ABENGOA

SAID Project
SmArt Water Management with Integrated Decision Support Systems

Antonio Hayas López
Abengoa Water

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Co-funded by the seventh framework programme (FP7), under grant agreement no. 619132, within the Water Inno & Demo-1

Introduction

Increase of the use of water resources

Population increase, water pollution

Floods and drougths

Water infrastructures

Smart water management

(Information, models, technology, natural and human factors)

Innovative Decision Support Systems (DSS)

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Challenges

"Development, implementation, validation and integration of the most innovative Decision Support Systems (MDSS) as the basis for smart water management systems to allow an integrated managment of complex basins, reducing the high investment required with current state of the tecnology"

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Policy issues

- Optimising hydro-power, water quality and flood risk with smart water infraestructure
- Robust real time monitoring to anticipate crisis management
- Big data for predictive river basin simulation
- Aggregated information for involving local stakeholders in decision making
- Capturing knowledge in DSS for training new generation of water managers
- Medium term validation is neccesary to assess sustainability of water innovation

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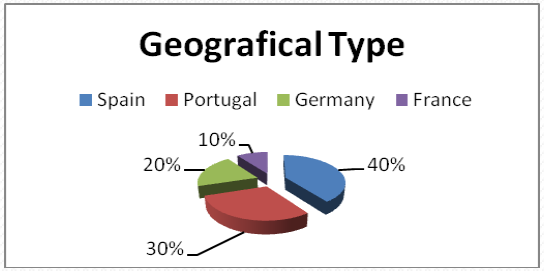
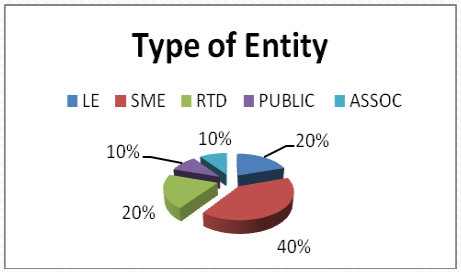
Partners

Project submitted to the call FP7-ENV-2013-Water Inno & Demo in the 7th Research Framework Programme of the European Commission (EC).

Participant no.	Participant organisation name	Participant short name	Country
1 (Coordinator)	ABEINSA BD	ABE	ES
2 (Scientific coordinator)	ABENGOA WATER	AW	
3	Lesswire	LWI	GE
4	IHP	IHP	GE
5	Softcrits	SCI	ES
6	Simbiente	SIM	PT
7	Addition	ADD	PT
8	Ubiwhere	UBI	PT
9	University of Málaga	UMA	ES
10	UT Semide	SEM	FR
11	Consejería de Medio Ambiente y O.T	CMAyOT	ES





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Objectives

Increase the knowledge and confidence of stakeholders in existing pre-commercial technology to build operational smart water management systems.

- ✓ **Validation of the benefits of simultaneous use of DSSs for different purposes in the same river basin.**
  - Implementation and exhaustive validation of three complex DSSs in the same river basin: flood management, quality of water and energy management
  - Definition of methodological aspects to the joint use of multiple DSSs in the same basin.
- ✓ **Definition of adaptation methods to obtain versions of DSSs for specific basins, avoiding the construction of new DSSs from scratch each time.**
  - Participants in the consortium provide their pre-commercial technology
- ✓ **Improving the production of cost-effective DSSs for water management.**
  - Defining and validating a platform for the integration.
- ✓ **Promoting to commercial exploitation of advance monitoring and communication devices.**
  - Central role to the quantity and quality of the real-time information

