

Tony Hoyle UK & Ireland General Manager- Sales , Measurement Products SBWWI Smart Water Networks Dec 2011

The role of Smart Networks and flow Metering Technology - Guaranteeing UK's future water supplies

Introduction: The role of Smart Networks and flow metering technology - guaranteeing UK's future water supplies

- Water Stress in UK, Leakage Management Metering District Meters Areas
- Vital elements of efficient and robust water metering systems
- What technologies offer the best solutions for detecting and targeting leakage repair teams
- Technology Convergence, Revenue Metering, Verification, Data Confidence, Smooth Pumping – Step towards Smart Networks
- Case Study example: How C2C cut leakage by 35% across 1500 MoD sites utilising 1150 flow meters.
- Overview Neptune R&D Case Study example
- Summary guaranteeing future water supplies

Water Stress in UK, Leakage Management Strategies for leakage control – DMA

- Very Dry Autumn 2011 - Many Southern Areas have water scarcity, Increasing demand.
- Most rain fall is not where it is needed
- Leakage Management, Water companies have established District Meter Areas (DMA) – introduced since 1980
- Almost complete DMA coverage across UK
- Robust data – understanding levels of leakage
- Focus on best ways of reducing leakage to meet regulatory and conservation targets
- Population increases
- Takes a lot of energy to move water (when not gravity fed) – impact on the environment



Courtesy  WRc

Strategies for leakage control

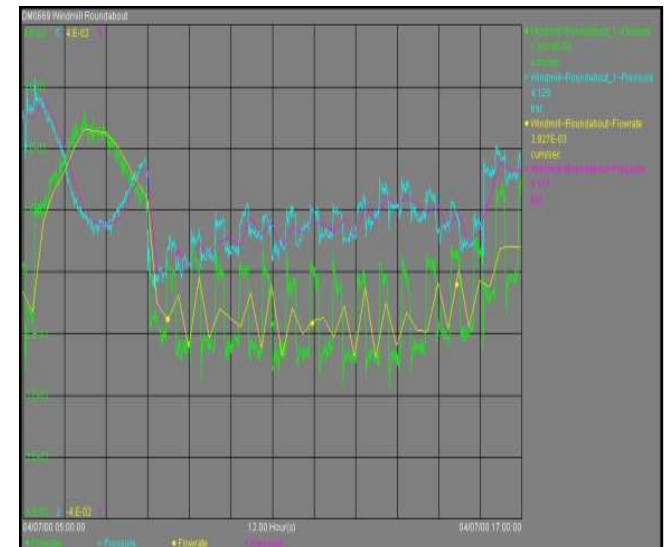
■ Passive leakage control

Response to:

- reported leaks
- supply & pressure deficiencies
- visual evidence

■ Active leakage control

A formal regime of regular or continuous monitoring of the network that detects and repairs unreported bursts



Vital Elements Metering

Robust Leakage quantification and data confidence

- Net Night Line Methods or Integrated Flow Methods
- Majority of data from Flowmeters:
 - Mechanical (traditionally) – under registration at low flows, wear
 - More recently electromagnetic meters like AquaMaster – better low flow performance
- Essential to have confidence in flow data
- Correctly installed meters with correct upstream/downstream pipe lengths
- Ability to verify using electronic verification (CalMaster2) or other methods
- Pressure Management
- Robust Boundary Valve control



Technologies

Correct meter selection

- Meter performance is crucial to effective leak calculation and repair targeting
- Older DMAs using mechanical meters. Used for smaller DMA pipe sizes (25mm / 40mm)
- Larger DMAs – typically 50mm/80mm to 400mm electro-mags being widely used
- Correctly installed meters with correct upstream/downstream pipe lengths
- Latest meters include integrated data loggers with GSM-SMS functions – technology convergence
- AquaMaster now available at 15mm / 25mm for smaller networks requiring high accuracy
- Ensure high quality cable signal/noise - reliable measurement



Technology Advances: AquaMaster 3 Pressure Transducer Option



Leak detection

- AquaMaster 3 has the flexibility to return pressure information from pressure transducer
- The user can indicate and log pressure in a line.
- Ideal leakage tool for zonal leakage detection – a pressure drop over time, likely leak in the pipeline.

