

# SWAN2011

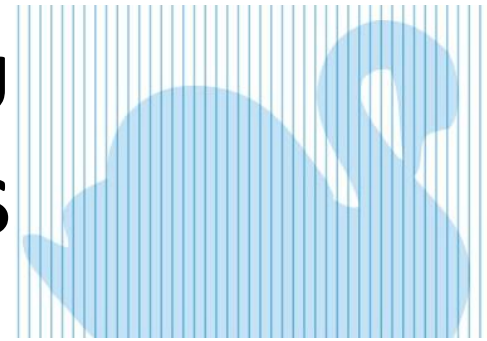
*Smart Water Networks*

## CONFERENCE



# The state of Smart Water Industry

**Pierre SACAREAU**  
**ONDEO SYSTEMS**



# Context

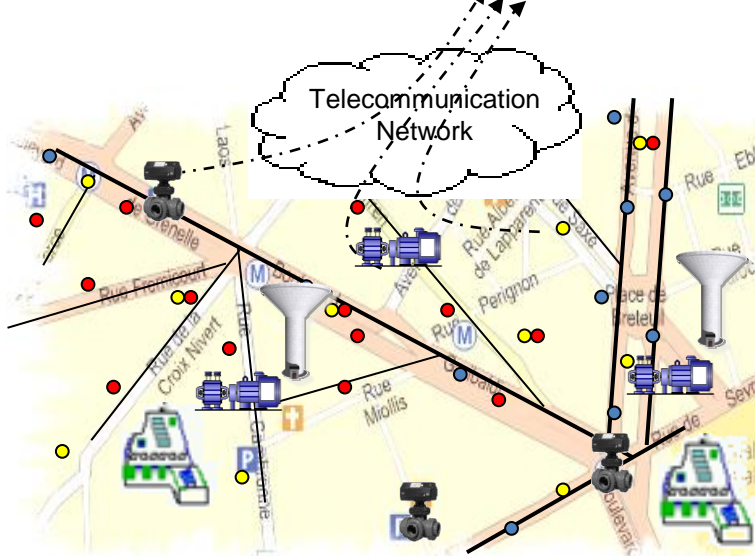
- On-line monitoring, modeling and control systems are existing and deployed since more than 20 years in the water domain... mainly in plants and powered sites
- Now technical and technological evolutions of sensors, telecoms, IT and power supply systems are permitting to deploy real-time systems in the networks...

# From plants to networks...

- 1990's : real-time water management systems (plants, tanks, pumps, valves). Simulation & optimization. Decision-making tools.
- Fall 1990's : GSM networks for district metering... flowmeters, district meters
- Mid 2000' : On-line leak detection systems (SMS)
- Mid 2000' : Automated meter reading
- Nowadays : Smart water networks

