From Smart Water Grids to Smart Water Utilities

Pedro Perdigão

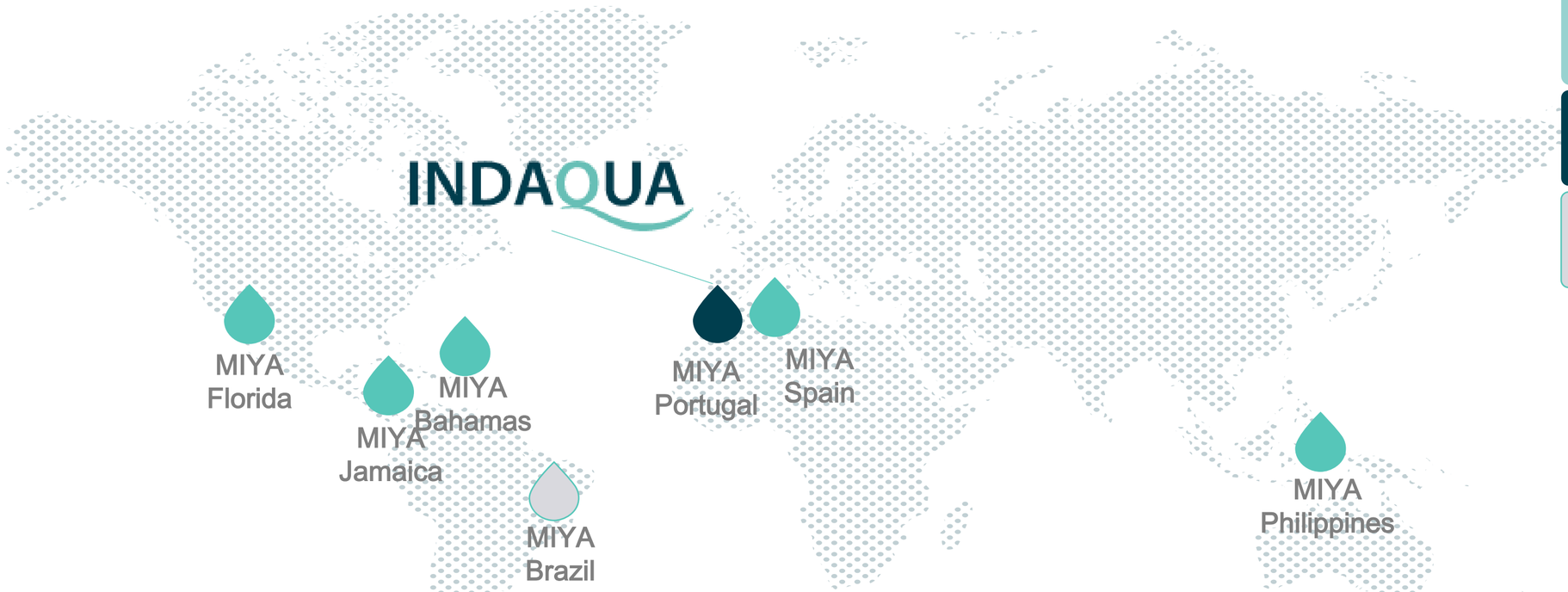
#WATEFCON 2018

NRW place in the global strategy map of a water utility - Motivation factors in implementing a NRW reduction - From an intellectual to a SMART NRW strategy - Smart water network vs smart water utility

Water Efficiency Conference
5-7 September 2018
University of Aveiro, Portugal

watef
Water Efficiency Network

Miya Group



NRW Projects

Concessions

Engineering (NRW and O&M Projects)

About Us

Miya is part of a group of companies of Israeli origin - ARISON INVESTIMENTS

Founded by Shari Arison in 2007 and headquartered in Luxembourg, its vision is to ensure the abundance of drinking water through efficient management of existing resources

What do we do?

Miya optimizes water supply in urban water systems worldwide

Plans and implements a comprehensive technology support solution, tailored to each client's budget, needs and priorities

What are the benefits?

Miya's solution significantly improves the operational and financial efficiency of the customer while also reducing energy consumption and reducing water contamination and health risks, benefiting people, the community and the environment

Where are we?

