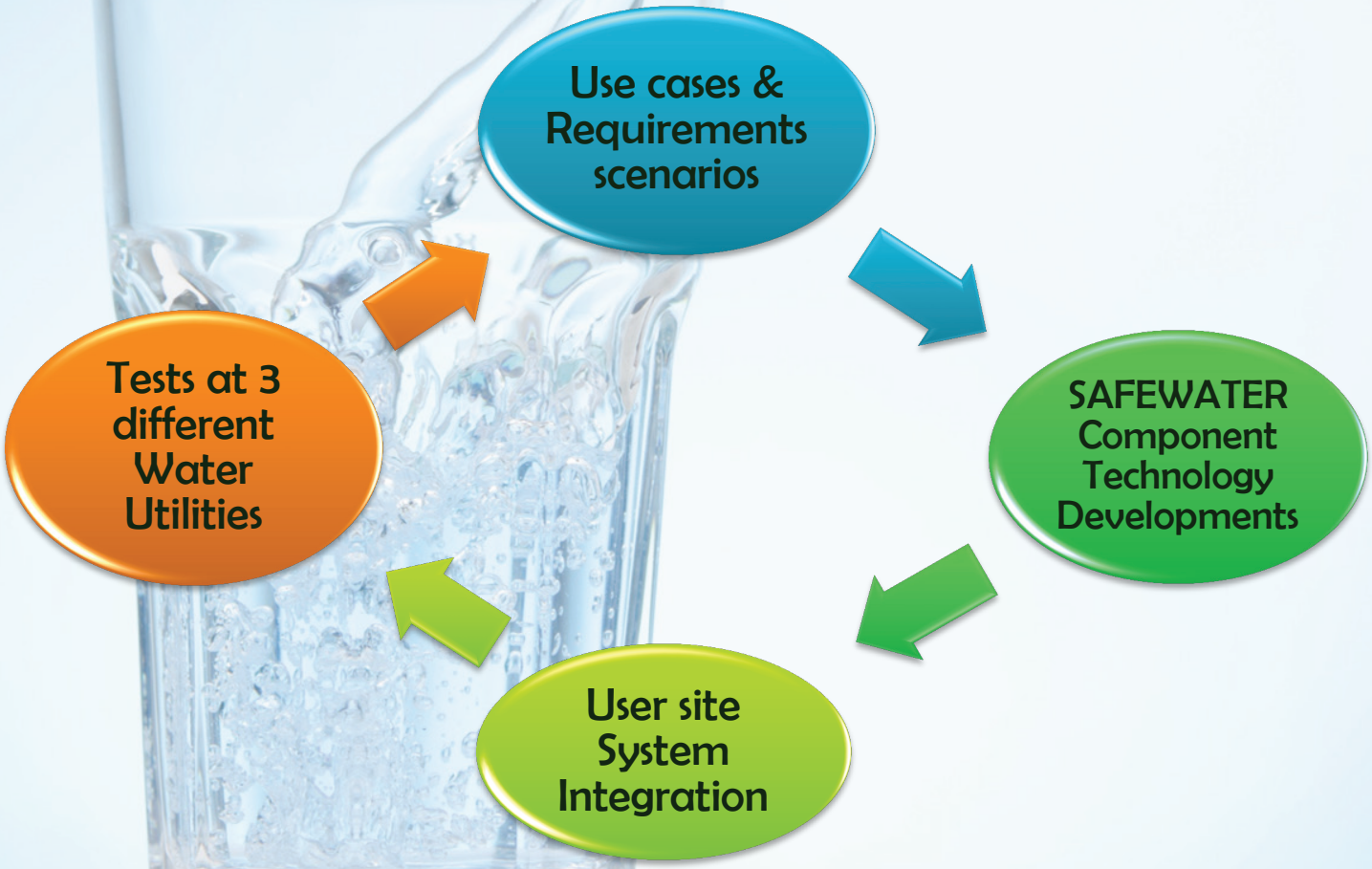
SAFEWATER at a glance

- EU funded FP7 – security project , 39 months, started October 2013
- Total budget: 4.7 Million Euros
- Coordinator – ARTTIC; Scientific Coordinator – Fraunhofer-IOSB
- International consortium of 9 partners from 5 different countries with expertise in the area of:
  - Sensor development (CEA, ACREO, biomonitech)
  - Event management and detection systems (Fraunhofer IOSB, Decision Makers)
  - Simulation and algorithms (3S Consult, Fraunhofer IOSB)
  - Management of Drinking Water Networks (Hagihon, AdA, Zürich)

