

Asset and Operations Real Time Analytics (AORTA) Project



Presented by **Thames Water and Wipro**

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SEMINAR 2012
E M E A
The **Power** of **Data**



Agenda

- About Thames Water
- Business challenge
- Legacy system landscape
- AORTA solution
- PI Tools used
- Screen shots
- How PI helped
- Future plans for PI
- Questions

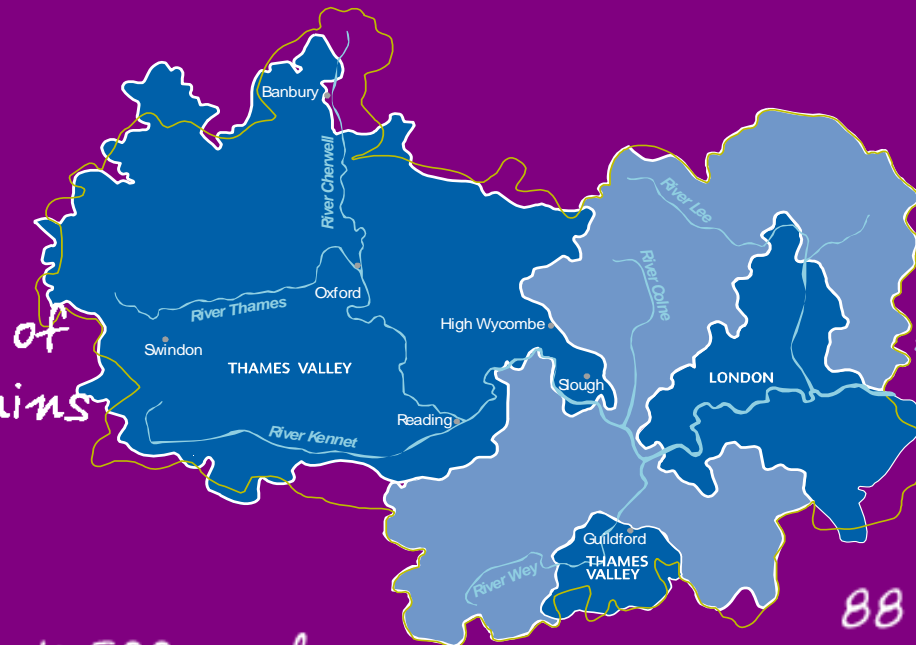
About Thames Water



14 million customers

68,000Km of
sewers

31,400Km of
water mains



4,500 employees
15,000 contractors

88 water treatment works &
350 sewage treatment works

UK's largest water and sewerage company

About Thames Water – contd...



- We serve one quarter of all customers in England
- The country's capital city is at the heart of our supply area
- £5 billion capital programme (largest in country)
- Biggest scarcity of water, with the highest population density
- Major, innovative and challenging engineering projects