With extensive experience in the implementation of water efficiency projects around the globe, Miya is active mainly in the Iberian Peninsula, Brazil, the Caribbean, Canada and the Philippines

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01

Motivation for NRW reduction

The economy, stupid

Measure to manage and motivate

Motivation for NRW reduction

The economy, stupid - James Carville (1992)

Lower **Higher**

Water utility consumers pay Non Revenue Water Costs

totally partially (efficiency gains and losses are shared)

Water origin

Vertical system Imported water from a bulk water supplier

with minimum consumption **w/o minimum consumption**

Low treatment cost high imported water price

Motivation for NRW reduction
Measure to manage and motivate

Economic water losses - Non-revenue water per service connection - last 12 months	l/(service connection*day)	67,6
Real water losses (W) - last 12 months	l/(service connection*day)	45,9
Economic water losses - Non-revenue water by volume (W) - last 12 months	%	16,1
Water losses by volume (W) - last 12 months	%	15,9
Economic water losses - Non-revenue water per network extension - last 12 months	m3/(km*year)	1 140
Infrastructure leakage index - last 12 months	(-)	3,1
Economic water losses - Non-revenue Water Cost (W) - last 12 months	€	2 029 179

Select KPI´s to measure the performance and set targets

Use KPI´s that people understand

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Motivation for NRW reduction
Measure to manage and motivate

Balanced Scorecard	jul/18	IFAF	ISTT	ISMF	IMTS	IVLC	IOAZ	Concessions
OBJ09 Reduce Non-revenue water	**Value**	**549**	**464**	**827**	**3 106**	**910**	**972**	**1 137**
10 Economic water losses - Non-revenue water per network extension - last 12 months m3/(km*year)	Goal	505	464	813	3 053	1 113	1 346	1 186
	Ratio	92,1%	100,1%	98,2%	98,3%	122,2%	138,6%	104,3%
	Score	8	12	10	10	20	20	15

Monitor (hourly, daily, monthly, annually) and share results

Benchmarking as much as possible

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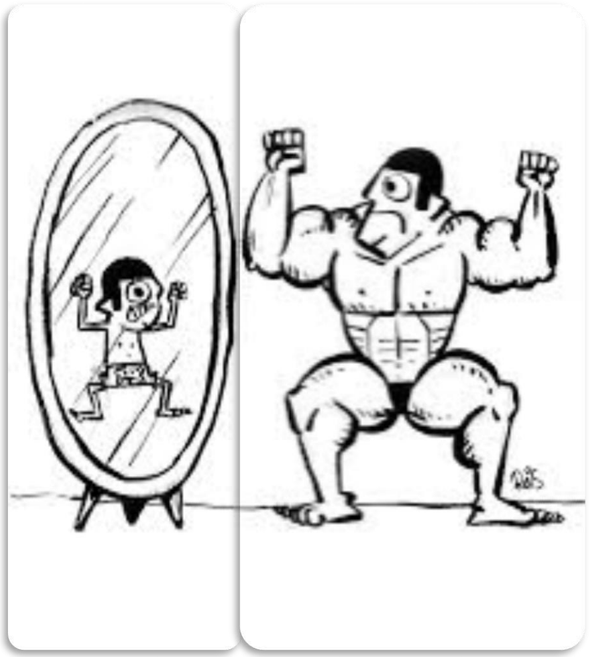
Motivation for NRW reduction
Benchmarking



Benchmarking is the process of comparing a company, process, and indicators in relation to other companies, processes and indicators **driving change and generating stakeholders value.**

Benchmarking is used to…

1. **DEFINE PERFORMANCE AND PRACTICE GOALS** and measure progress in achieving those goals
2. **POSITION THE COMPANY TOWARDS OTHER** competitor **COMPANIES**
3. **MEASURE THE EXACT *GAP* BETWEEN THE COMPANY PERFORMANCE** and other relevant companies
4. **IDENTIFY IMPROVEMENT OPPORTUNITIES AND MAKE RECOMENDATIONS** for activities that will help achieve the performance *target*

"Benchmarking is a tool for performance improvement through systematic search and adaptation of leading practices"
IWA, 2011

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02

NRW place in the strategy map
balanced scorecard
execution and monitoring

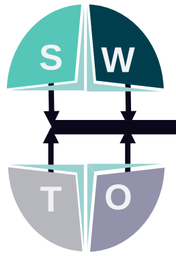
NRW place in the Strategy Map
balanced scorecard

1 Define strategy | 2 Execute | 3 Monitor

The approach to the Performance Management System at INDAQUA has evolved into an integrated and more complete system where it relates different components.