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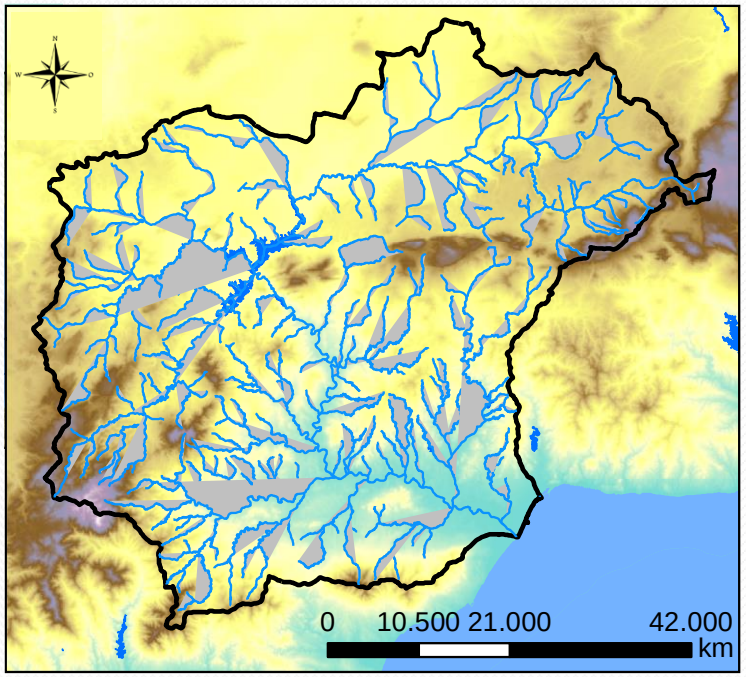
Demonstration area

Guadalhorce River Basin (Spain)



- Long drought periods
- Length:154 km
- Area: 3158 km^2
- **3 reservoirs** for water uses: urban, irrigation, tourism, energy, ecology
- Water problems:
  - Frequent **river flooding**
  - Urban and irrigation **water supply deficit**
  - Leaks in **water distribution networks**
  - Complex **reservoirs management**
  - Water quality problems (**salinization**)
  - **Hydropower production**