# ... and Smart Water Networks

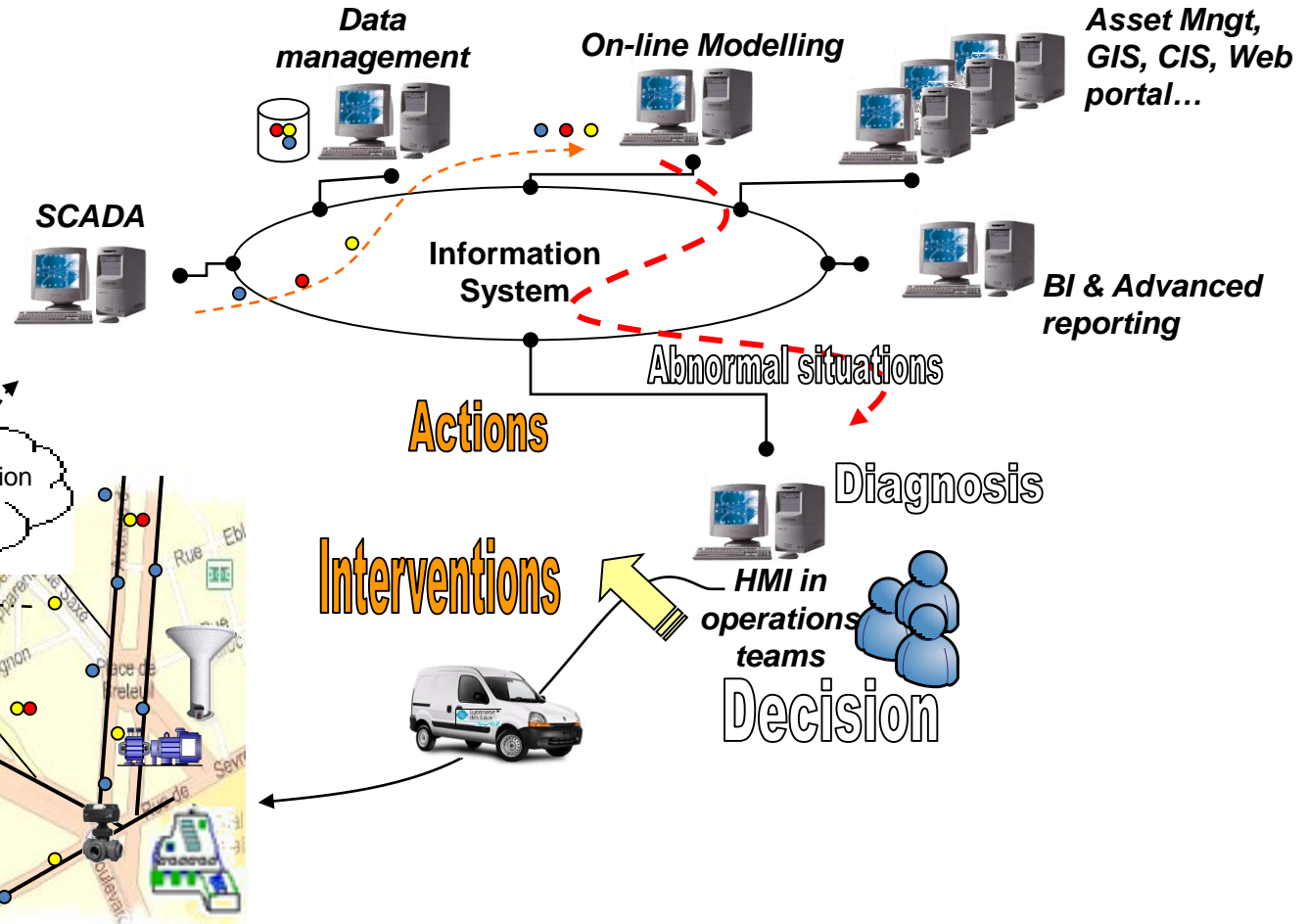
Sensors from around the network (water, wastewater, storm) will provide information which needs to be compiled and distilled so as to improve decision making, minimize man-hours and interventions, and improve general operation of the network.



**SENSORS/METERS**



Isolated points, battery-supplied, wireless communication



# Impact of Smart Networks

- On water companies & water utilities
  - Improvement of water networks management
  - Anticipation of changes in energy tariffs management
  - Early leak detection
  - Resource preservation
  - Sustainable development
  - New services to consumers
  - New relationship with consumers

# Impact of Smart Networks

- On Water industry
  - New challenges – new businesses
  - R&D and Innovation
    - Europe and member states are promoting many R&D programs on smart networks
  - New markets with high financial impact, worldwide

# ONDEO SYSTEMS

- ONDEO SYSTEMS (formerly industrial IT division of Suez Environnement research center), was created in January 2009 as a subsidiary of Suez Environnement and Lyonnaise des Eaux
  - 25 years of experience
  - 70 employees
  - +10 patents in the area of AMR
  - An important portfolio of academic and industrial partnership
  - More than 70 clients in France and worldwide
  - Technical Assistance provided in more than 40 Countries
  - High growth rate of the turnover (x2 after two years (end 2010))
  - The turnover with external clients exceeds now 30% (2010)

# ONDEO SYSTEMS

- ONDEO SYSTEMS is committed to developing practical, effective, easy-to-use, and economical solutions that enable our clients to improve the productivity of their operations
  - For the environmental market
  - Through Real Time Information Systems
  - In a worldwide area
- ONDEO SYSTEMS
  - Assists Suez Environnement business units in developing new business Opportunities
  - Provides external Clients with high value using innovative solutions environment-oriented

# ONDEO SYSTEMS

## An offer covering the whole Smart Water Network



### Monitoring & Control Information Systems

- ✓ Design and implementation of industrial information systems
- ✓ Design and construction of control centre for water or sanitation operation
- ✓ Technical Data Management
- ✓ Implementation of control and decision support systems

### Smart Metering



### Meter Reading

- ✓ Design and installation of an innovative fixed-network AMR solution
- ✓ Field-proven technologies
- ✓ Flexible rate policies
- ✓ Infrastructure management
- ✓ Improved Customer Service