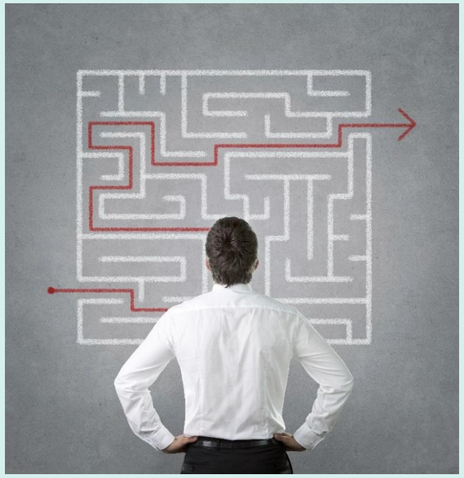
- Vision
- Values
- Mission
- Strategic Guidelines

Competences



Environment
PEST

OBJ09 Reduce NRW



Strategy map

For every goal answer: WHY?

NRW place in the Strategy Map
balanced scorecard

1 Define strategy | 2 Execute | 3 Monitor

Balanced Scorecard provides a methodology that allows the mission and strategy to be transposed into operational objectives and to monitor the results of the implemented actions.

Financial	OBJ01 Increase the EBITDA	OBJ02 Increase revenues	OBJ03 Reduce Operational Expenditure	OBJ04 Increase the effectiveness of collection
Costumer	OBJ05 Improve Comunication	OBJ06 Reduce Service Interruptions	OBJ07 Reduce court processes	OBJ08 Reduce Bursts
Internal business process	OBJ09 Reduce NRW	OBJ10 Increase Water Production	OBJ11 Increase Energy Efficiency	OBJ12 Reduce infiltration of rainwater into the ARD network
Learning na Inovation	OBJ13 Investment Plan	OBJ14 Systematize Innovation	OBJ15 Water network renewal	OBJ16 Wastwater network renewal

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NRW place in the Strategy Map
execution and monitoring

1 Define strategy | 2 Execute | 3 Monitor

After defining the objectives it is imperative to **define actions that sustain the achievement of objectives**. The definition of these actions is monitored through the implementation of a action plan from execution to strategy

Actions and initiatives

Illustrative example

Objective	Actions/Initiatives	Resp.	Expect. Date	Expect. Concl.	Real Beginnin	Real Concl.	Real Actions	Comments
Goal 09 Reduce Water Losses	(O9A1) List and priories' (Payback, VAL, TIR and Risk) possible changes in the Water network considering the number of breakages.	DEXP						
	(O9A3) Each Concession must have a control file of the Water invoiced by the Upstream Management Entities (comparing the meter reading from SCADA, on-site and invoiced by the Bulk Supplier)	DEXP						
	(O9A4) Re-evaluate estimates for more adjusted values for clients without real meter Reading in xx months (one month of high estimate)	DCOM						
	(..)							

For every goal answer: How?

Make a Plan - define actions (responsibilities, resources, dates)

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NRW place in the Strategy Map
execution and monitoring

1 Define strategy → 2 Execute → 3 Monitor

The results of the considered month are presented and compared with the previous month, homologous month and the year forecast. This monitoring is constant and with adequate effort