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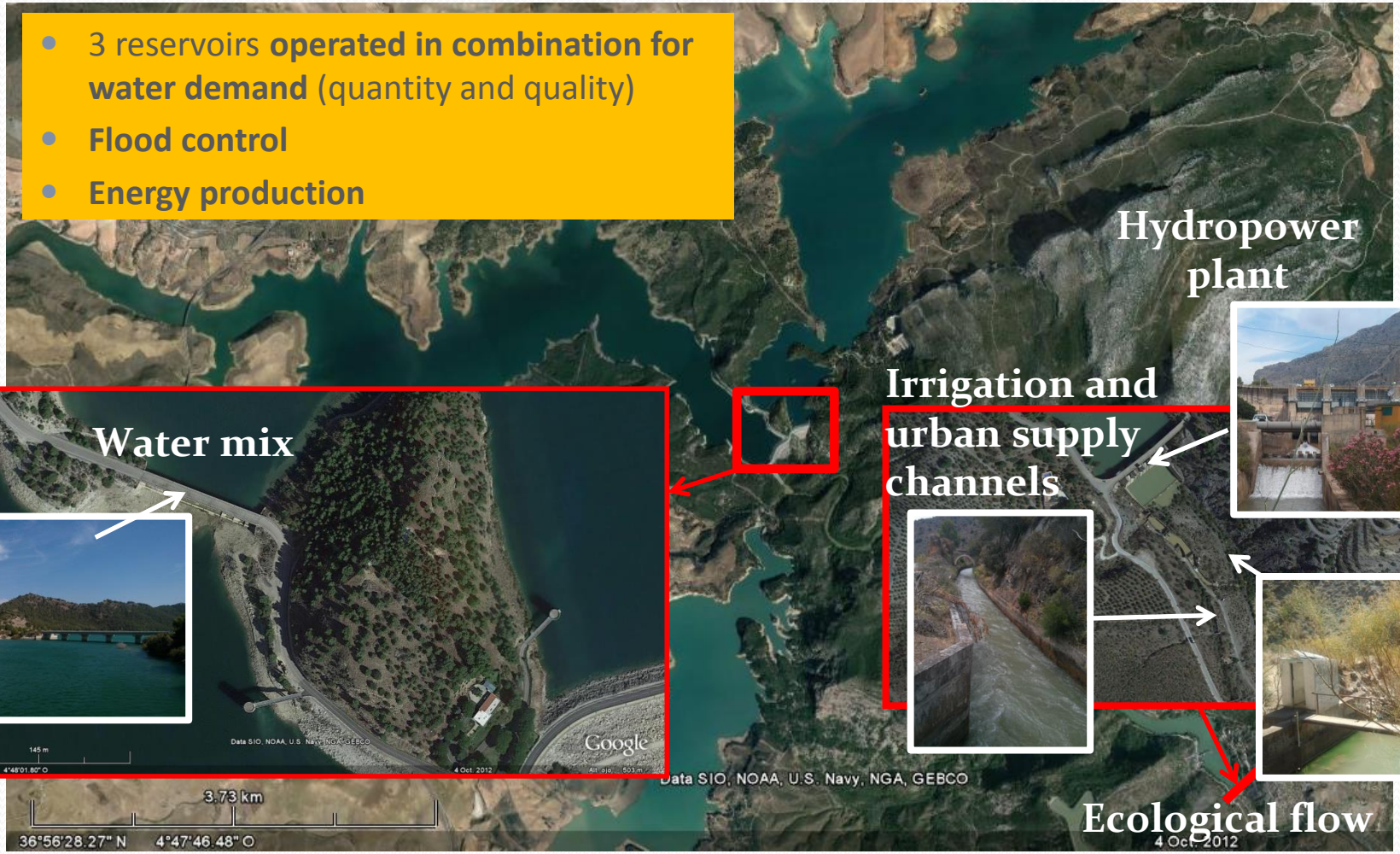
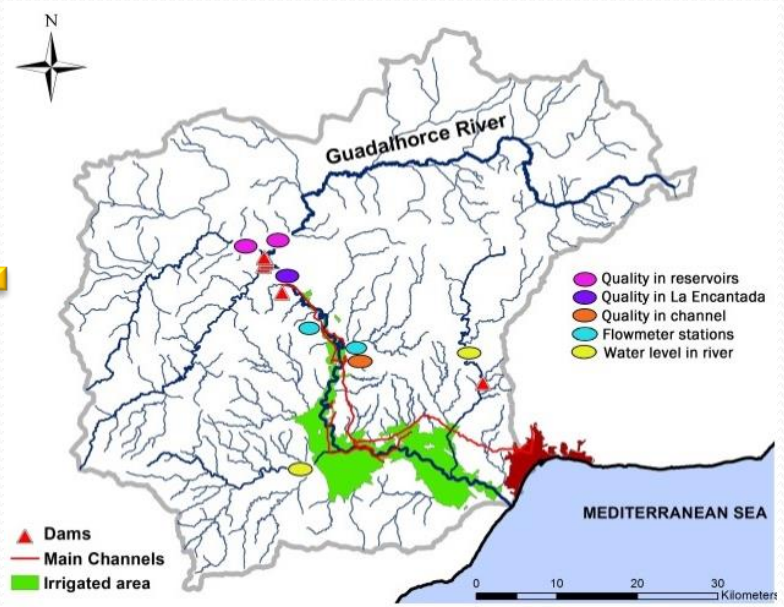
Demonstration area

Guadalhorce reservoirs system

- 3 reservoirs **operated in combination for water demand** (quantity and quality)
- **Flood control**
- **Energy production**



Results: Monitoring network



- CMAyOT manages remote stations that communicate by radio in real time and collect **hydro-meteorological information** for water resource monitoring and control purposes across the Andalusian Mediterranean region

- Measurements of **water level, discharges, rainfall, snow, gate and valve opening, thunder detectors**, etc. as well as security parameters (voltages, switches, …)

