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Toward Smart and Resilient Cities

W-Smart hosted by AMWA

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Smart and Resilient Cities at Veolia

Our key figures

€24,390 M in revenue

163,226 employees

WATER

100 million people supplied with drinking water

61 million people connected to wastewater systems

4,052 drinking water treatment plants managed

2,928 wastewater treatment plants operated

SOLID WASTE

40 million people provided with collection services on behalf of municipalities

45 million metric tons of treated waste

764,477 business customers

591 waste treatment facilities operated

ENERGY

44 million MWh produced

37,339 Heating installations managed

2,086 Industrial sites managed

551 heating and cooling networks operated

SHOCKS

Hurricane Irma, Saint Martin, 2018

Aging Infrastructure
Scarcity of ressources

STRESSES

Earthquake, Mexico, 2017

Urbanization
New air and water pollution

WHAT IS RESILIENCE ?

Resilience: Strategic approach to strengthen the socioeconomic attractiveness of the urban ecosystem, guaranteeing its sustainable growth.

Shocks

- **Climate Change** and natural catastrophes
- Terrorists attacks
- Pandemic diseases
- Man-made environmental disasters

Attractiveness of Urban Ecosystems

More violent and frequent shocks

Crises is the main aspect of Veolia three businesses:

To protect our people and assets operated by Veolia, we have continuously developed a solid and proven know how:

- Organization centered on the “on-call”
- Events anticipation by using sensors, rain gauge, radar and developing analytics
- Implementation of innovative solutions
- Sharing of good practices developed in all our contracts

To illustrate my words, in 2017, Veolia Water France, managed 225 alerts and crisis.

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Attractiveness of Urban Ecosystems

Stresses

- Globalization
- Urbanization
- Demographic pressure
- Greenhouse gas emissions
- Resource usage conflicts and shortages
- Aging infrastructures
- Hazardous materials

Main Stress

Aging Infrastructures

Aging sewerage and underground infrastructure and often fleeing

The impact of weather conditions on the electricity grid costs to the US economy : 18 et 33 billion US $ / year

For example, Sao Paulo has a network yield of 30%. Rehabilitation requires a different approach.

Growing complexity of management

Growing urbanization: an additional 2,5 billions people will live in urban areas by 2050.

Increasing budget pressure, challenged operation efficiency

A more demanding and connected population, waiting for more transparency

Weakened resources

Water demand is expected to increase by 55% by 2050

The United Nations plans a 40% decrease in water resources by 2030

Added to these figures is the emergence of new pollution with a high health impact

Social Tensions

13%, global unemployment rate for 15-24 year old

800 billions people live with less than 1,90$ a day (poverty line)

Difficulties to increase the tariffs. Need to make services more efficient and more economical