COLOUR MAP – Analysis of the BSC result indicators

Overview 100,0%			Previous Year	Previous Month	Present Month	Estimate
			jun/16	may/17	jun/17	dec/17
OBJ01 Improve Concessions Results		**Amount**	**3 372 237**	**3 105 458**	**3 975 198**	**8 053 642**
EBITDA - Acum. Year		Goal	3 372 237	2 941 638	3 390 576	7 464 820
Weight		Ratio	100,0%	105,6%	117,2%	107,9%
30%	€	Score	8	12	20	12
OBJ02 Increase Turnover		**Amount**	**7 021 705**	**6 060 927**	**7 553 227**	**15 364 087**
EBITDA Income - Acum. Year		Goal	7 021 705	6 020 405	7 337 288	15 143 948
Weight		Ratio	100,0%	100,7%	102,9%	101,5%
10%	€	Score	8	10	15	12
OBJ03 Reduce Concessions Costs		**Amount**	**3 649 469**	**2 955 470**	**3 578 028**	**7 310 445**
EBITDA Spendings - Acum. Year		Goal	3 649 469	3 078 767	3 946 711	7 679 128
Weight		Ratio	100,0%	104,2%	110,3%	105,0%
10%	€	Score	8	12	20	15
OBJ04 Increase Billing Effectively		**Amount**	**558 491**	**576 946**	**578 639**	
Costumers´Debt w/more 12 months		Goal	558 491	549 623	558 491	611 648
Weight		Ratio	100,0%	95,3%	96,5%	0,0%
4%	€	Score	10	10	10	5

BSC is presented monthly in Executive Board meetings of each concession where **results far below target are analysed (COLOURS ARE ALERTS!)**

Allows to define and follow correctly a **set of indicators - not random, but following a certain logic**

The **indicators base is permanent**, but the attention and follow-up are different, **depending on the company and time**

Far below *target* (score 5 - 8)

On target (score 10 – 12 - 15)

Far above *target* (score 20)

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03

From Intelligent to SMART

Intelligent vs SMART
SMART Water Utilities

From Intelligent to SMART
Intelligent vs SMART

From Intelligent to SMART
SMART water utilities

i-SMART

Sensor and communication system

Analytical capacity

Timely actions

intelligent

Monitor key variables transforming data into information

Resources and means to implement decisions

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04

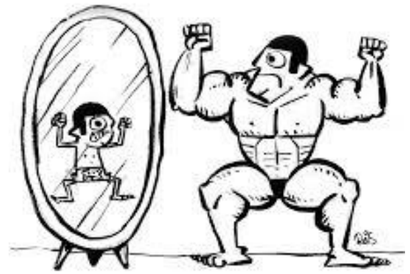
Smart Water Grid vs Smart Water Utility

an NRW example

Smart Water Grid vs Smart Water Utility
an NRW example

Soma de ValorRegulador	Non Revenue Water (%)		
Rótulos de Linha	%	(m3/km)	(m3/service connect)
Concessão (concessão municipal)	19,0%	1 198	33
Indaqua Santo Tirso/Trofa	8,6%	358	8
Águas de Cascais	10,3%	1 311	42
Luságua Alcanena	13,5%	568	19
Águas de Paços de Ferreira	15,0%	568	15
Indaqua Fafe	15,4%	464	19
Águas de Valongo	15,4%	1 484	35
Indaqua Vila do Conde	16,0%	1 199	22
Águas de Barcelos	16,6%	504	15
Águas de Gondomar	16,8%	1 642	28
Águas de Mafra	16,9%	1 009	31
Águas da Teja	17,6%	335	19
Indaqua Matosinhos	19,2%	3 723	60
Indaqua Feira	19,7%	786	17
Águas da Figueira	20,9%	1 037	38
Aguas de Paredes	20,7%	895	32
Águas da Azambuja	21,9%	1 137	33
Águas do Lena	22,0%	995	35
Águas do Planalto	22,8%	611	20
Águas do Sado	24,9%	3 470	94
Indaqua Oliveira de Azeméis	26,9%	1 485	37
Delegação (empresa estatal)	10,5%	7 141	101
EPAL	10,5%	7 141	101
Delegação (empresa municipal ou intermunicipal)	25,7%	2 476	69
AGERE	13,7%	1 264	35
Águas do Porto	18,6%	4 847	54
INFRAQUINTA	4,6%	1 139	44
Total Geral	30%	2 403	70

Above National Average



- Indaqua had, already, very god results in NRW
- The NRW (%) gives a wrong notion of the best performing water utilities