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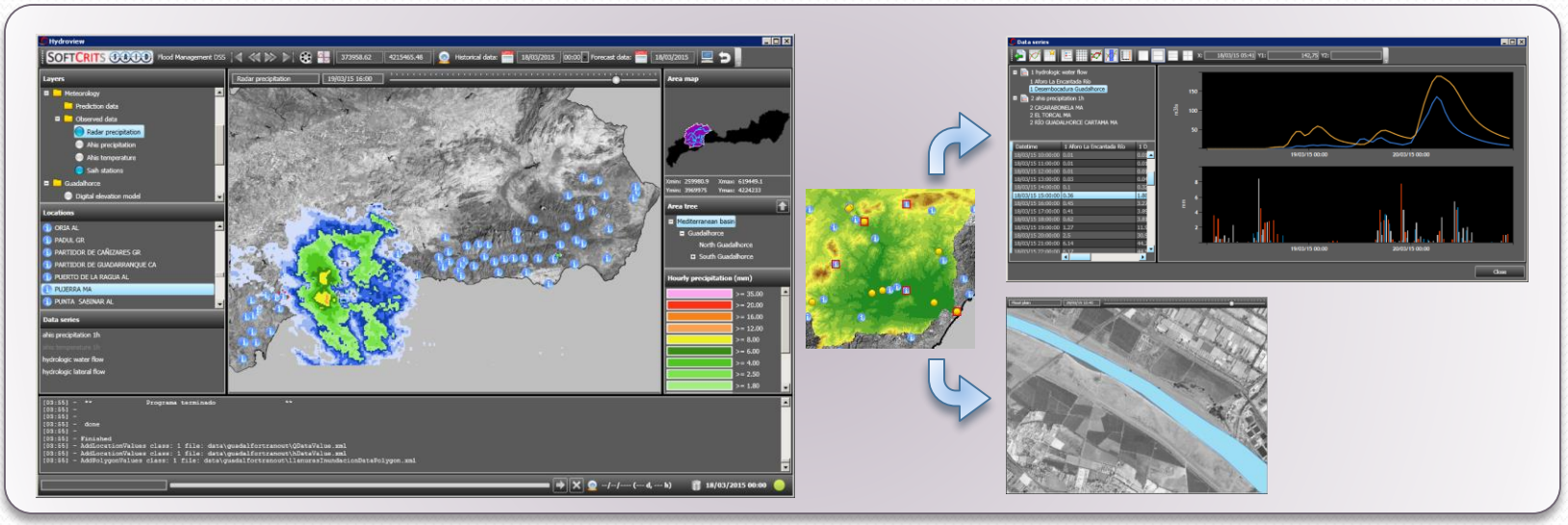
Results: Flood management DSS



- The FM-DSS (Hydroview) is a GIS-based desktop application that exploits two complementary simulation models to reproduce the behavior of a river basin: WiMMed, a physically-based distributed hydrological model and Guadalfortran, a one-dimensional hydrodynamic code
- Simulations combine historical data and forecasts for a more realistic river basin response. 72-hour HIRLAM-based forecasts with variables such as precipitation and temperature computed on a 0.16 km resolution mesh (every 6 hours) are used
- Dam outflows can be specified/imported to include their effects in downstream simulation results
- This tool lets the users display sets of input and simulated time data series on screens and graphs. Besides, distributed variables and other sorts of thematic layers can be shown on a (map) viewer