Renewable Energy Sources

Power Management handled within Meter



- AquaMaster 3 transmitters have 3 power modes based on specific customer requirements:
 - Mains powered with SuperCap back-up
 - Battery powered (safe none-Lithium)
 - External Renewable (solar/wind) energy with SuperCap back-up.
 - 6-21vdc direct connection of small solar panels (5 watts)
 - Small wind generators

Technology Advances: AquaMaster 3

Data logging Convergence



- **Built-in data logger option**
- This technology convergence means complete system in one unit - flow meter + logger + GSM/SMS/Quadband
- Both meter & logger can be remotely configured - remote meter monitoring, diagnostics, service
- Verifiable with CalMaster2
- The AquaMaster 3 is available with a multichannel, multivariable built in data logger.
- A big step towards **Smart Water Networks**

Technology Advances: Smart and Efficient Networks

Burst reduction

Use Latest Technology to minimise bursts - taking flow and pressure information to provide Pressure Management (reducing pressure before pipe ruptures)

Utilise PRV or Preferably Variable Speed Pump Drives with smooth starting, stopping and speed control to eliminate:

- Pressure surges

- System shocks

- Make systems more efficient, and save energy, water, and burst repair time



Example of typical: Energy savings

Profile - Year by Month - Electricity

Stark

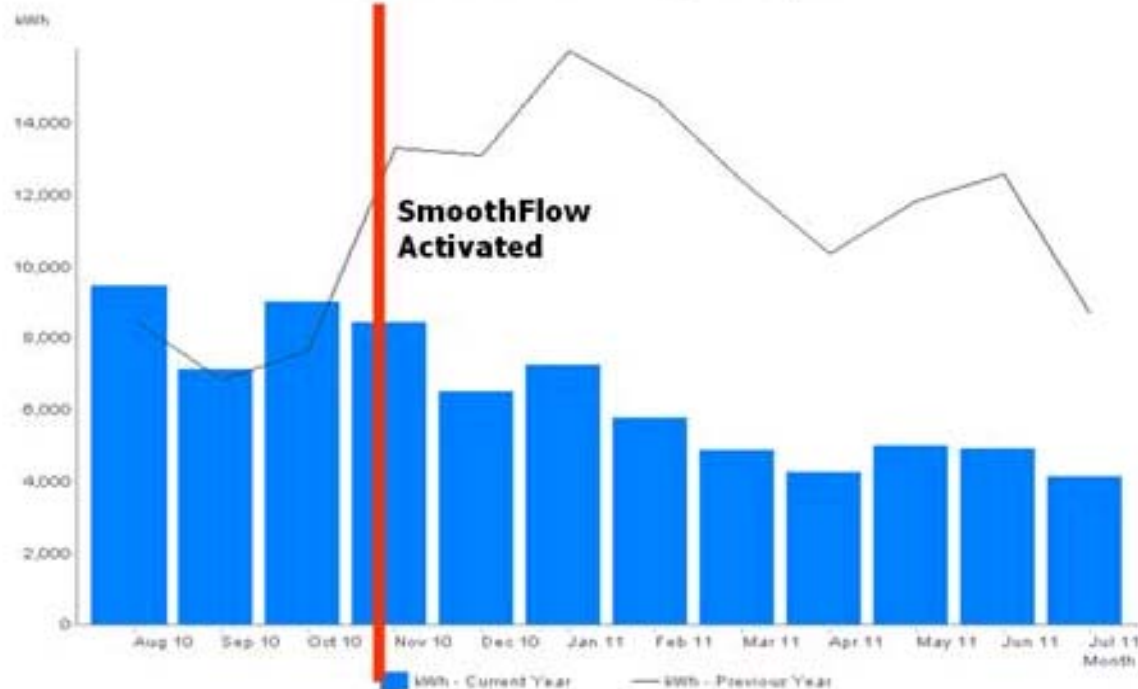
Company:
Site:
MPAN / Meter ID:
Online Meter Name:

Severn Trent Water
Bettys Lane SPS - EF010
N/A / N/A
Bettys Lane SPS - EF010



Report Year Ending: Jul 2011
Report Run Date: 29/07/11 @ 11:39:27

Annual Profile of Electricity Consumption



Report Time Zone: (GMT) Gre

Bettys Lane

Since SmoothFlow Activation

	Yr 1	Yr 2
Nov	13306	8419
Dec	13096	6480
Jan	15995	7215
Feb	14683	5770
Mar	12347	4848
Apr	10357	4251
May	11847	4993
June	12594	4924
July	8702	4108
	112927	51008
	Saving	55%

Drive Innovation: Energy Saved, Efficiency improved

Variable Speed Drive Pumping – Soft pipe filling, Proven energy savings – Efficient Systems



Power and productivity
for a better world™

Eliminate pressure
peaks with
soft pipe filling

[Find out more >](#)



Protect pipelines from pressure build up with ABB drives' soft pipe filling

When starting a pump system, pressure surges can seriously damage the pipeline and pumps. ABB drives' soft pipe filling allows a pipeline to fill smoothly.

[For more details click here](#)

Contact

07000 DRIVES
(07000 374 837)

Send us an **email**
energy@gb.abb.com



Benefits of soft pipe filling

- A smooth build-up of flow increases the lifetime of the pipeline and pumping system.
- Prevents overpressure and reduces burst pipes and damaged seals during pump start.
- Avoids water hammer and helps to reduce leakage.