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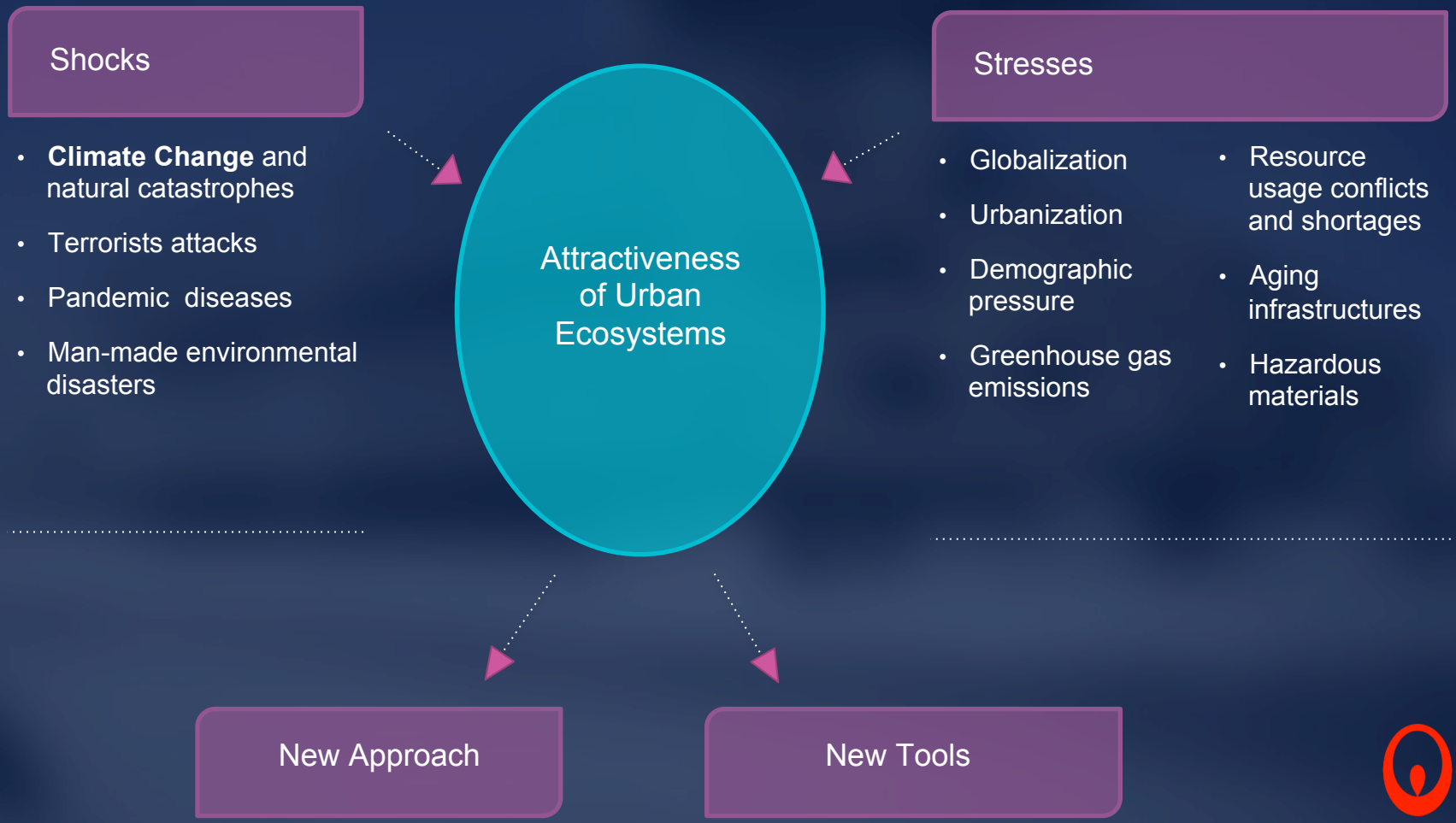


Digital solutions

For Water services ?

WATERNAMICS

Communication, reporting and traceability :
- **Down to consumers**
- **Up to officials**

Real Time Daily Operations

Back Office:
Engineering Studies
Simulation, Asset management,
Capex and Opex Optimisation.

