ENGINEERING
THE DIGITAL TRANSFORMATION COMPANY

APPENDIX
Water Management

ReThink Water Management

1 The Water Resource

Water use is increasing worldwide in light of population growth, economic development and changing consumption patterns.

The current collection and distribution model is severely challenged by climate change, which generates highly variable situations including periods of heavy rainfall and periods of drought. Companies in the sector must therefore organise themselves and change their management model to cope with the varying demands.

2 Investments in Italy

Several initiatives have been launched across Italy to promote processes to restore the efficiency of water distribution networks as part of the Integrated Water Service.

These initiatives are now supported by **national funding lines** that take up the guidelines, regulations and directives of the European Community.

The **National Recovery and Resilience Plan (NRRP)** addresses interventions and projects that can be funded by the European Community for the entire water life cycle, including Water Losses (M2C4 Inv. 4.2).

3 Challenges

- Constant dialogue with network remote control systems.

- Effective supervision of the operation of the network and water network systems.

- Accurate analysis of parameters acquired in real time.

- Continuous comparison with historical data in databases.

- Ability to intervene remotely on a priority basis, activating field teams for the necessary operational and maintenance interventions.

- Ability to guarantee timely interventions, ensuring continuity of service to citizens.
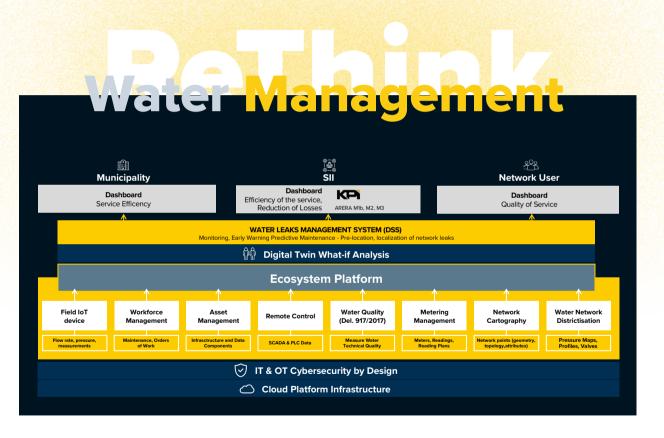
Our Approach

Engineering has developed a specific Composable Platform to support the management of utilities infrastructures impacted by the NRRP investment lines in the **Water**, **Power & Gas**, **Heating**, and **Waste** market areas. Based on the needs of the main stakeholders of the reference ecosystem, it is a horizontal technological platform that integrates Engineering's platforms & solutions with other market solutions, thanks to the construction of a network of partnerships that guarantee the best skills in terms of both business processes and technologies.

What is it?

To support the challenges of Integrated Water Service Authorities in the coming years, we have developed our **Water Management Solution (WMS)**, a Composable Platform that adopts an end-to-end approach applied to business processes and operational activities designed to **manage and reduce water losses**.

ReThink Water Management

Municipality

| Dashboard |
| Service Efficency |

SII

| Dashboard |
| Efficiency of the service, Reduction of Losses |
| **KPI** ARERA M1b, M2, M3 |

Network User

| Dashboard |
| Quality of Service |

WATER LEAKS MANAGEMENT SYSTEM (DSS)
Monitoring, Early Warning Predictive Maintenance - Pre-location, localization of network leaks

Digital Twin What-if Analysis

Ecosystem Platform

Field IoT device	**Workforce Management**	**Asset Management**	**Remote Control**	**Water Quality (Del. 917/2017)**	**Metering Management**	**Network Cartography**	**Water Network Districtisation**
Flow rate, pressure, measurements	Maintenance, Orders of Work	Infrastructure and Data Components	SCADA & PLC Data	Measure Water Technical Quality	Meters, Readings, Reading Plans	Network points (geometry, topology,attributes)	Pressure Maps, Profiles, Valves

IT & OT Cybersecurity by Design

Cloud Platform Infrastructure

What Does it Do?

The solution covers all operational steps involved in Network Loss Management

Survey of water networks

Acquisition and digitisation of information on a GIS platform, supporting hydraulic engineering experts in the management of their activities (knowledge of assets, survey, use of computerisation devices in the field) and in the quality of the data acquired (hydraulic congruence, documents associated with individual points in the network).