User-driven iterative process



User-driven iterative process - cont.

- The project's consortium includes three renown water utilities:
  Hagihon - Jerusalem water utility (Israel),
  Águas do Algarve (AdA, Portugal) and
  Wasserversorgung Zürich (WVZ, Switzerland)
- They ensure that the solution is developed in light of the end user needs and working procedures
- The system performance including sensors, event detection and management systems and simulators will be tested against a set of 6 usage cases in beta sites and real network environments
- Guidelines for event detection, management and recovery will be established, setting a standard that may reduce the fragmentation in drinking water event detection & management

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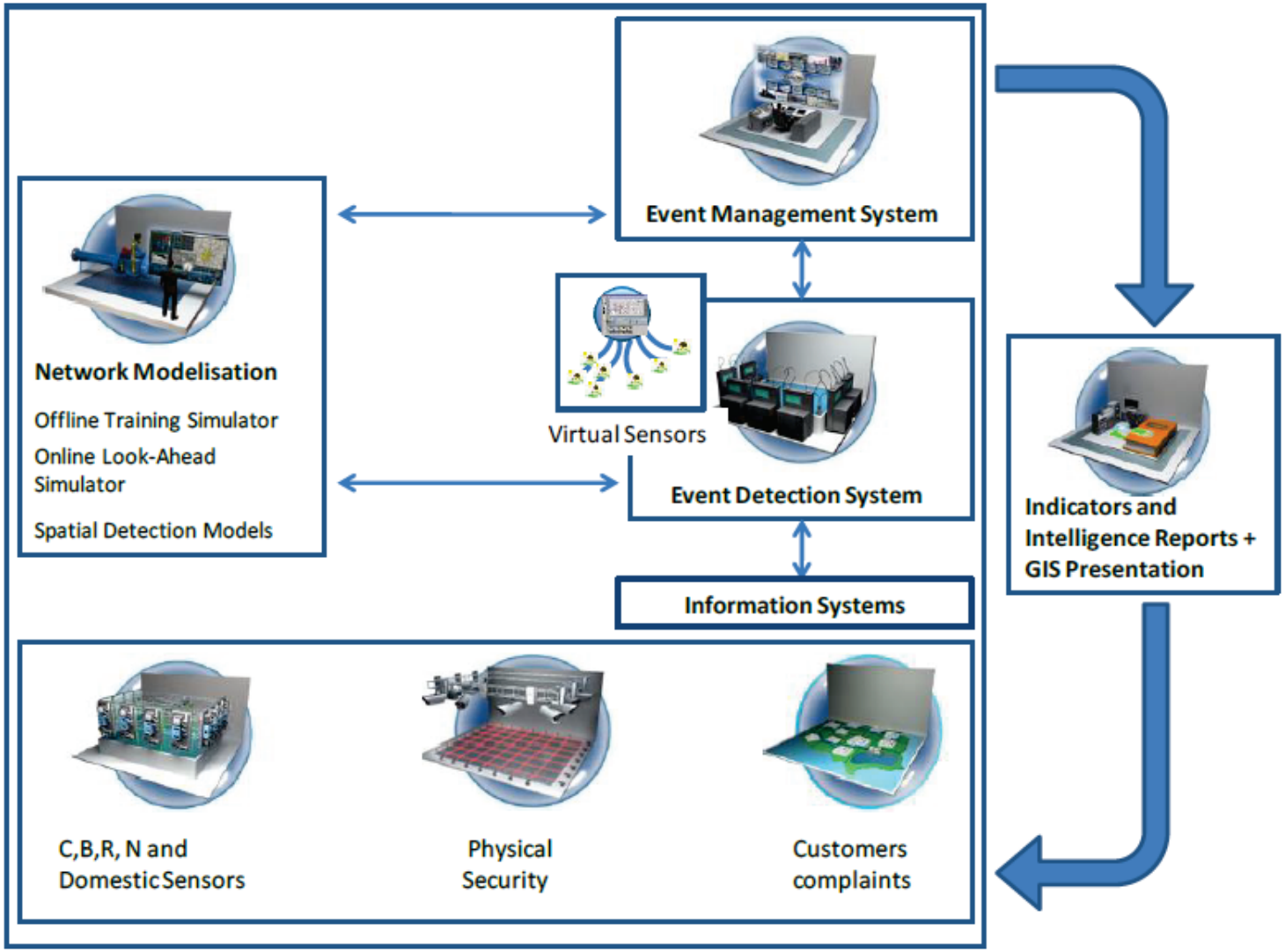
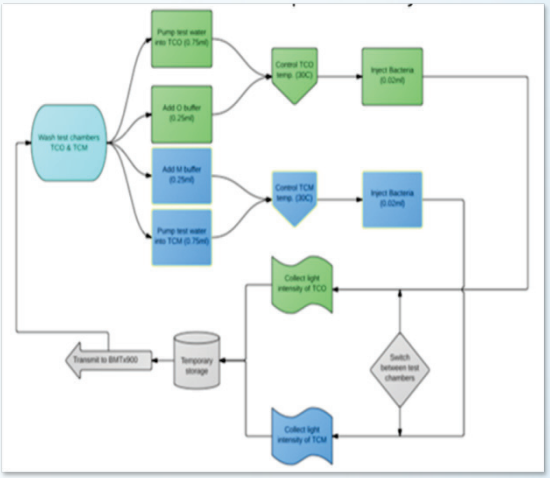
Solution Concept