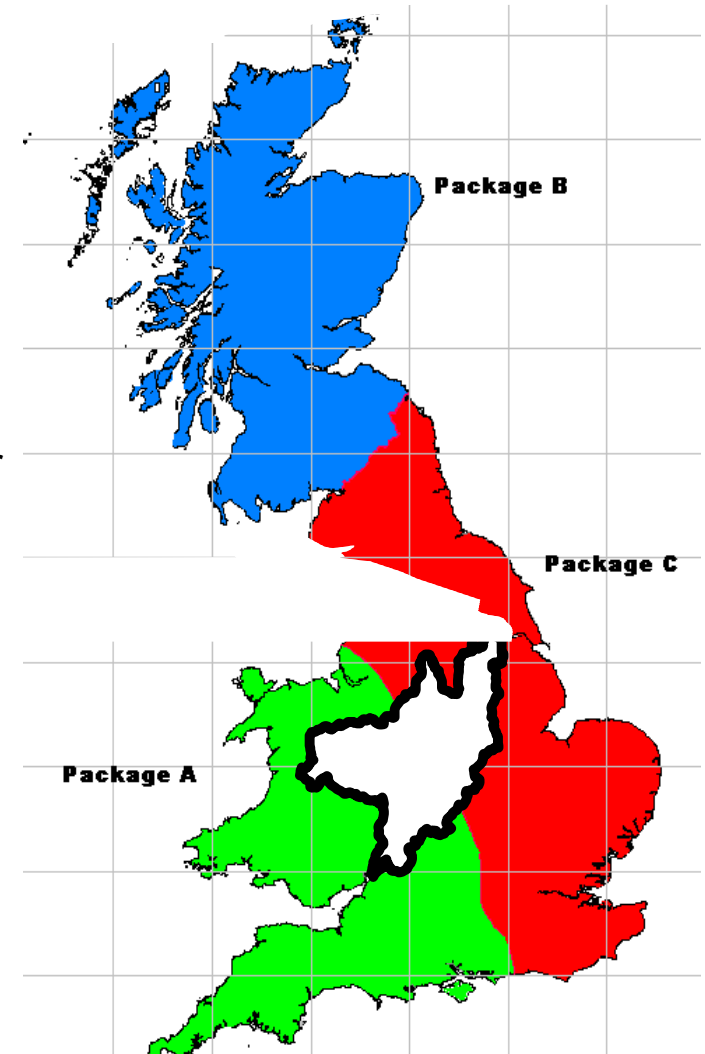
Contact us

Call **07000 DRIVES (07000 374 837)**

New technology convergence helps C2C cut leakage

Case study – C2C Services

- £1billion, 25 year project to manage water services on 1,500 MOD sites in England
- C2C Services, a joint venture between Severn Trent Services and Costain
- Strategic PFI Project designed to:
 - operate & maintain MOD water and wastewater assets
 - construct and finance asset upgrades
 - manage MOD's existing relationships with Statutory Water Undertakers
 - Access private sector expertise
- Why ABB AquaMaster flow meters?
 - C2C's income is demand based
 - Need to measure water consumption
 - Identify and reduce leakage costs



Typical C2C AquaMaster installation Meter & Transmitter installation

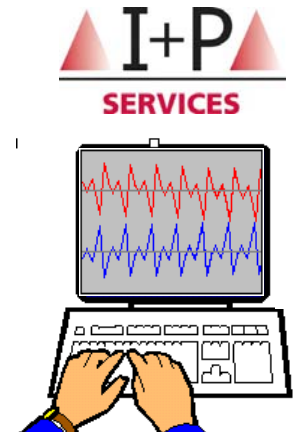


Flowmeter

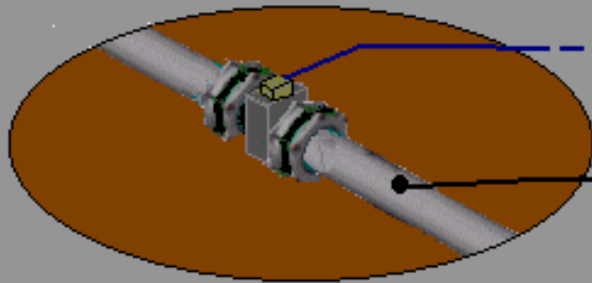
Marshalling kiosk with ABB
Logger, Transmitter and Aerial



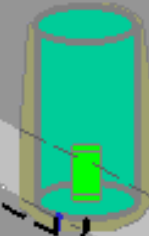
Mobile GSM
Network



PC with I&P
Autochart
Leakage
Software



Pressure tapping on large applications



C2C's metering & leakage reduction objectives and the installation

- Install **accurate equipment** to measure consumption
- Capture **robust data** and increase confidence
- Gather data enabling leakage to be minimised, commercially economic levels
- Reduced leakage
- Forms foundation for pro-active Site Utility Management
- **Prioritise “leak locate and fix” activity.**
- **The installation** :Over 1150 meters installed and commissioned to date, divided into
 - ‘Gross meters’ – monitor incoming water supply at each site and continuously validate Statutory Undertaker (SU) revenue meters used by local Water Companies for bills
 - ‘Night meters’ – used to monitor legitimate night use on non-household buildings