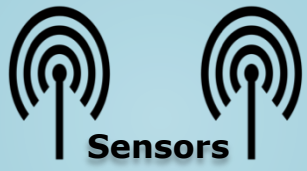
Crisis Management

Standard Operating Procedures

Situation Awareness

Analytics

Software



Sensors

Sensors apps

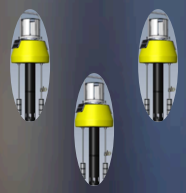
Existing analytics

CRM

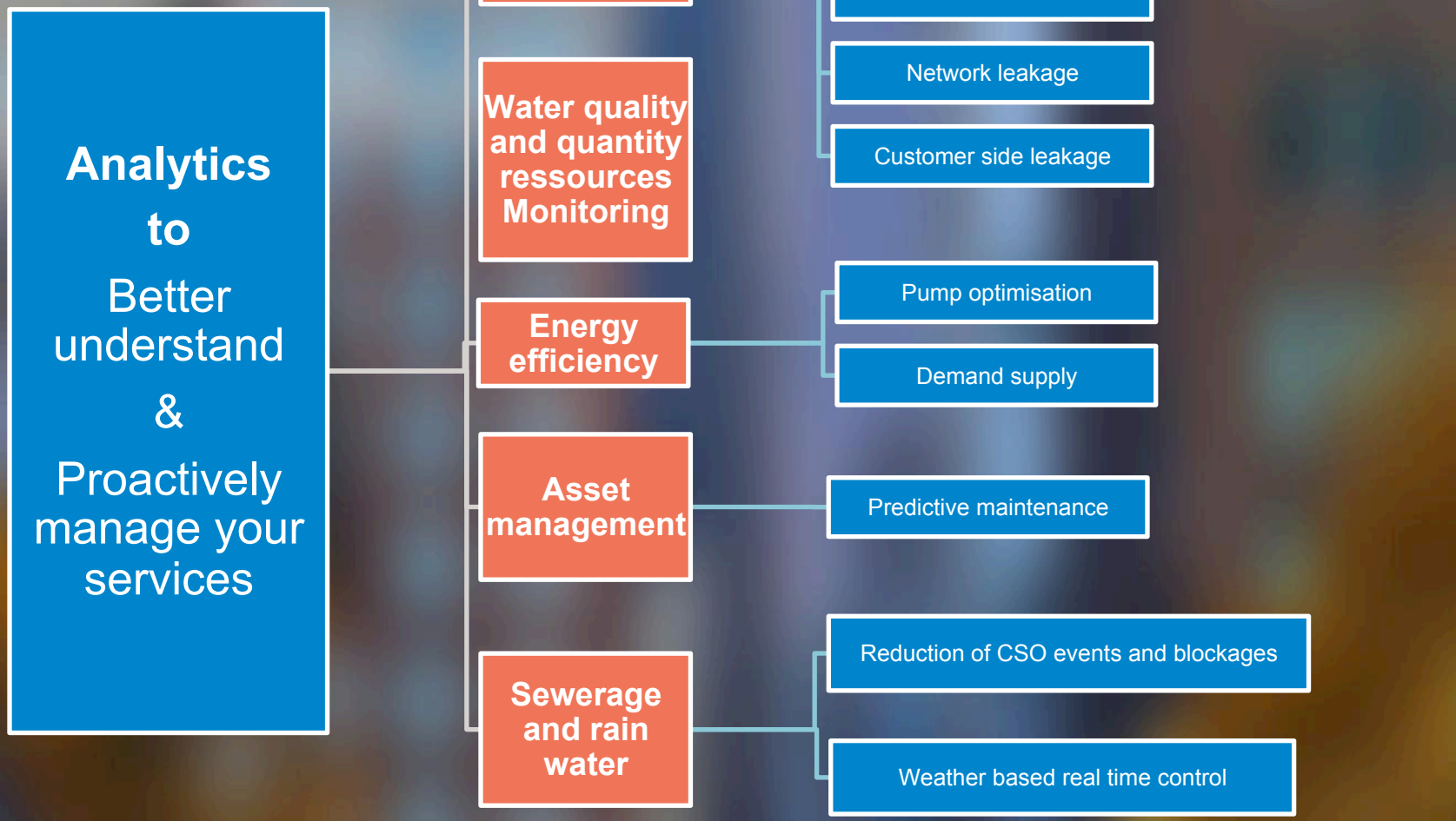
Dispatching
Vehicle tracking

CMMS

GIS
SCADA



Analytics create a new way of working for more efficiency



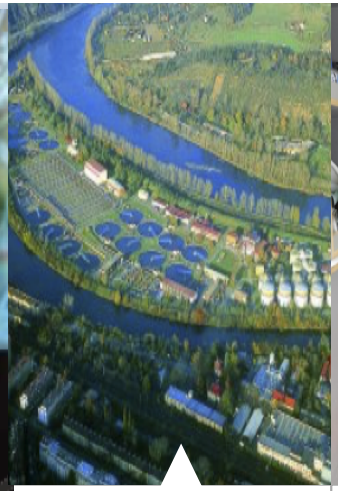
VEDIF, France
149 municipalities

Time to get an appointment reduced from 7 to 2 days

Shanghai, China
3.6 million inhabitants

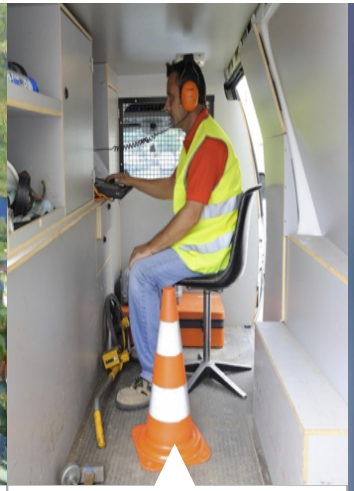
Service coverage x2

Workforce -20%



Prague, Czech Republic
4,279 km

Incidents response time reduced by 30%



Lyon, France
1.3 million customers

12 million m^3

Water loss reduction commitment

Drinking water networks

- ✓ Lille, France
- ✓ COBAS (Bassin d'Arcachon), France
- ✓ SIDECM (Côte des Maures), France
- ✓ CUCM (Creusot-Montceau), France
- ✓ Western Water, Australia