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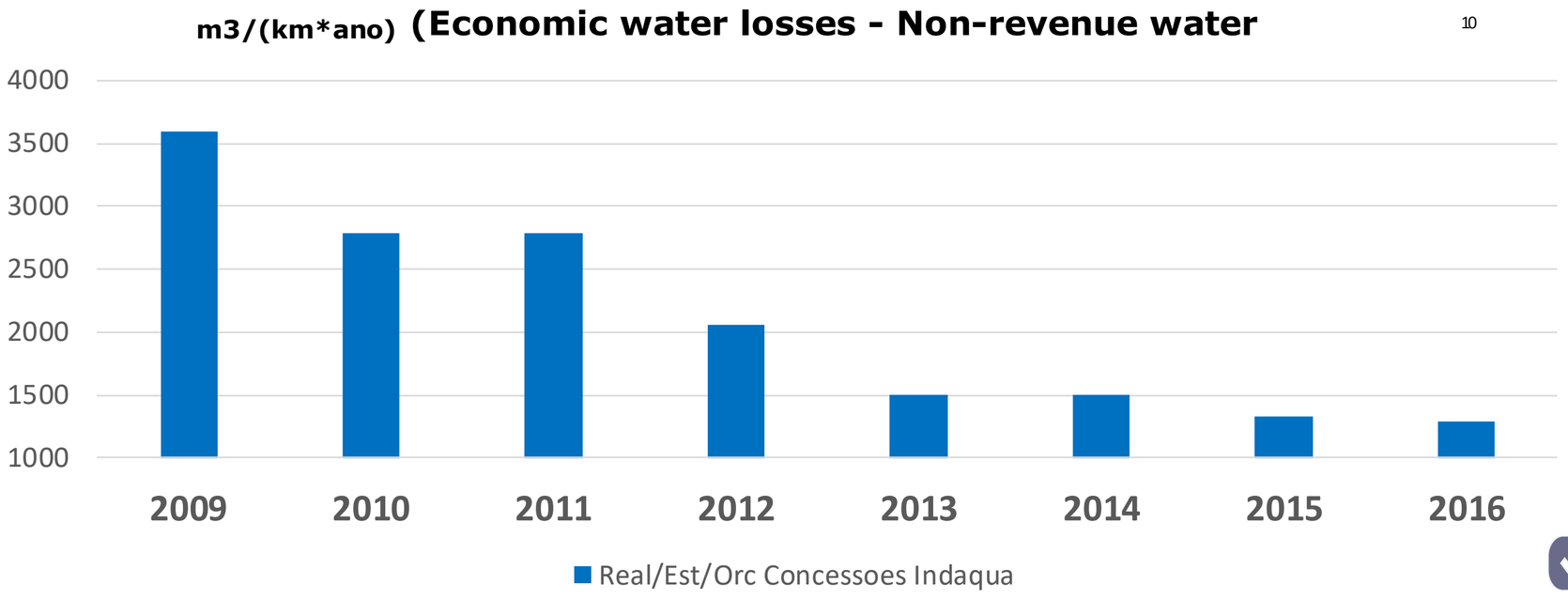
Smart Water Grid vs Smart Water Utility
an NRW example