Typical ‘Gross’ Meter Installation



Before and after investment by C2C



Ensuring accurate measurement

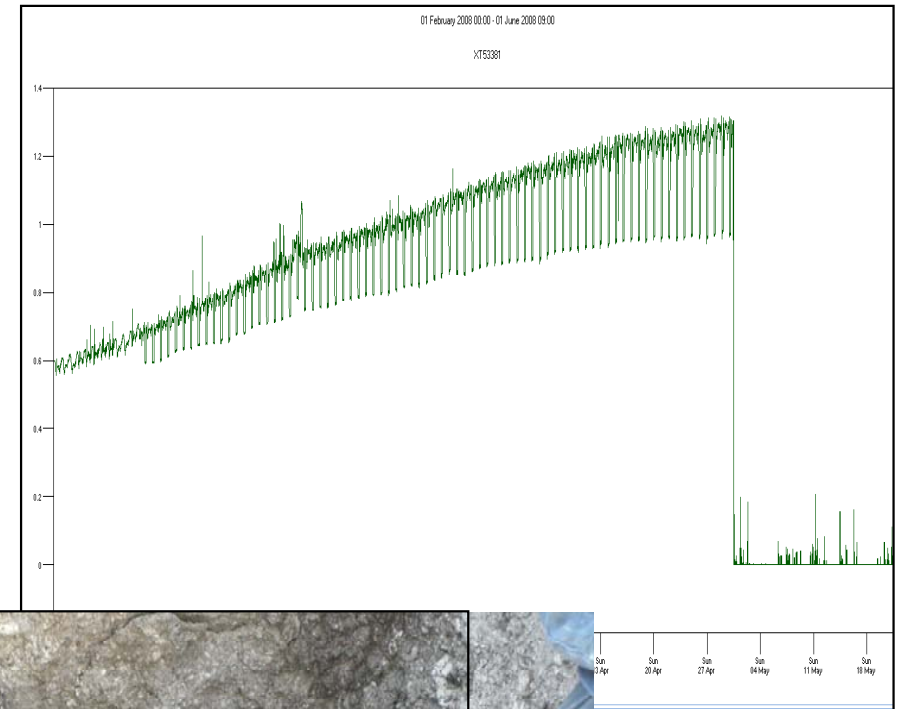
- Information from AquaMasters is one data set used by C2C to determine client consumption
- C2C monitors the water supply to an accuracy of 0.5% on larger sites
- Must also be able to verify that the meters provide continued accuracy
 - All AquaMaster meters electronically fingerprinted
 - CalMaster2 verification system used to detect any deviation from original factory electromagnetic performance and calibration
- Systems managed by C2C's Leakage Specialists and Field Technicians