### Assets Management

### Smart Operation

- ✓ Management of underground (pipelines, valves, etc.) and visible assets
- ✓ Advanced Monitoring and maintenance
- ✓ On-line leak detection
- ✓ Risk management

### Smart Management

# ONDEO SYSTEMS Reference



- Real time predictive storm water management system in Paris area
  - Coordinates operational actions on the network among 4 departments
  - 1800 km<sup>2</sup> are monitored, representing 8.5 millions inhabitants
  - 460 km of networks (main sewers : 2 to 8m),
  - 150 sites are monitored, 60 of which are controlled by the system
  - 2.5 Millions m<sup>3</sup>/day treated
  - 800 000 m<sup>3</sup> of storage capacity



Real time data management treatment Cycle



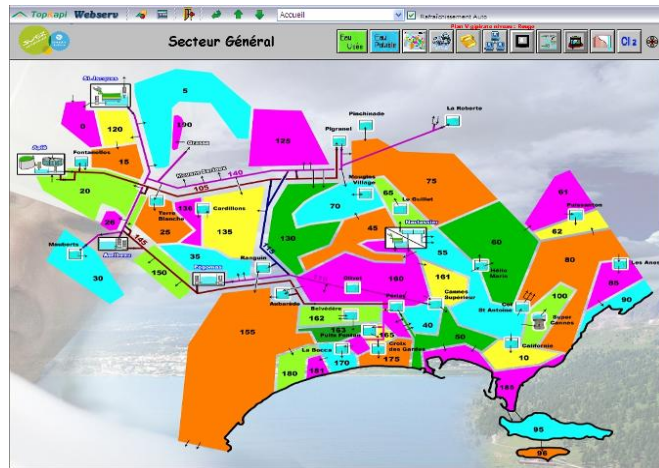
Control Room (SIAAP Paris)

# Some Modelling Projects

- Project Name : VigiRes'Eau
- Founder : French National Research Agency (ANR)
- Field test area : SICASIL network (South of France, Cannes area) :
  - Prevention of Biological terrorism : real time detection of unexpected decrease of chlorine level in drinking water networks.
- Project Name: OZONOR On-Line
- Customer : Lyonnaise des Eaux
- Field test : Aubergenville drinking water plant:
  - Real time valuing of bromates and bacteriology of drinking water



Drinking water supply system



SICASIL network (Cannes)

Général		
Température	(°C)	16,0
pH		7,80
Débit d'eau	(m <sup>3</sup> / h)	2000
Concentration bromures (entrée)	(µg Br / L)	100
Demande immédiate O <sub>3</sub>	(mg O <sub>3</sub> / L)	0,15
Constante cinétique O <sub>3</sub> (à 20°C)	(1/h)	0,00001
Résiduel O <sub>3</sub> (entrée)	(mg O <sub>3</sub> / L)	0,00
Cible bactéri		Cryptosporidium
Concentration bactéri (entrée)	(Nb / L)	1,00E+10

**OZONOR**  
 Calcul des bromates

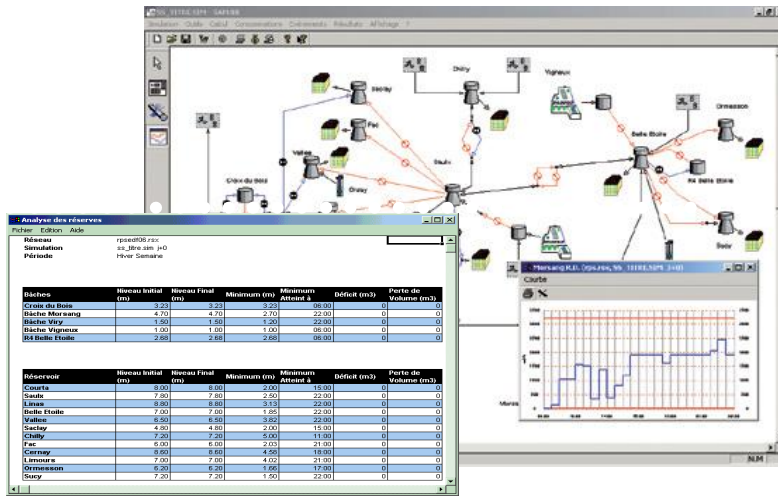
Ozonation	A	B	C	D	E	F
Configuration injection O <sub>3</sub>	Contre-courant	Eau seule	Contre-courant	Eau seule	Eau seule	Eau seule
Surface ou section du compartiment (m <sup>2</sup> )	105,984	27,446	122,176	25,000	1,170	20,000
Hauteur ou longueur du compartiment (m)	5,400	5,400	5,400	5,400	83,000	188,000
Débit gaz injecté (Nm <sup>3</sup> gaz / h)	295,0	0,0	125,0	0,0	125,0	0,0
Concentration O <sub>3</sub> dans gaz injecté (g O <sub>3</sub> / Nm <sup>3</sup> gaz)	3,2	0,0	3,2	0,0	3,2	0,0
Rendement de transfert O <sub>3</sub> considéré (Calculé ou Mesuré)	Calculé	Calculé	Calculé	Calculé	Calculé	Calculé
Rendement de transfert O <sub>3</sub> mesuré (%)						