Indaqua' s performance was relatively stable for the last four years

ILI<1,0 and Meter Errors estimated in 2,6% of Revenue Water

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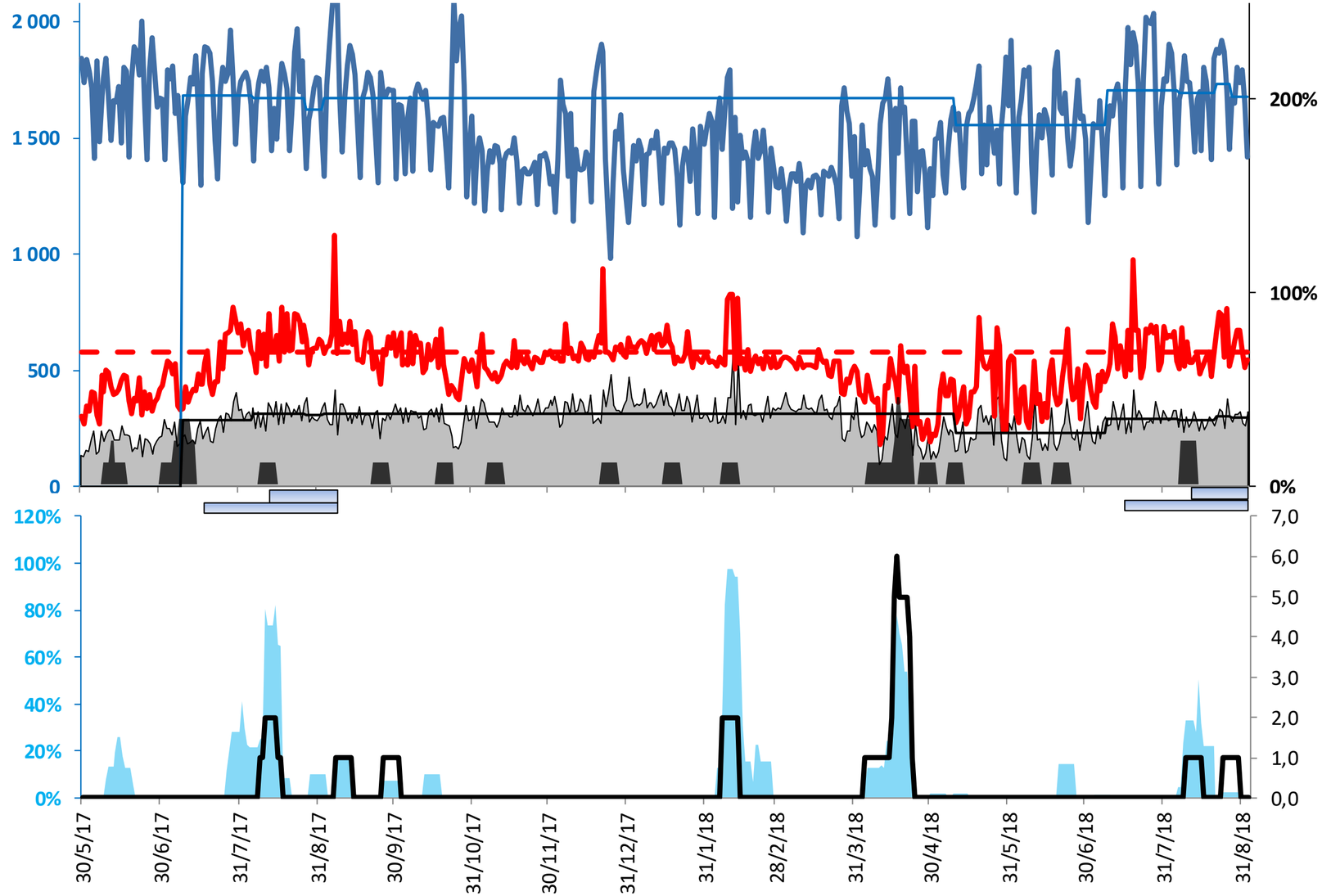
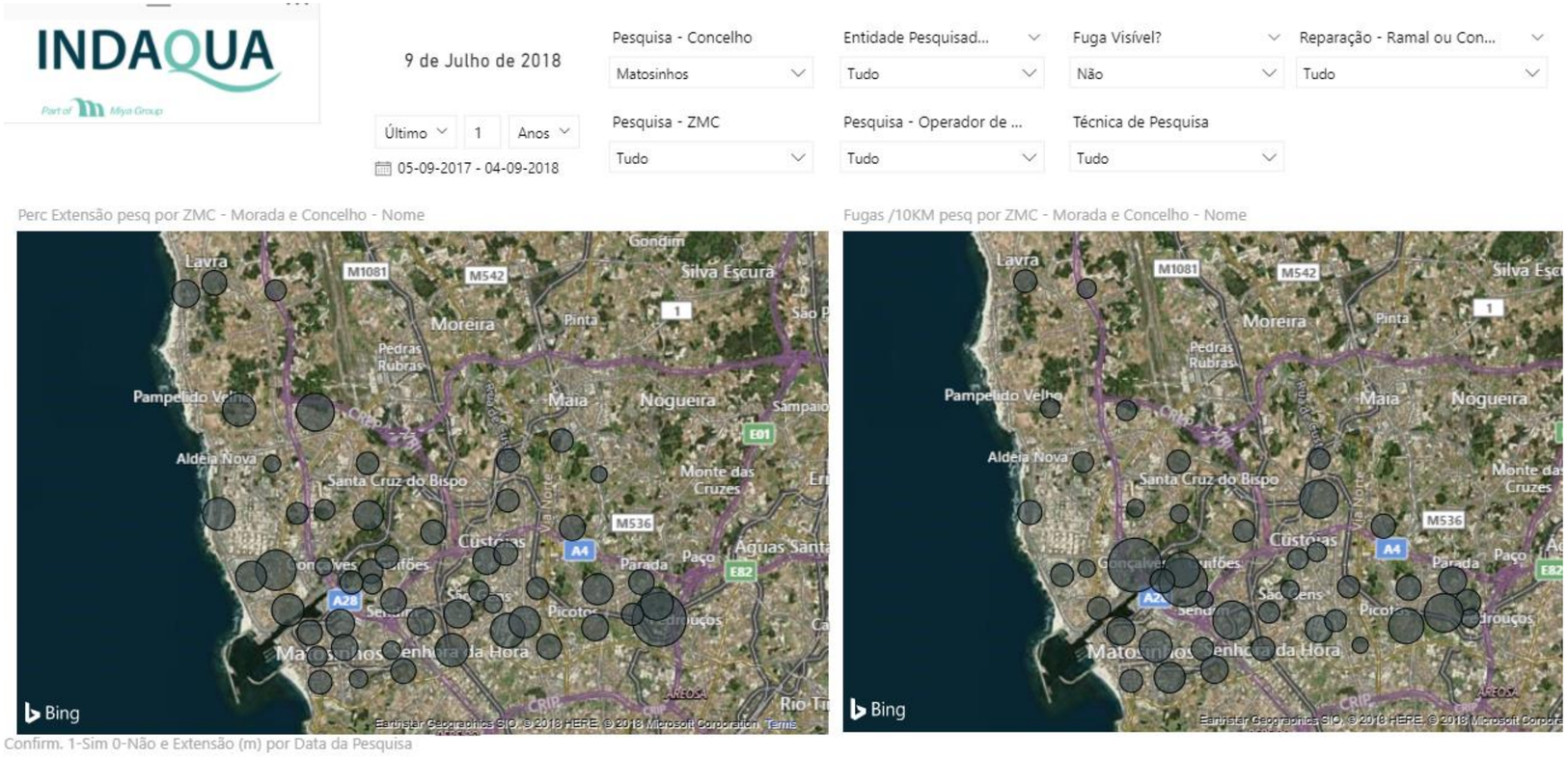
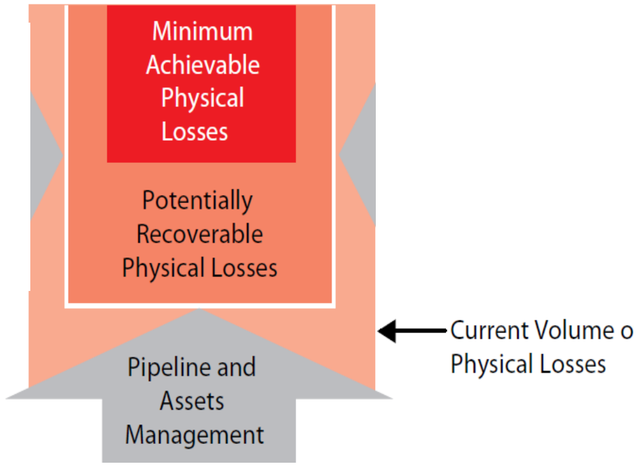
Smart Water Grid vs Smart Water Utility
an NRW example