C2C's leakage team uses live data to monitor water systems

Utilising the data

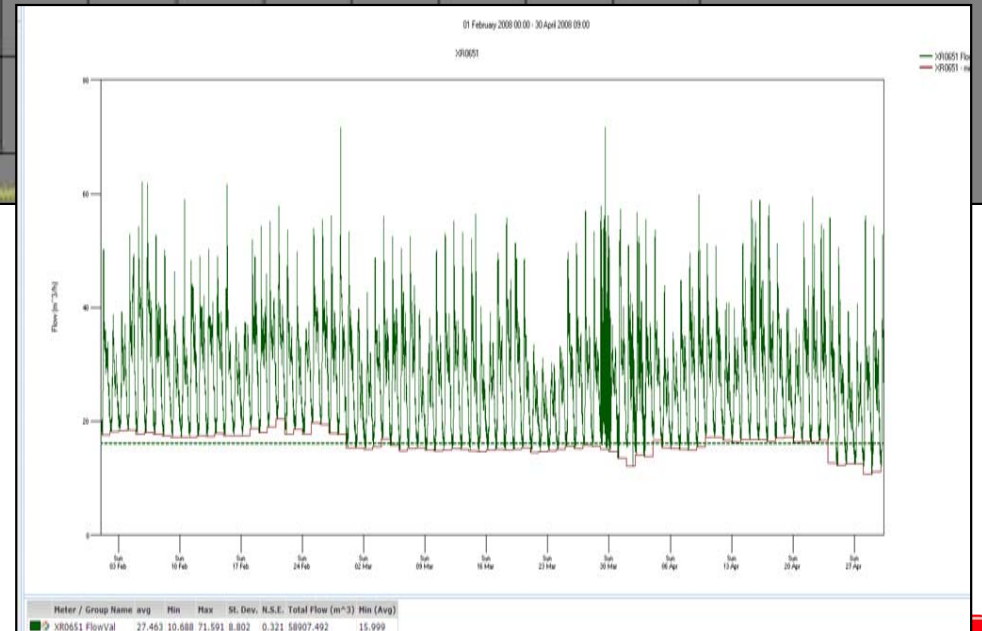
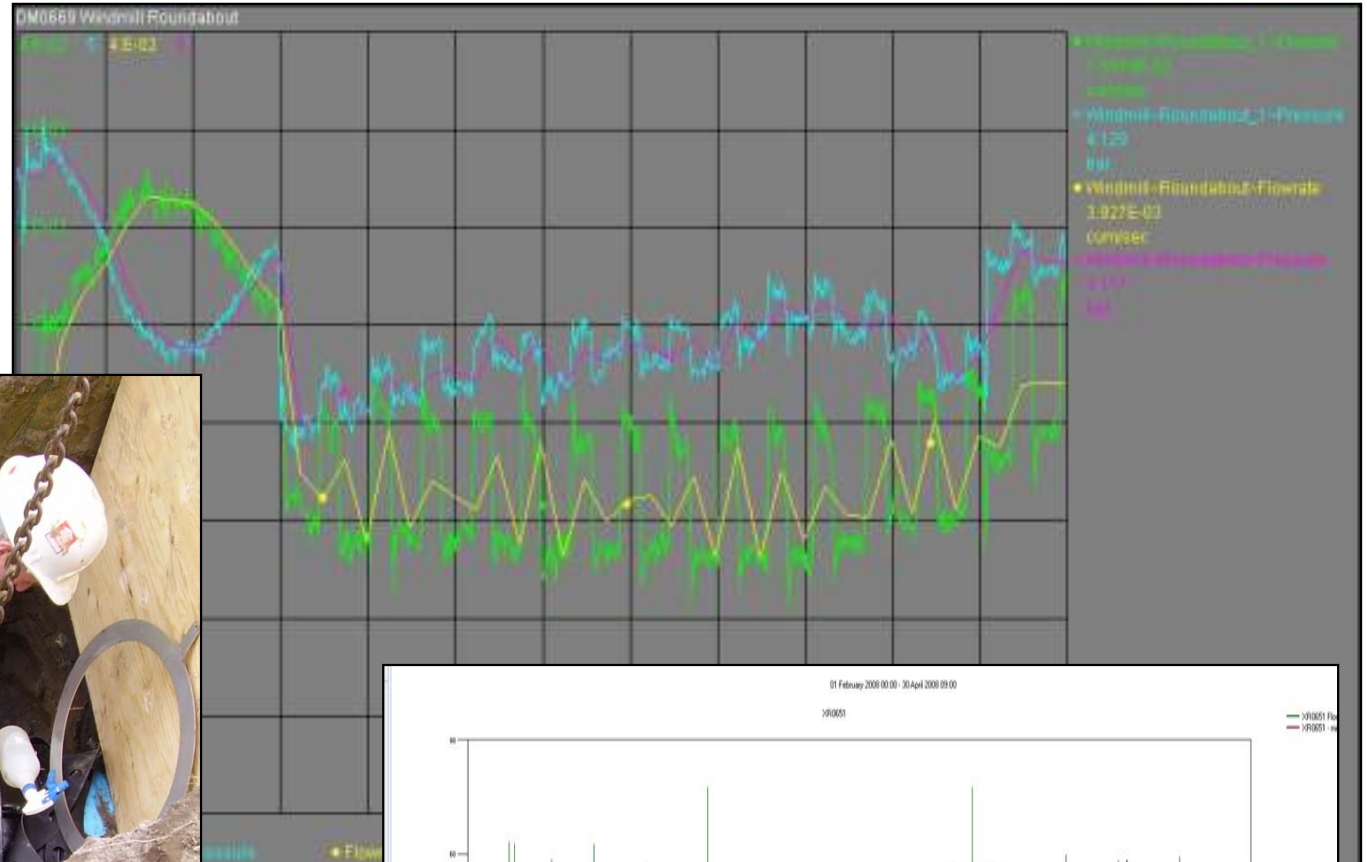
- Integral data logger logs meter readings every 15 minutes
- 1 minute intervals to confirm night use or leakage
- Daily readings uploaded to central server using text messages sent via built-in GSM facilities
- Data is interrogated by C2C using AutoChart software
- Leakage or demand variations investigated immediately by C2C
- Reduced response time for leak detection & repairs