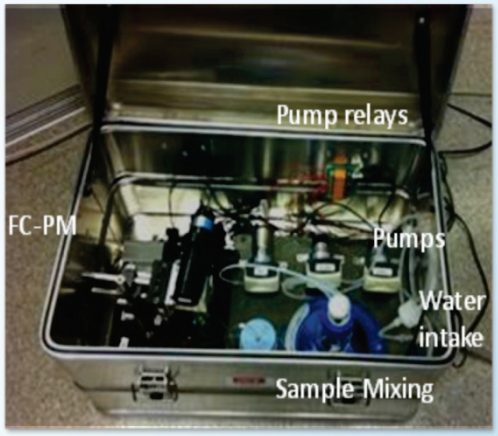


The Sensors

- **Bacteria-based chemical sensor** consists of two test temperature-controlled channels, one for monitoring metallic toxic chemicals and one for organic toxic chemicals. Luminescent bacteria is injected and light intensity is recorded throughout 15 minutes of incubation.



- **Antibody-based biological sensor** is used to detect E. coli in drinking water, based on a specific antibody-mediated fluorescent labelling of Escherichia coli bacteria, followed by detection using a custom designed flow cytometer.



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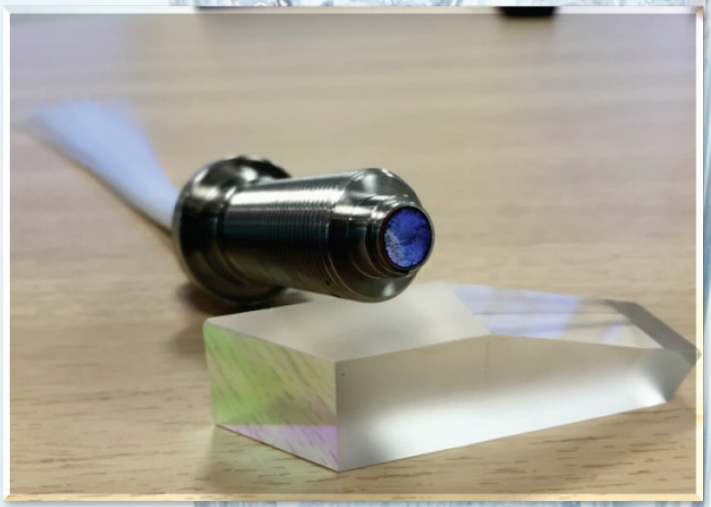
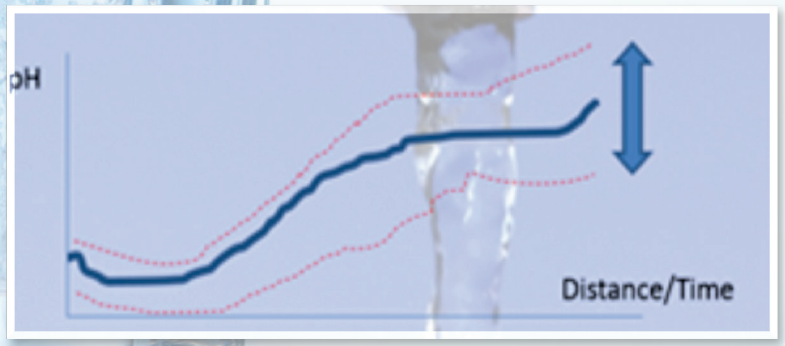
The Sensors – cont.

- **α & β radiological sensors** presents new approaches for signal processing, improved performances of the scintillators by new geometry detectors' definition and signal processing enhancement for precise analysis of the radiological pollutants origin.