- **Indaqua had a very developed monitoring system with DMAs and Pressure Zones associated with analytical tools**
- **Water Losses technicians competent and adequate**

Smart Water Grid vs Smart Water Utility
an NRW example





The Manager's Non-Revenue Water Handbook: A Guide to Understanding Water Losses

Level and effectiveness of Leak Detection with room for improvement

Increase in means and reengineering Leak Detection with individual KPI´s

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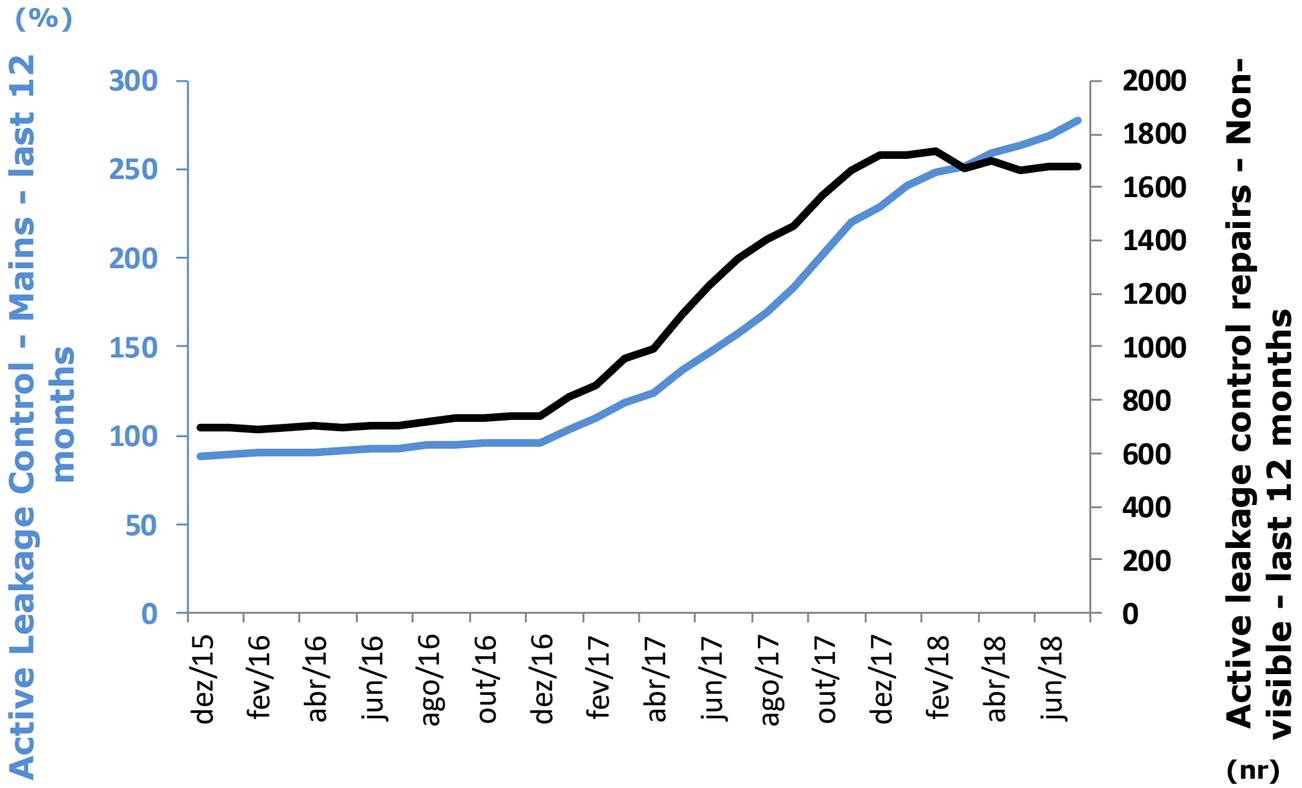
Smart Water Grid vs Smart Water Utility
an NRW example



Researcher	N.º Days	Lenght (m)	Length by day	Confirmation	Confirmation Day	Leaks /10KM search
MB	39	65602	1682	104	2,67	15,85
Louis Hugues	19	72342	3807	49	2,58	6,77
TW	26	33364	1283	64	2,46	19,18
DW	40	74683	1867	97	2,43	12,99
ST	52	153660	2955	116	2,23	7,55
CM	31	85738	2766	61	1,97	7,11
NC	41	65169	1589	77	1,88	11,82
Pashawn Sutherland	10	15239	1524	17	1,70	11,16

Changes in Leak Detection increased 100% the number of Non Visible Leaks detected

Bonus Scheme for the Leak Detection Operators

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Smart Water Grid vs Smart Water Utility
an NRW example

i-SMART

Sensor and communication system

Analytical capacity

Timely actions

intelligent

Monitor key variables transforming data into information

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obrigado.

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