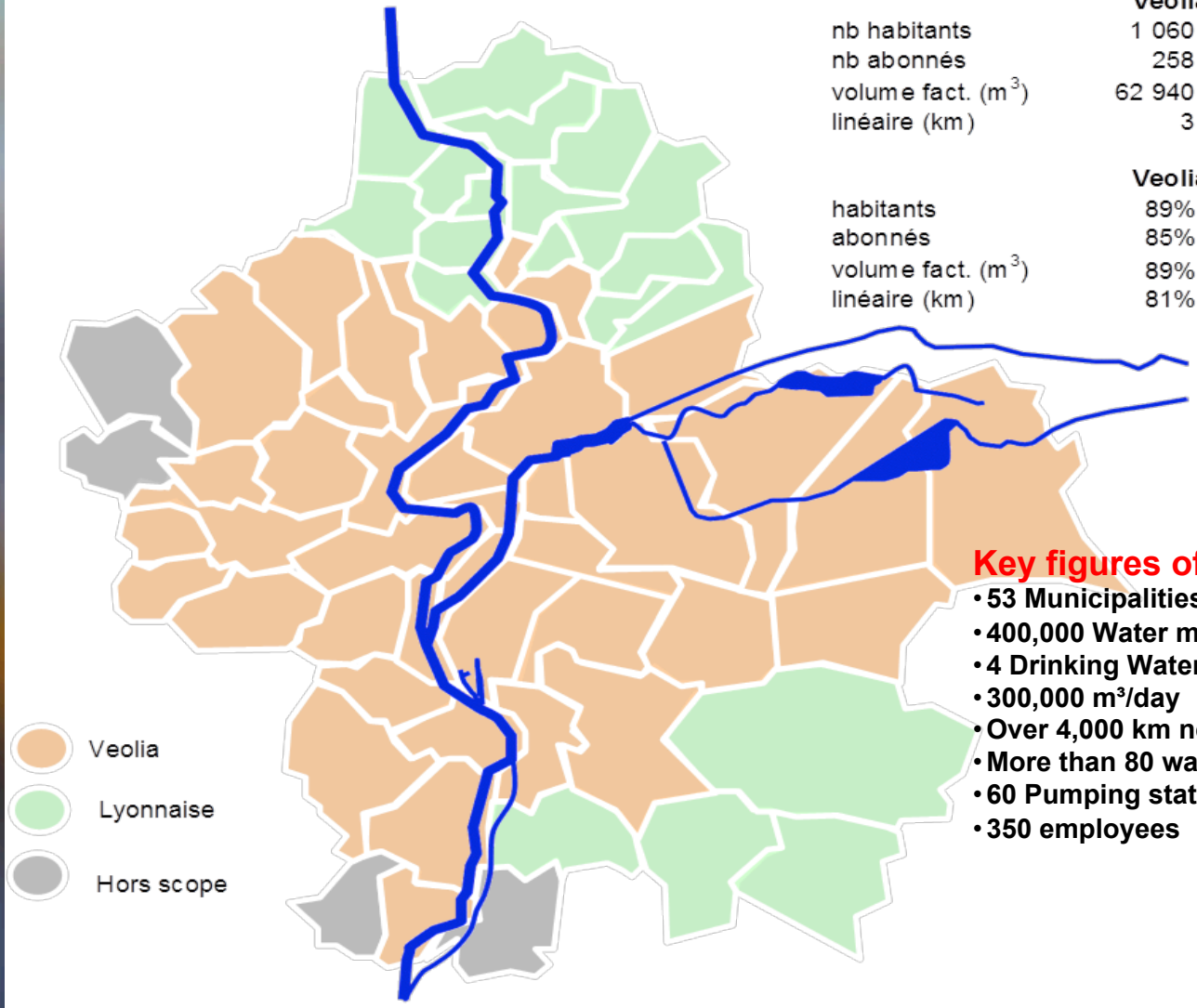
Wastewater networks

- ✓ Cap Atlantique (La Baule), France
- ✓ Saint Malo, France
- ✓ Ramatuelle (en cours), France

An example : LYON (France)

Great Lyon key figures

Distribution actuelle du périmètre Grand Lyon



	Veolia	Lyonnaise	*Total*
nb habitants	1 060 800	134 000	*1 194 800*
nb abonnés	258 600	43 900	*302 500*
volume fact. (m^3)	62 940 100	7 687 600	*70 627 700*
linéaire (km)	3 060	740	*3 800*

	Veolia	Lyonnaise
habitants	89%	11%
abonnés	85%	15%
volume fact. (m^3)	89%	11%
linéaire (km)	81%	19%

Key figures of the Drinking Water Service:

- **53 Municipalities**
- **400,000 Water meters**
- **4 Drinking Water plants**
- **300,000 m³/day**
- **Over 4,000 km network**
- **More than 80 water tanks**
- **60 Pumping stations and rechlorination points**
- **350 employees**

Great Lyon 6 Main Challenges

1

Aging infrastructure

About 400 additional leaks per year…

2

Growing demand