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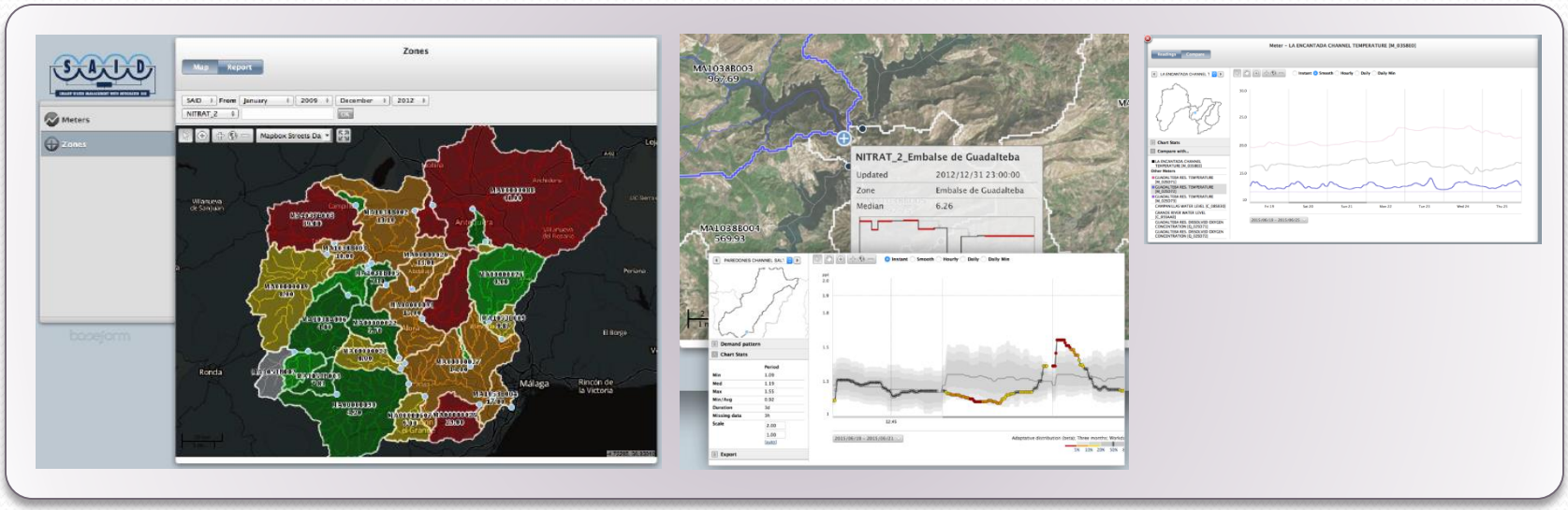
Results: Water quality DSS



- The WQ-DSS delivers its results combining two software modules: the Monitor web application, to address the storage and assessment of large time series of measured information, and WiMMed, for the adequate reproduction of the pollutant loads from the river basin and into the reservoir
- Monitor is a cloud application for real-time analysis of measured water consumption and quality, supported by a geographic information system for easy geo-location of network elements and events
- The WiMMed –Reservoir module adequately reproduces the substances dynamics within reservoir water body. Through this module it is possible to obtain simulated series of inflows and outflows, besides values of substance concentration in a distributed way

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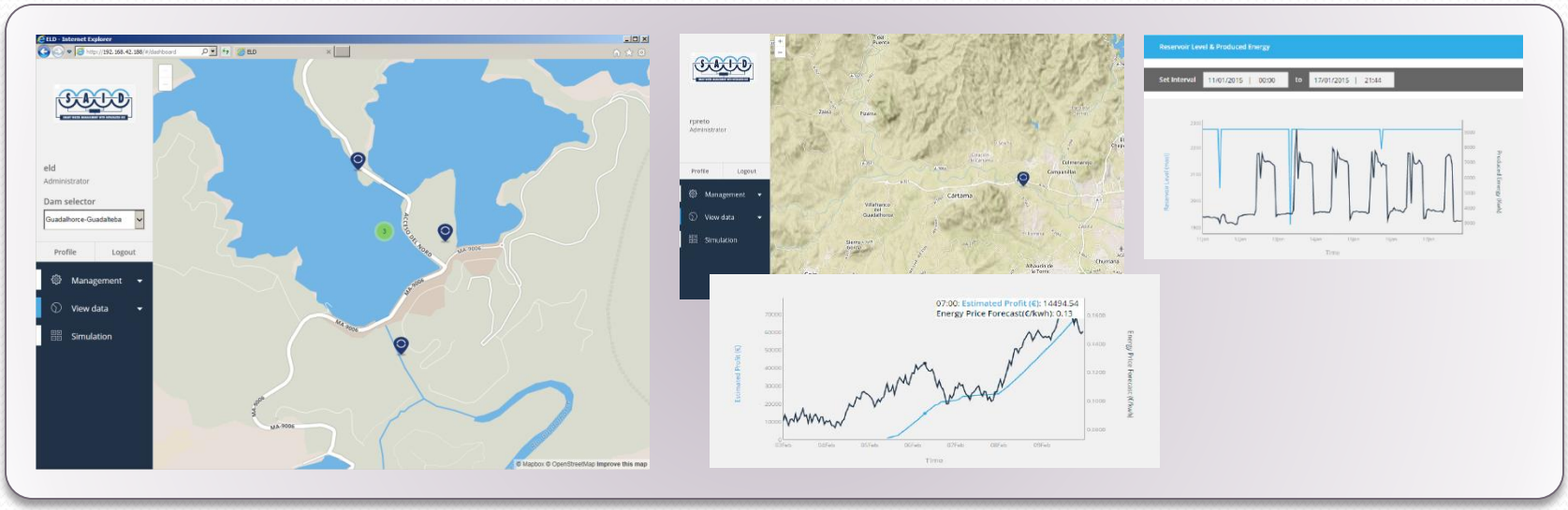
Results:Energy management DSS