Résultats	A	B	C	D	E	F	Total / Final
Temps de séjour (hh:mm:ss)	00:17:10	00:04:27	00:19:48	00:04:03	00:02:55	01:52:48	02:41:10
Taux de traitement (mg O <sub>3</sub> / L)	0,47		0,20				0,67
Quantité O <sub>3</sub> injectée (g O <sub>3</sub> / h)	944		400				1344
Quantité O <sub>3</sub> transférée (g O <sub>3</sub> / h)	846		325				1171
Rendement de transfert O <sub>3</sub> (%)	89,6		61,2				87,1
Résiduel O <sub>3</sub> (sortie) (mg O <sub>3</sub> / L)	0,12	0,12	0,16	0,16	0,16	0,17	0,17
CT (mg O <sub>3</sub> · min / L)	0,62	0,52	2,68	0,72	0,52	19,41	24,47
Concentration bromates (sortie) (µg BrO <sub>3</sub> / L)	1,08	1,28	3,69	4,65	5,41	7,24	7,24
Abattement bactéri (log)	0,14	0,12	0,61	0,16	0,12	4,24	5,40
Concentration bactéri (sortie) (Nb / L)	7,17E+09	5,44E+09	1,33E+09	9,10E+08	6,93E+08	3,96E+04	3,96E+04