Not Homogeneous demand : decreasing consumption in the South East District and densification in the center

3

Improve consumer relationship and Transparency

Large & active Customers GroupRise of unpaid bills Raising citizen expectation

4

Budget constraints

Reduce the water tariff to enable investment on the production plants

5

Climate change mitigation

Recurrent freezing period who blow customer connections

6

Chemical Pollution

Rhône river is not anymore considered as a sustainable resource

Great opportunity to link all that we have done in the past

- **Existing tools and software**
  - *SCADA*
  - *GIS*
  - *Planning Center*
  - *Call Center*
  - *Intranet*
  - *Extranet*

Existing Connected Sensors

- *3,000 Water meters (sensitive consumers)*
- *1 Quality probes (one hospital)*
- *12 Pressure meters*
- *100 (mobile leak detector)*
- *20 (flowmeters)*

Existing Analytics

- *Asset Management*
- *Quality management*
- *Hydraulic models*

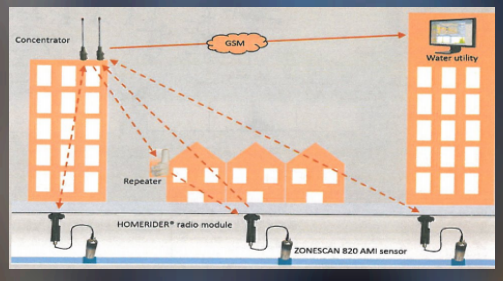
Creation of the “3C Room”