Hydraulic modelling of networks

"Real Time" sharing of data on field instruments and desktops, with the possibility for operators to carry out preliminary analyses of the data surveyed, topographical surveys, optimisation of any recycling survey, georeferencing of measurements taken for greater precision, processing and calibration of hydraulic models, management of hydraulic analysis (schematisation of element calculations, characterisation and allocation of water demand, simulations to be carried out). It also supports the **management of short-term monitoring campaigns** aimed at acquiring pressure and flow rate data at significant points in the network, optimal estimation of pipe roughness, hourly consumption coefficients of utilities and water loss coefficients of network nodes.

Districtisation of networks and loss control

- Optimisation of water activities, enhancement of districts, generation of pressure and leakage maps according to the modelling carried out, definition of the criticality map to be addressed with pressure regulation, data transmission from the field.

- Data acquisition from utilities (periodic, scheduled), mode of exchange with management systems.

- Identification and assessment of water losses, planning of activities, investment management (support for the design of new networks and/or their upgrading).

Pre-localisation of network losses

- Leakage research using simulation tools based on AI and sensor data already in use, calibration of water loss coefficients differentiated by zone, design of step tests to be carried out at night time on the network, identification of sub-areas or sectors where the lost flow rate is greater, refinement of pre-localisation using noise-logger.

- Analysis of information from asset management for the evaluation of the infrastructure (pipe age,

breakage history, material composition, list of ordinary and extraordinary maintenance operations, etc.) in correlation with data from other data sources (e.g. satellite radar images).

Localisation of losses

Accurate localisation of leaks by correlating the data obtained from the simulation with those received from the solution's sensors, with identification of the point(s) of leakage using tools and equipment useful for finding leaks, parameter verification methods, spatial navigation (planned route), address search sent by DSS.

Identification of replacement activities/rehabilitation of network sections

- Field verification of pre-located areas with indication of leaks found, evaluation of network monitoring parameters through data integration from all applications involved with respect to expected axes of observation, decision support based on geospatial analysis, network analysis, data mining, machine learning, AI; definition of axes of observation of phenomena related to water leaks.

- Ability to aggregate data from heterogeneous

sources, with structured and unstructured data, ability to build new value from integrated data for homogeneous axes of observation (quality, efficiency, effectiveness).

- Ability to measure NRRP objectives through ARERA KPIs, added value offered on data aggregation from heterogeneous sources, many years of experience in the observation of water phenomena, technological skills to qualify the axes of predictive analysis and decision making thanks to the join on water business processes.
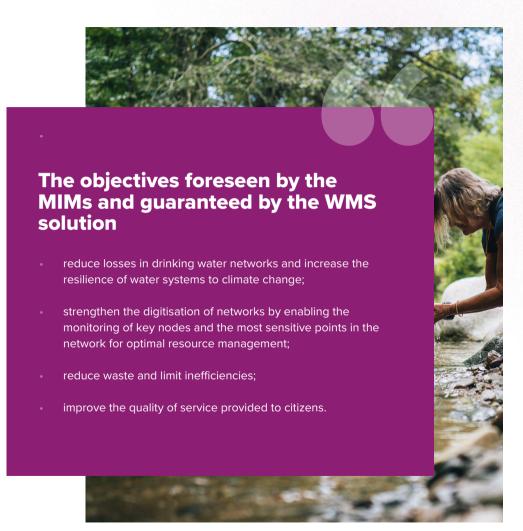
Decision support

Thanks to a data driven approach in near real time mode, information acquired in real time to assess and manage critical issues in the day to day (abnormal flow rates, impromptu leaks) is managed through:

- Management of an Early Warning System to support interventions that are necessary to the timely resolution of incidents.