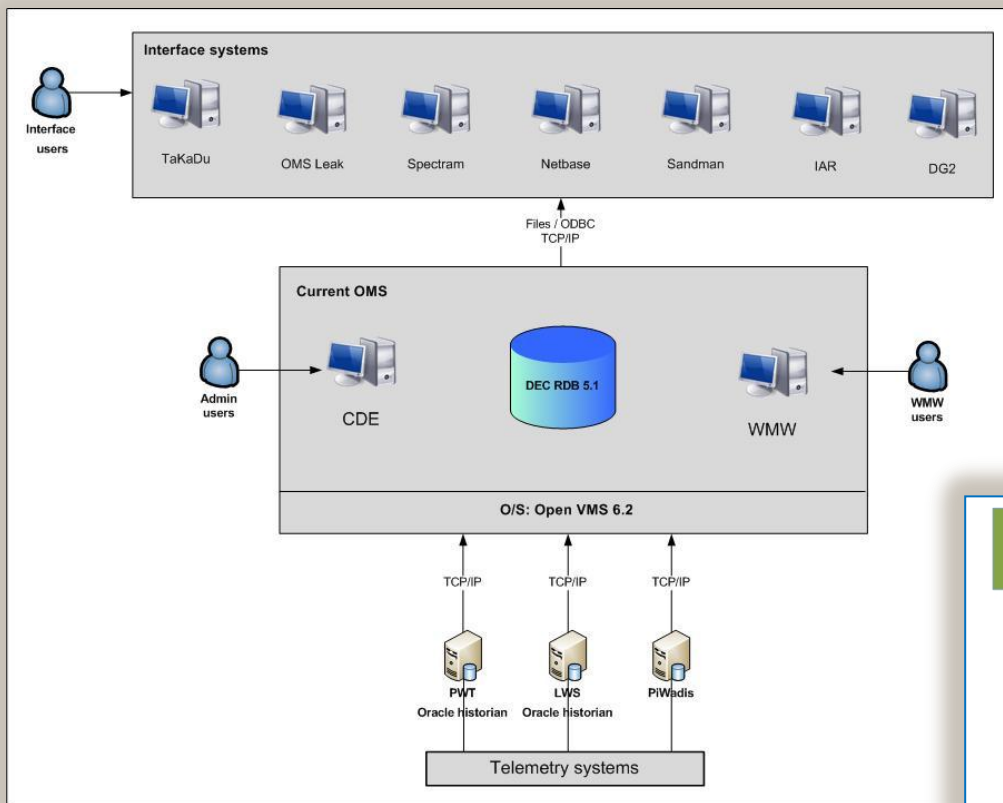


Business challenge



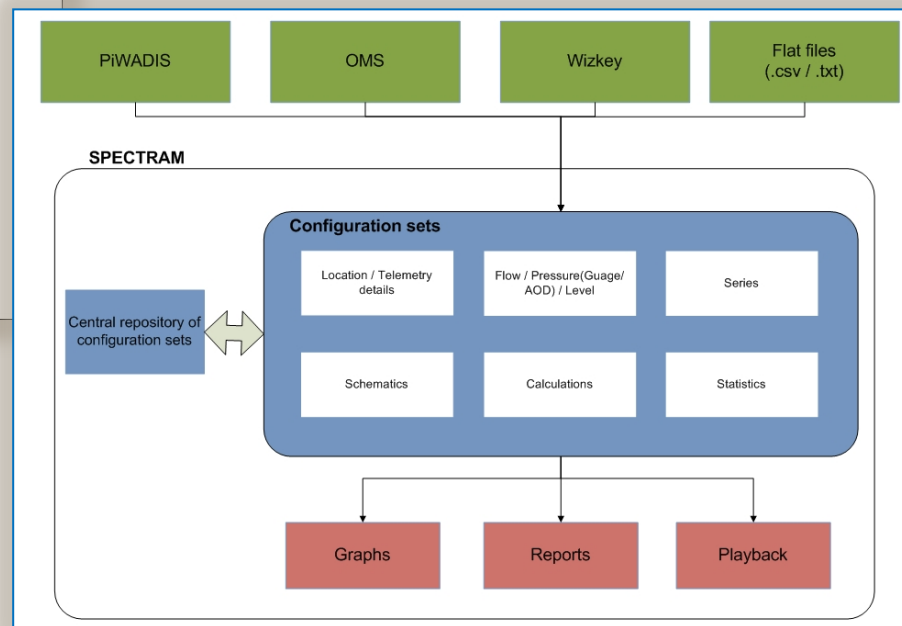
- Operational Management System (OMS) was a 20 year old legacy application used in Thames Water to hold flow, pressure, turbidity and reservoir levels information collected from Thames Water's clean water network
- Interface application systems collected data from OMS to produce business-critical regulatory reports
- OMS was at the peak of the operating limits and was unsupported by the vendors which posed a high risk to the business for regulatory reporting
- As OMS was not scalable there were other interface systems getting the data from OMS for slow sand bed filters(Sandman), leakage reporting (OMS Leak, Netbase and Takadu) that were built around OMS
- OMS could hold only up to 40 days online data due to the infrastructure limitations.