Control, Command, Crisis Room

Achievements

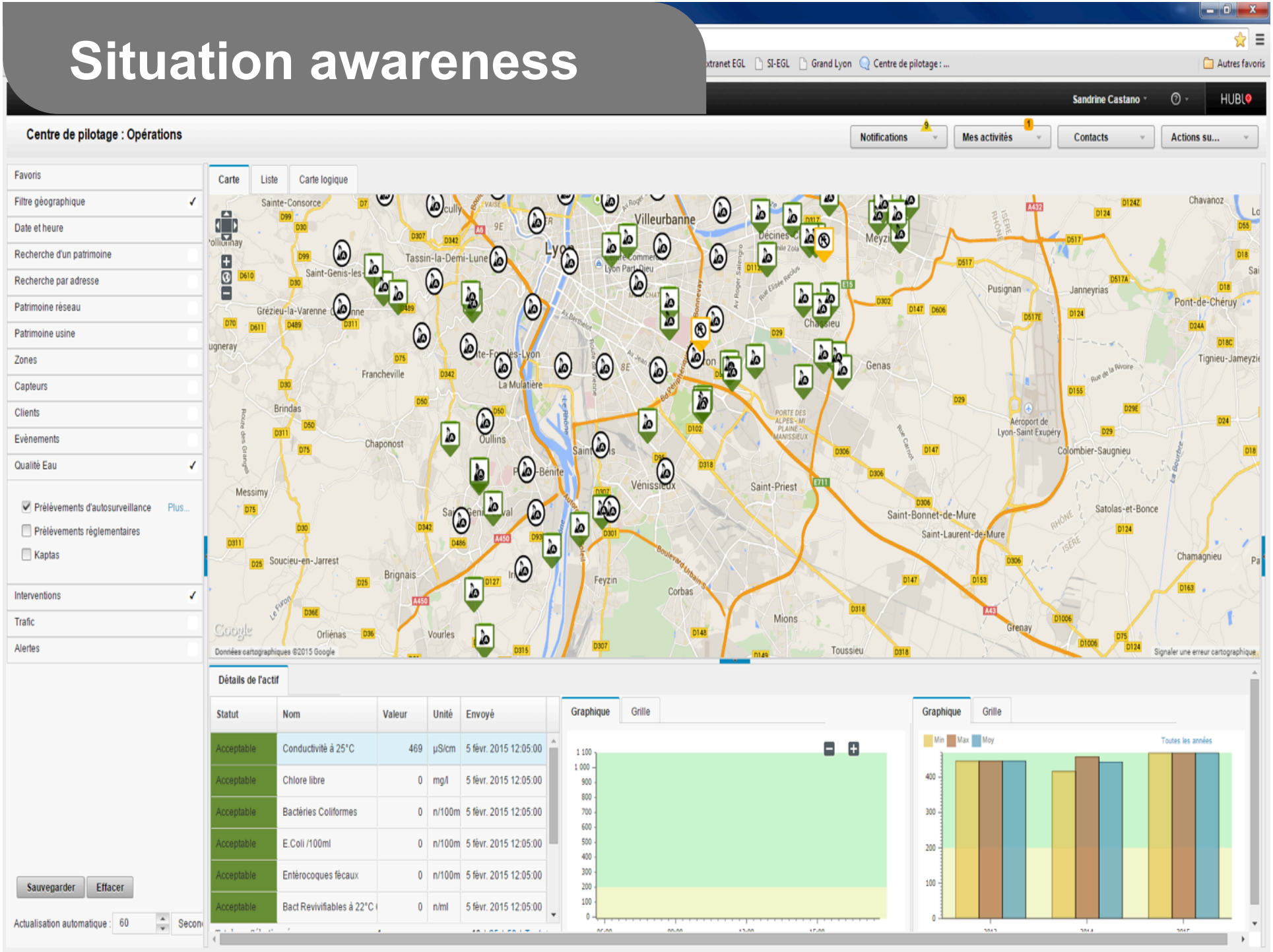
- Installation of 5,500 acoustic sensors with correlators for leak detection
- 400,000 smart meters being installed gradually (gradually renewed)
- 70 Water quality sensors (Kapta)
- 250 pressure meters
- All Hydrants on/off information
- Modernization of existing analytics (Asset Management, Quality Management)
- Development of more than 15 new analytics (Energy Efficiency, Smart metering…)
- 100 new Standard Operating Procedure (using existing Apps Waze, Street View, Social networks…)
- And more are under development by Eau du Grand Lyon