***C2C monitoring
enables early repair
of non visible leakage***

Example – 15 min & 1 min logger data

**Line stopping for 400mm
ABB meter installation**



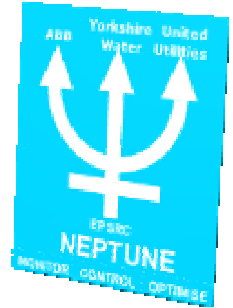
**Customised charts
enable rapid analysis**

Results to date

- Total water leakage reduced by over 35% to date (and C2C is targeting 50%)
- Leakage is now 60% less on some sites
- Lessons learnt:
 - Essential to have competent installation teams
 - Larger sites pressure management
- Business benefits:
 - Significant **cost savings** on water & wastewater costs
 - Measurement **accuracy compliance** with ABB meters
 - **Confidence** in flow data used for analysis
 - Proactive and **immediate identification** of leakage
 - Optimal **efficiency** of repair and maintenance operations

Project NEPTUNE Overview

Integrated Solutions for Water Supply Operation



What is NEPTUNE?

R & D Project

- NEPTUNE sets out to advance knowledge and understanding about water supply systems in order to develop novel, robust, practical techniques and tools to optimise efficiency and customer service
- 3-year R&D project run in consortium with 2 leading UK water utilities and 7 UK universities
- **Project duration: 04/2007 – 03/2010**
- Pilot customer installation and comprehensive testing to validate results

University Partners



Methodology and
fundamental research

System Provider



Systems and
technology

Water Utilities



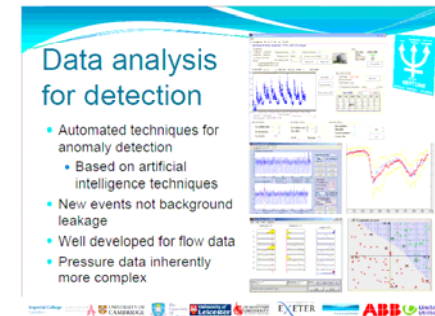
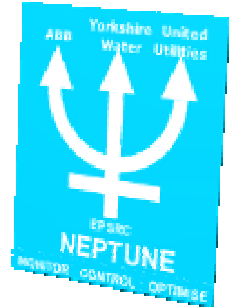
Application and
business processes

NEPTUNE

Objectives

To Develop:

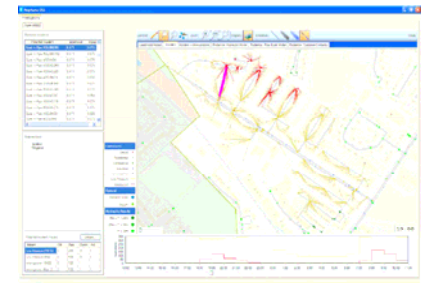
- Pragmatic, robust and novel methods and technologies to understand **system performance in real time**.
- Novel approach and practical tools for pressure management in order to improve **customer service, efficiency and sustainability** of water distribution systems and to test innovative technology in which pressure management will be linked with **energy consumption** and leakage reduction.
- Integrated, **risk-based decision support system** for evaluation of intervention strategies (both tactical and strategic) to inform decision making for **sustainable water system operation**.
- Increase operator awareness, understanding and knowledge of system performance to **enhance efficiency** and effectiveness of operation and service delivery.
- Knowledge, capabilities and tools to integrate system operation and enable intervention in system operation in **real time** to maintain and **enhance performance**.
- The implementation and validation of prototype outputs from the above in conjunction with on-going business processes **utilising and developing innovative ideas**.