# ONDEO SYSTEMS Products

## For Drinking water network

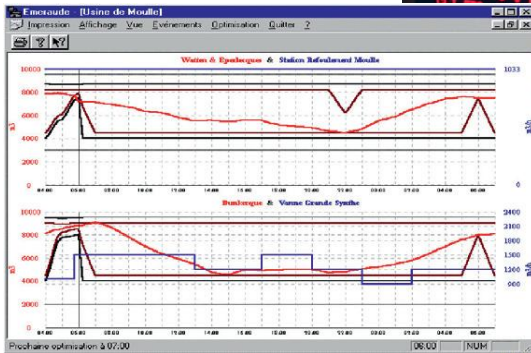
### Optimisation & Decision-Making



SAPHIR



EMERAUDE



PREDICTOR

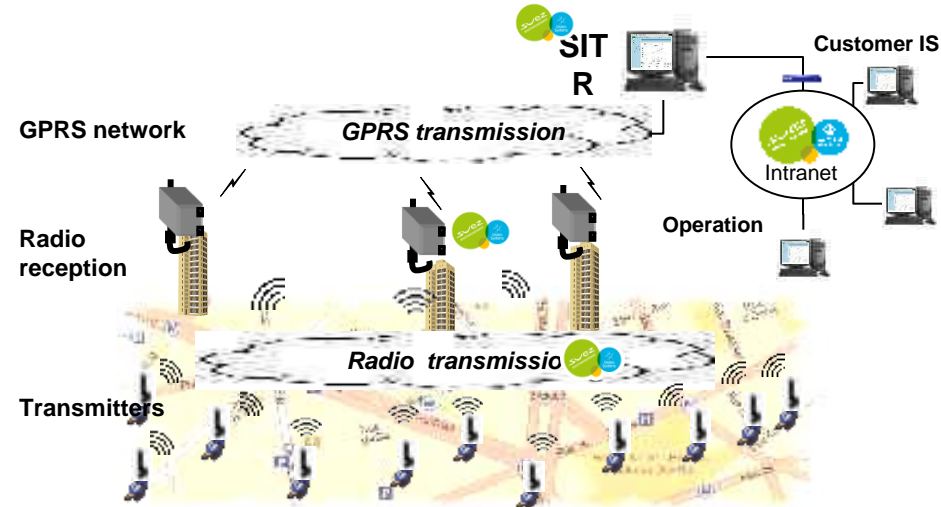


**Saphir (Off-line), Emeraude (On-line)water :**

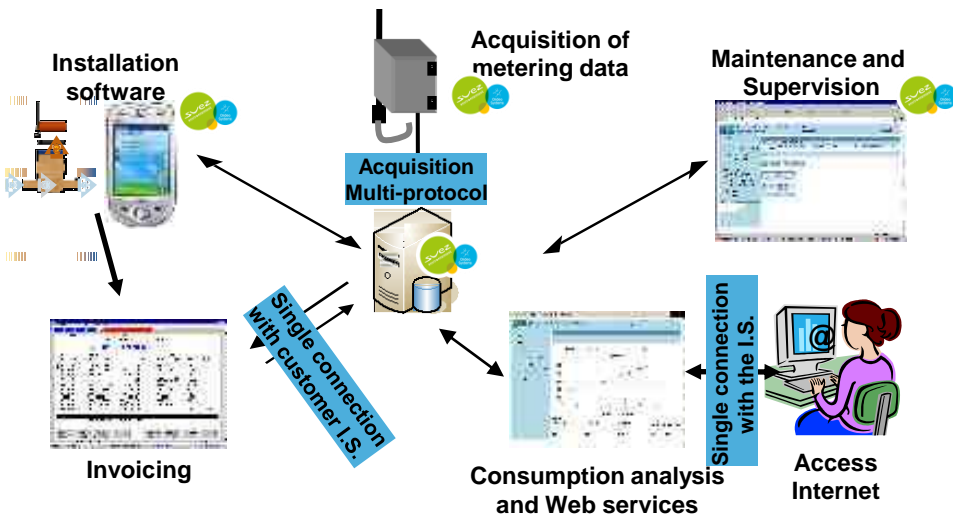
- Consumption Calculation
- Historical storage of consumption
- Forecast of customers consumption
- Real time consumption forecast update
- Pumping strategy definition and remote controls
- Real time process monitoring and field workforce management

**Predictor :** real time consumption forecast

# ONDEO SYSTEMS AMR Solution



Transmission network diagram

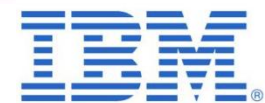
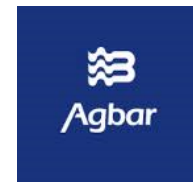


Automated meter-reading information system

- Long-range VHF radio communication infrastructure using the European frequency band
- Install a radio transmitter on each meter to periodically transmit a metering data (+ backflow, leak alert, fraud alarm, battery, etc.)
- The radio coverage is designed to ensure that all data frames transmitted are gathered by at least two receivers
- Set up a GPRS system to send the incoming data frames to the central Metering Data Management system
- Analysis of data frames
- Dedicated Web page for customers