Radio Communication Network



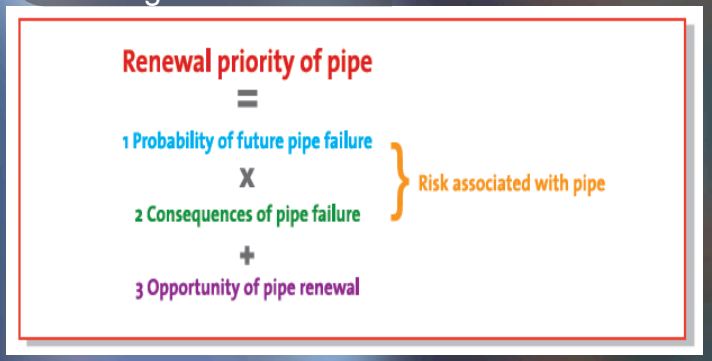
Today : The “3C Room”, named Hublo

Situation awareness

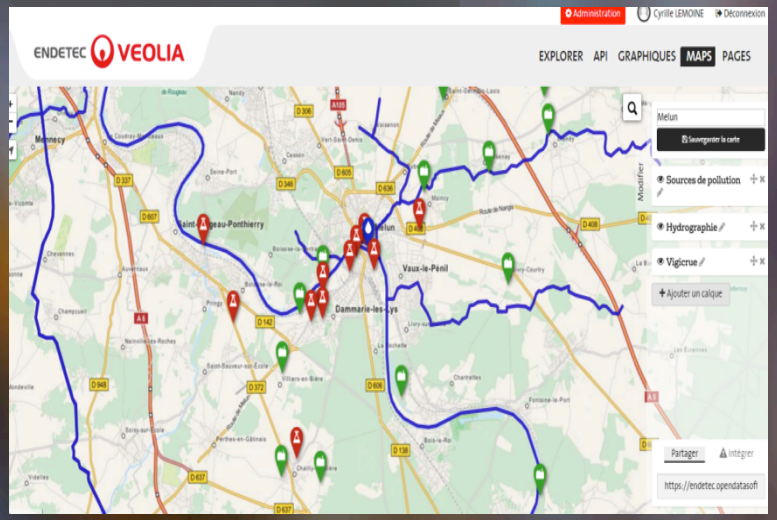


Street View

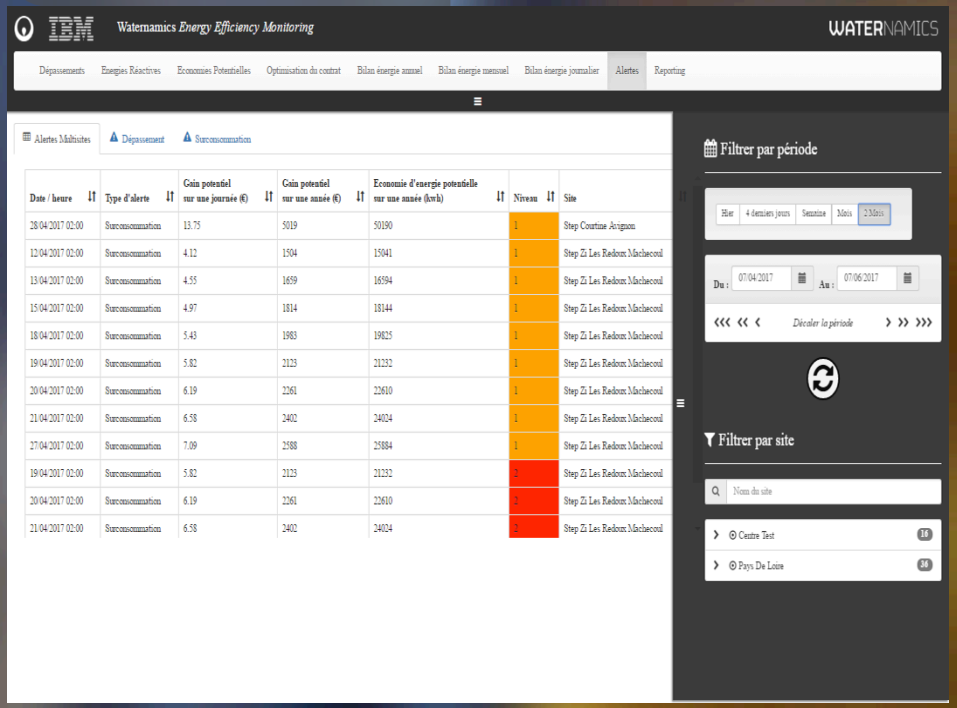
Asset Management



Water quality monitoring



Energy efficiency



Lyon savings after one year of operation :