- Creation of observation axes of phenomena based on axis and time variables (past, present, future):

  - **Effectiveness:** leakage reduction vs. target objectives, water demand allocation (including what-if analysis scenarios), water balance
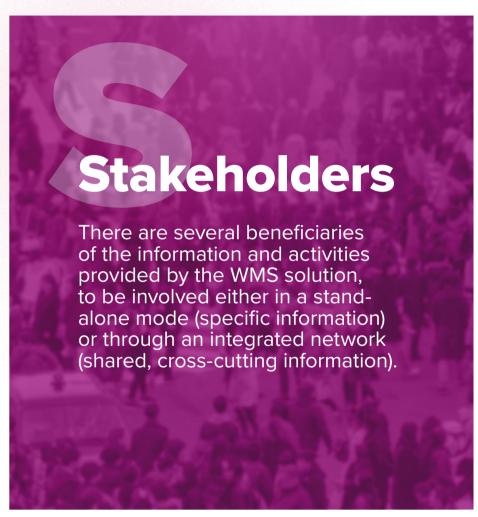
calculation, quantity of flow recovered - M1, Asset monitoring.

- **Efficiency:** ageing indicators, ordinary and extraordinary interventions, peak management, consumption optimisation, district optimisation.

- **Quality:** restoration time, breakage rate, reduction of extraordinary interventions.

- Management and alerting of **teams in the field**, with the possibility of defining on-the-field training paths to optimise ordinary/extraordinary maintenance interventions.

- **Planning management**, with long-term analysis of the progressive deterioration of the network, thanks to statistical information (critical network points, types of problematic devices, etc.).

- Ability to **measure NRP objectives through ARERA KPIs** as required by the MIMs.

What value for Stakeholders?

- **Efficient and sustainable management of water**: effective control and management of activities guarantees a better quality of service for the final user (proactive and preventative management), while continuing to raise awareness of more careful management of the resource.

- **Improvement of operational effectiveness**: the proposed project approach favours the industrialisation of operational processes, nurturing skills management centred on digital innovation.

- **Development of an informed knowledge of one's own water assets**: the quality of the information collected, the integration and constitution of useful "new data" to improve awareness of the infrastructure, enabling prudent investments over time.

- **Improvement of public-private relations**: lthe evolutions proposed by system integrators will be part of a shared frame of reference, enabling an effective enhancement of the relationship and collaboration between the parties, promoting a continuous improvement approach.

The objectives foreseen by the MIMs and guaranteed by the WMS solution

- reduce losses in drinking water networks and increase the resilience of water systems to climate change;

- strengthen the digitisation of networks by enabling the monitoring of key nodes and the most sensitive points in the network for optimal resource management;

- reduce waste and limit inefficiencies;

- improve the quality of service provided to citizens.

Stakeholders

There are several beneficiaries of the information and activities provided by the WMS solution, to be involved either in a stand-alone mode (specific information) or through an integrated network (shared, cross-cutting information).

Users

Guarantee responses in terms of overall service quality, with support for the valorisation of the water asset, partly also through specific campaigns.

School

For environmental sustainability issues, with environmental awareness to be raised.

Municipalities & Local Communities

Enhancing the territorial connection through objectives and results achieved and improved over time.

Trade associations

Interact with trade associations to improve the Water Service Divide.

Institutions

Entities with control functions must have an informed approach on the evolutions initiated through the investments assigned.

Media

Structured actions to raise awareness and education on the importance of water, enabling information campaigns on the correct use and of the water resource.

Stakeholders

Why choose us?

Why Choose Us?

- **End-to-end coverage** of all operational processes required for water loss management.

- **Process-driven approach** in the analysis and implementation of the project solution, through the definition of an operational WBS (Work Breakdown Structure) consistent with the objectives and requirements of the Ministry of Sustainable Infrastructures (MIMs).

- **Safeguarding investments** made over time on existing applications with a "best fit" technological approach for new elements.

- **Enhancement of the existing application stack**, with integrations on systems external to the water loss project proposal (Accounting, HR, etc.).

- **Expertise on water processes**, also considering the availability of business solutions applicable to the project (Remote Control, Water Quality, Metering Data Management).

- **"Data-driven" orientation** with the ability to generate new value through the integration of data from heterogeneous sources and relating to the water network of the Managing Authority.

- **Management of the overall governance** of the skills required to manage the project in a comprehensive manner (partnership ecosystem).

Appendices

Heating Management

+

Renewable Management

+

Waste Management

COMING SOON

+

H

Why Choose Us?

@ www.eng.it

in Engineering Ingegneria Informatica Spa

◉ @LifeAtEngineering

𝕏 @EngineeringSpa

ENGINEERING
THE DIGITAL TRANSFORMATION COMPANY