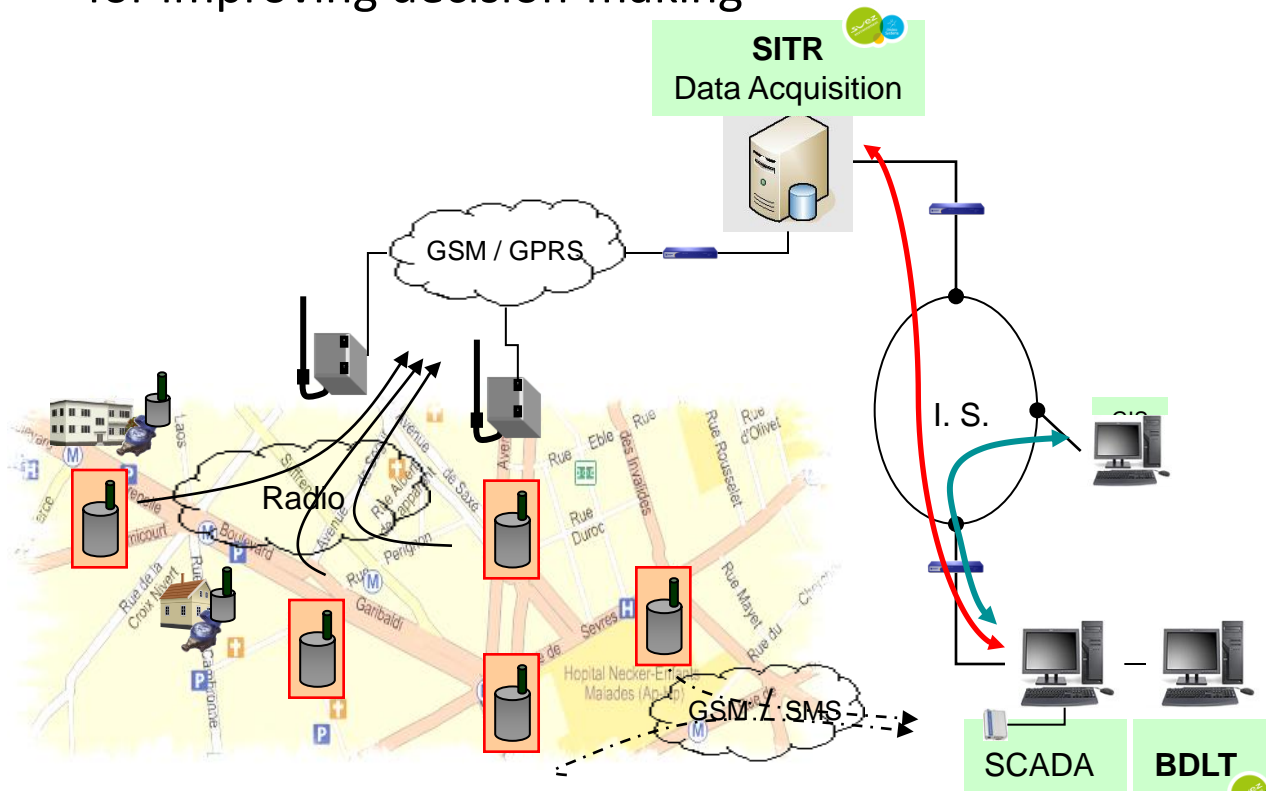
# ONDEO SYSTEMS AMR References

- **150 000 fixed network AMR devices** are handled on line in France : Paris, Lille, Créteil, Bordeaux, etc.
- **About 700 000 fixed-network AMR devices** under deployment : Malta (with IBM), France, Spain, ...
- AMR pilots and international business perspectives in collaboration with SE Business Units : Spain, Mexico, China, Morocco, Italy, ...
- GAS : Operational Pilots in France (GrDF, REGAZ (Bordeaux)) and Italy (LGH)



# Example of Smart Water Grid

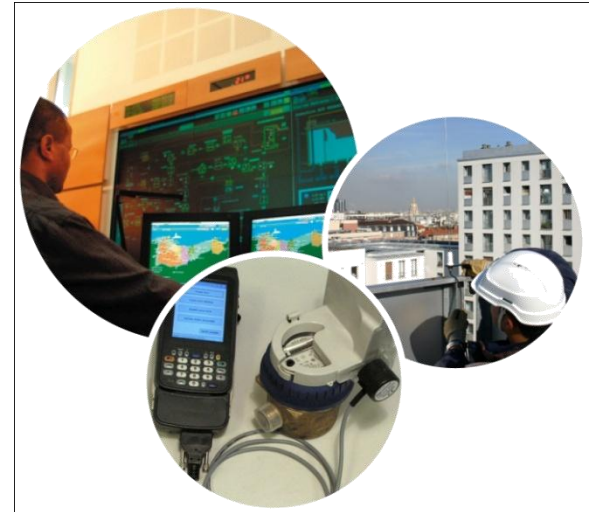
- Deployment of a Monitoring and Control information system gathering data from district metering RTUs and acoustic loggers, via GSM-SMS and/or radio-communication
- Data are on-line available for intervention teams either in automated reports and trends (SCADA and Data Management Systems) or through geographical interfaces for improving decision-making



- Web and Terminal Server Client application available
- Compliance with any brand of acoustic loggers, including combination of brands and types.
- Dynamic link with asset management and GIS
- **On-line calculation of network efficiency**

# CONCLUSIONS

- Smart Water Networks are now really at stake in water industry
- Technologies are getting mature and many systems are available
- But technology is not enough for going from the installation of innovative solutions to a real improvement of water networks operations and an optimisation of operation's costs
- A strong expertise in water networks management combined with optimised tools and information systems is the key for Smart Water Networks to go from pilots to roll-outs



**THANK YOU !!!**

[pierre.sacareau@ondeosystems.com](mailto:pierre.sacareau@ondeosystems.com)