Legacy system landscape



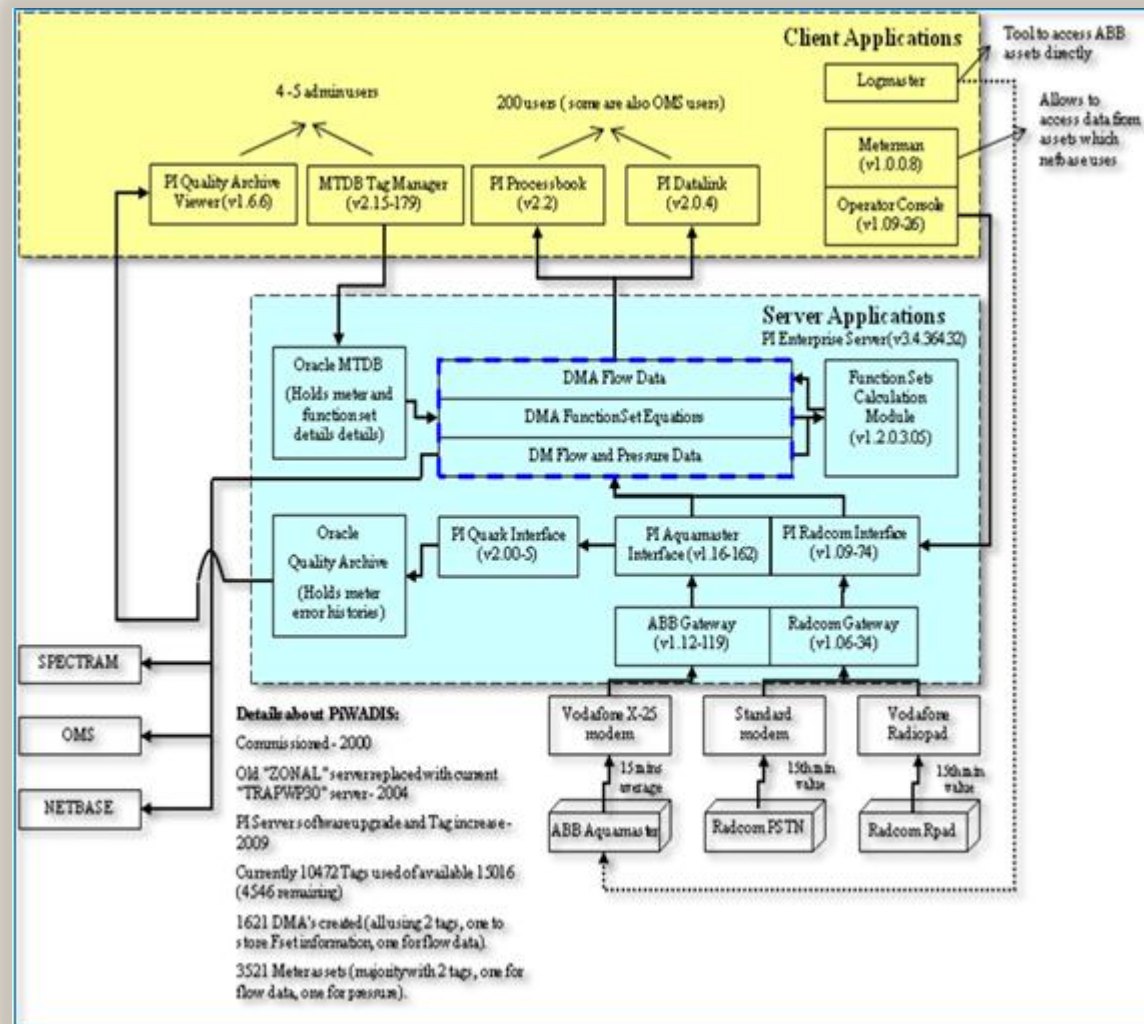
← OMS

Spectram →



Legacy system landscape contd..