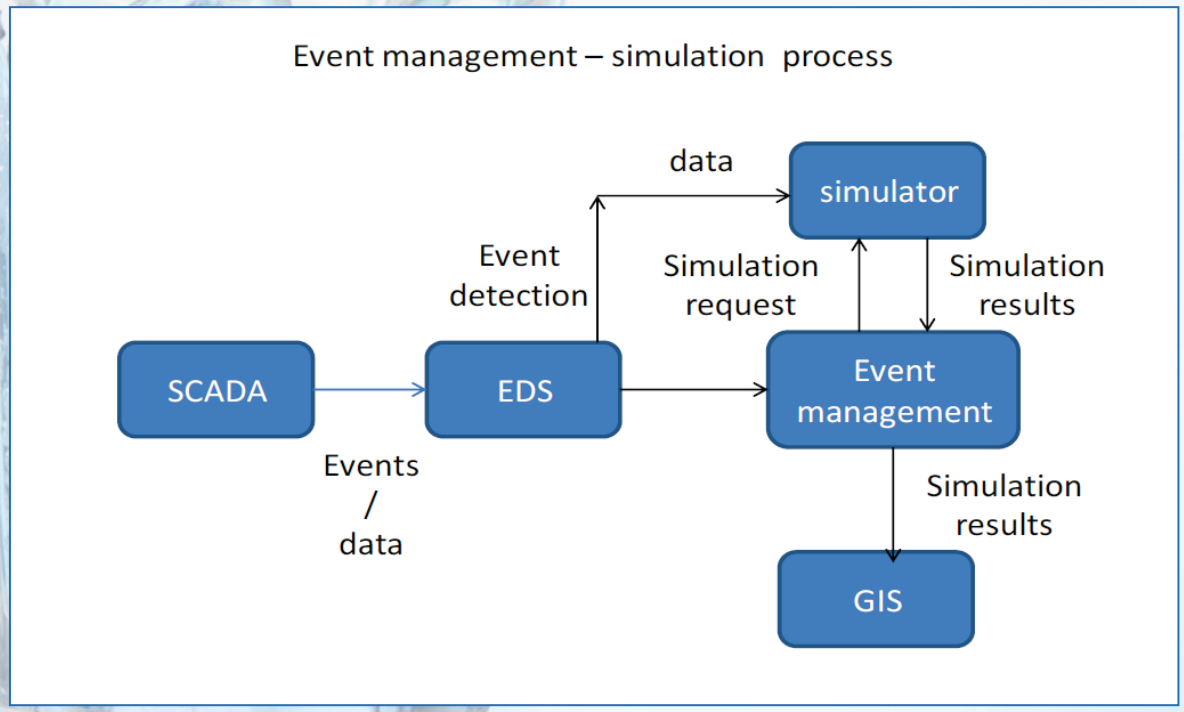
Event Detection System & Spatial Model

- **The Event Detection System** builds according to water quality measurements of Domestic and network sensors predictive model and confidence intervals that are transmitted to the Domestic Sensors which alerts if confidence intervals are violated.
- **Spatial Model** aims to detect water abnormality based on relation between different measurements in different network locations which should obey chemical and physical constrains if there is no contamination event. If contamination occurs the normal relations will be violated.



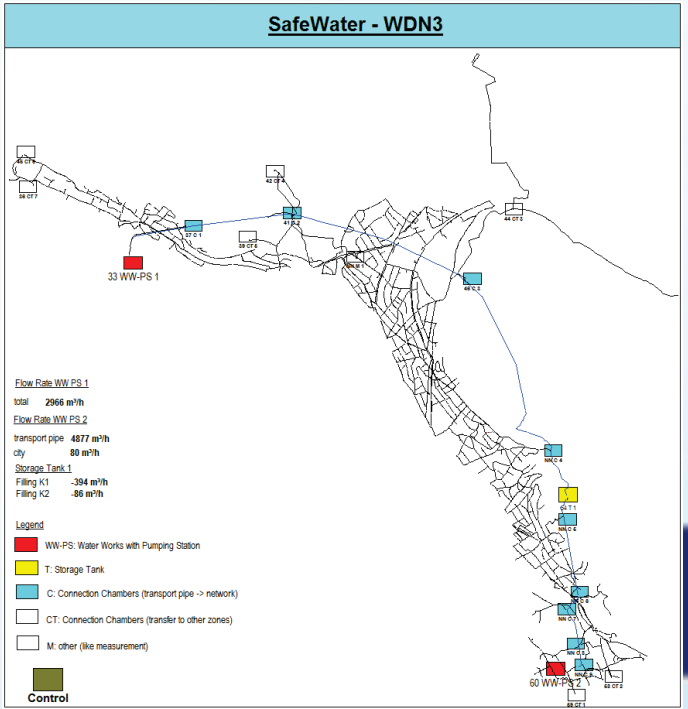
The Event Management System (EMS)

- **The Event Management System** response to water quality events detected, integrates information from multiple sources, asses the situation, distribute information and alerts, trigger relevant systems and serve as the heart of the SAFEWATER solution.



The Simulators

- Hydraulic and water quality simulators support the online identification of contaminant sources in real time, providing an estimation of the contamination severity and the impact of mitigation and recovery measures by means of look-ahead calculations.
- The simulators are used offline for the analysis of different contamination scenarios in order to get a better understanding of the water network behaviour.
- Data from event simulations will be used to train the event detection system (EDS).



Expected Impact

- Overall significantly **improve the security and safety** of drinking water
- **Enhanced capacity of monitoring systems (sensors)** allowing for real-time detection of CBRN contaminants in drinking water
- **Real-time ranking of the severity of alerts** and evaluation of the propagation & contamination for better preparedness, response, and management of the crisis
- **Extended event detection** models based on many low cost sensors located at different points of the network, to obtain reliable knowledge of water quality as close to the end user as possible
- **Creation of drinking water and CBRN oriented community** (SAFEWATER community) as a platform for knowledge share and exchange of ideas

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SAFEWATER Community

- **The SAFEWATER Community** involves a broad range of stakeholders from the world of drinking water and CBRN, including practitioners, policy and decision makers, researchers and experts

- The community is managed through the public website of the project **www.safewater-project.eu** and will enable the consortium to support the **exchange of ideas and to share knowledge** on the latest developments in the project

Contact us

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