- Water losses : 7 Mm3
- Energy saving 16%
- Reduction of customer complaints and inquiries by 12%
- Improve response time on minor crises by 22%
- Reallocate 33% of the staff
- Reduce the transportation per agent by 11%
- Reduce by 15% the overtime cost

We are waiting to save 2% more this year thanks to new analytics that our operators are deploying themselves

An average productivity of 25% (Non Revenue Water representing 10%, Energy efficiency 6%)

Change Management in Lyon

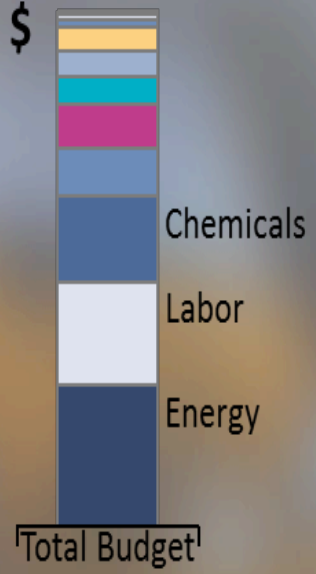
REX Waternamcis

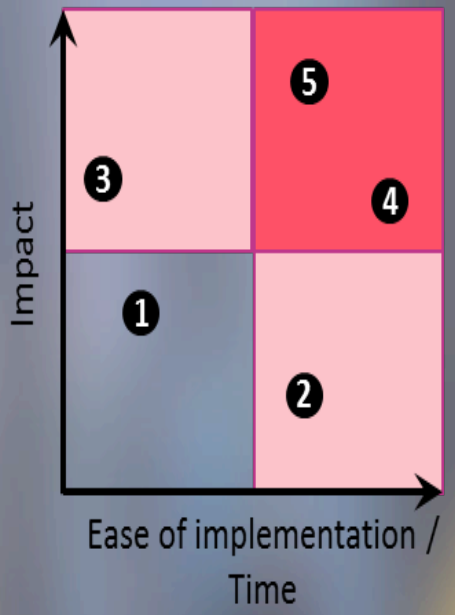
Where is the most money being spent ?

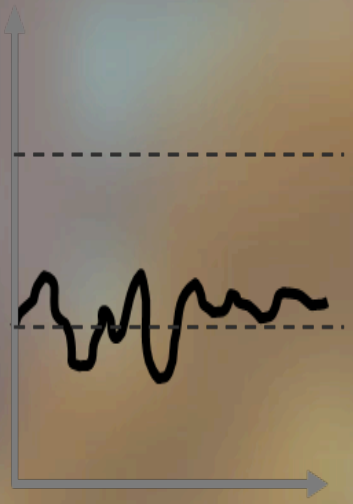
Which initiatives will yield the highest impact?

Which initiatives are best to be implemented?

How do we track progress and verify impact?







Design and free thinking – Placing Waternamics at the heart of the organization

31 interviews

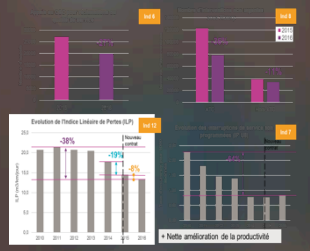
10 processes identified

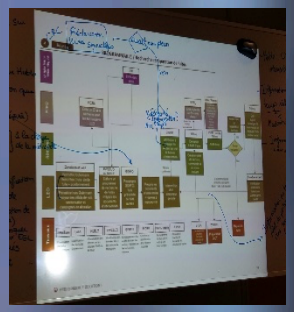
17 indicators

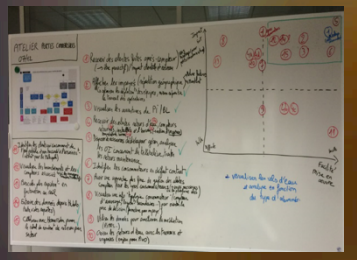
7 workshops for 7 use cases

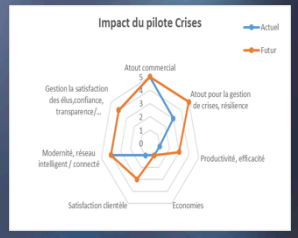
45 initiatives identified, prioritized

Potential impact evaluated










VEOLIA
Thank you very much !