Combined energy and pressure management WP2.5

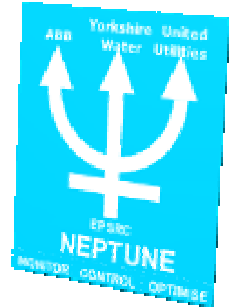
UU case study:

- 3537 nodes, 3258 pipes, 5 reservoirs, 12 tanks, 19 pumps in 11 PS, ~800 l/s (45 DMA, 15 exports)



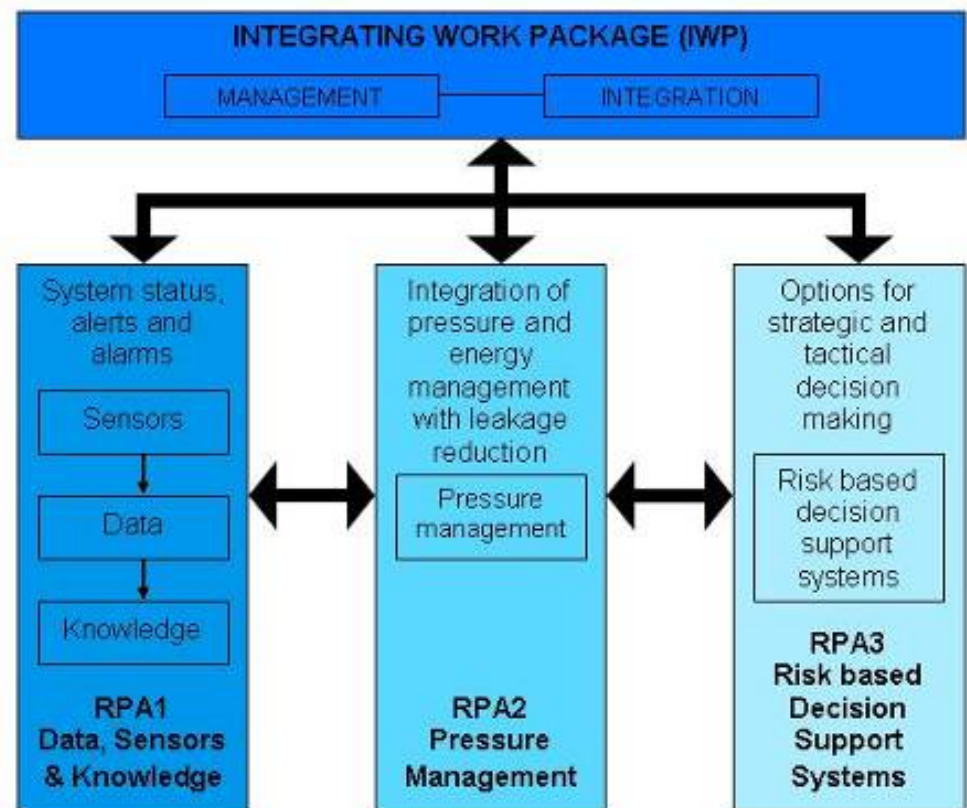
NEPTUNE

The approach



The project was 3 structured Research Priority Areas:

- RPA1: Data, Sensors, Knowledge
- RPA2: Pressure Management
- RPA3: Risk-Based DSS



Summary: The role of Smart Networks and flow metering technology - guaranteeing UK's future water supplies

- Water Stress in UK, Flow meters and DMAs - one part of **Active** Leakage Management Strategy
- Technology Advances offering the best solutions for detecting and targeting leakage repair teams
- Correct meter selection improves data confidence and can be verified
- Effective network management relies on accurate flow data
- Smart and efficient Water Networks utilise drive technology to smooth out surges, save energy and prevent bursts.
- Technology convergence now means “Pipeline to Online” providing more accurate picture of night lines and leaks spotted quickly : Step towards Smart Networks
- C2C cut leakage by 35% across MoD sites utilising flow meters. Proven installations, working well, meeting business needs
- Overview Neptune R&D Case Study example - working together
- The technology is here, with effective use of data available and **Smart Networks** we can assure our water supplies for future generations.

Power and productivity
for a better world™