- The EM-DSS aggregates all the data related to energy generation at a dam and allows planning the best management strategy to assure its production objectives taking into account all the other constraints (such as flood risk and water quality)
- Given a certain production target and considering the reservoir current volume, this DSS is able to schedule productions for the next week in order to meet the target using the most valuable energy price hourly slots
- The fact that users can simulate different strategies and approaches on either realistic or simulation scenarios leads to more efficient management and to more rentable energy production

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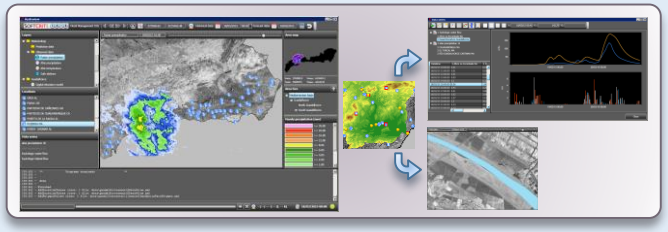
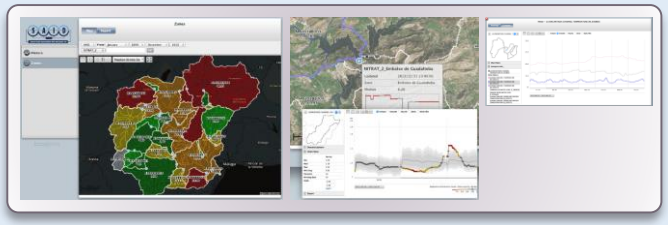
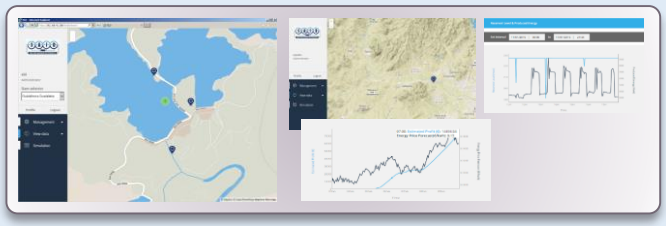
Results: Integrated tool



FM DSS



WQ DSS



EM DSS

Integrated tool for Managers and end-users

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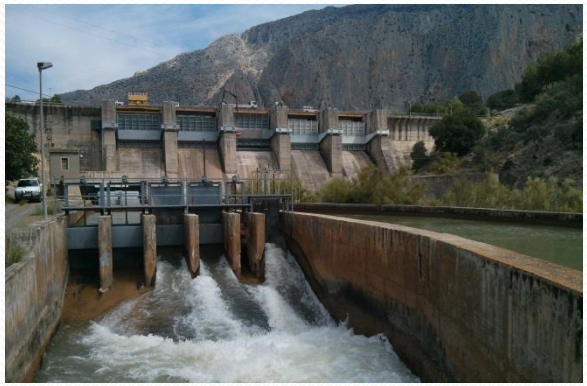
Stakeholder involvement

Dam managers

Channel managers

Energy managers



- The most suitable **design of the monitoring network.**
- Agreements within the local and regional authorities to **allow the location of sensors and devices** in public infrastructures.
- Collaboration in getting **access to measured data** both, historical and in real time.
- Tasks for **comparison of the new demonstrator data and traditional manually collected** data by the dam managers.
- Access to software tools **participation in the definition of the DSSs integration** and enhancement of the graphical interfaces targeting end users.

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Thank you for your attention

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