PiWadis



AORTA solution



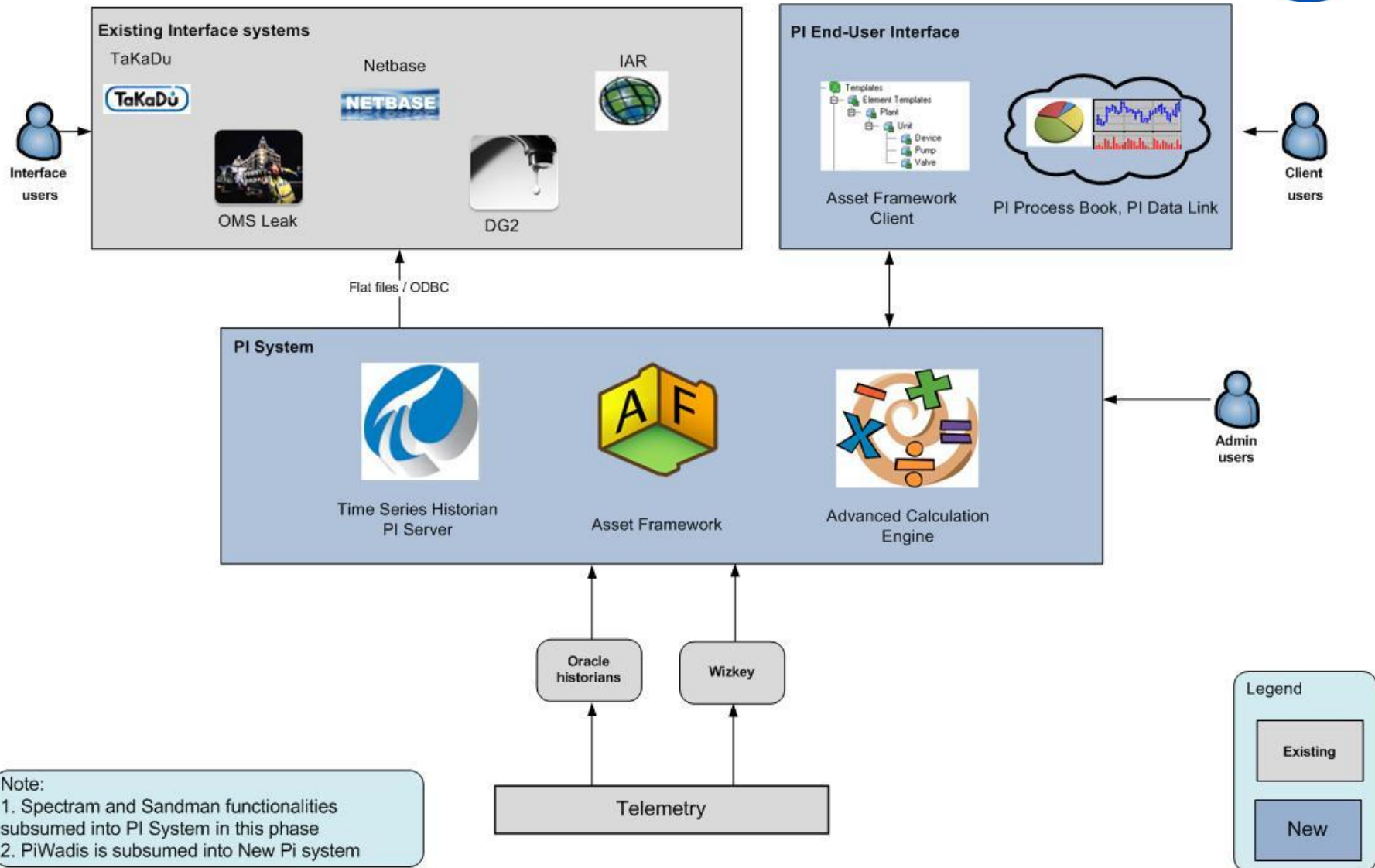
- Wipro, the IS partner for Thames water carried out detailed analysis of the systems and the market study to replace OMS and its surrounding interface systems
- OSI PI was selected as a replacement product for OMS and its legacy interface functionality
- Thames Water district meter data was stored in an old PI System called PiWadis. The project provided an opportunity to migrate the PI functionality to PI2010
- The 20 years data from OMS was migrated to PI 2010 with thorough validations and data checks
- The regional SCADA data is currently stored in Oracle database. The project has migrated 7 years time series data and enabled the live data collection from the Oracle SCADA historians

AORTA Solution – contd..



- About 120 K tags have been validated and incorporated into PI archive for regular monitoring
- Close to 500 schematics representing the areas have been re-validated, merged and implemented in PI 2010
- 3500+ daily calculations for leakage, regulatory, demands, flows have been incorporated in PI
- The slow Sandbed filtration process was implemented with PI tools
- Tools have been built for network analysis and optimisation
- Required training provided to teams using new PI application

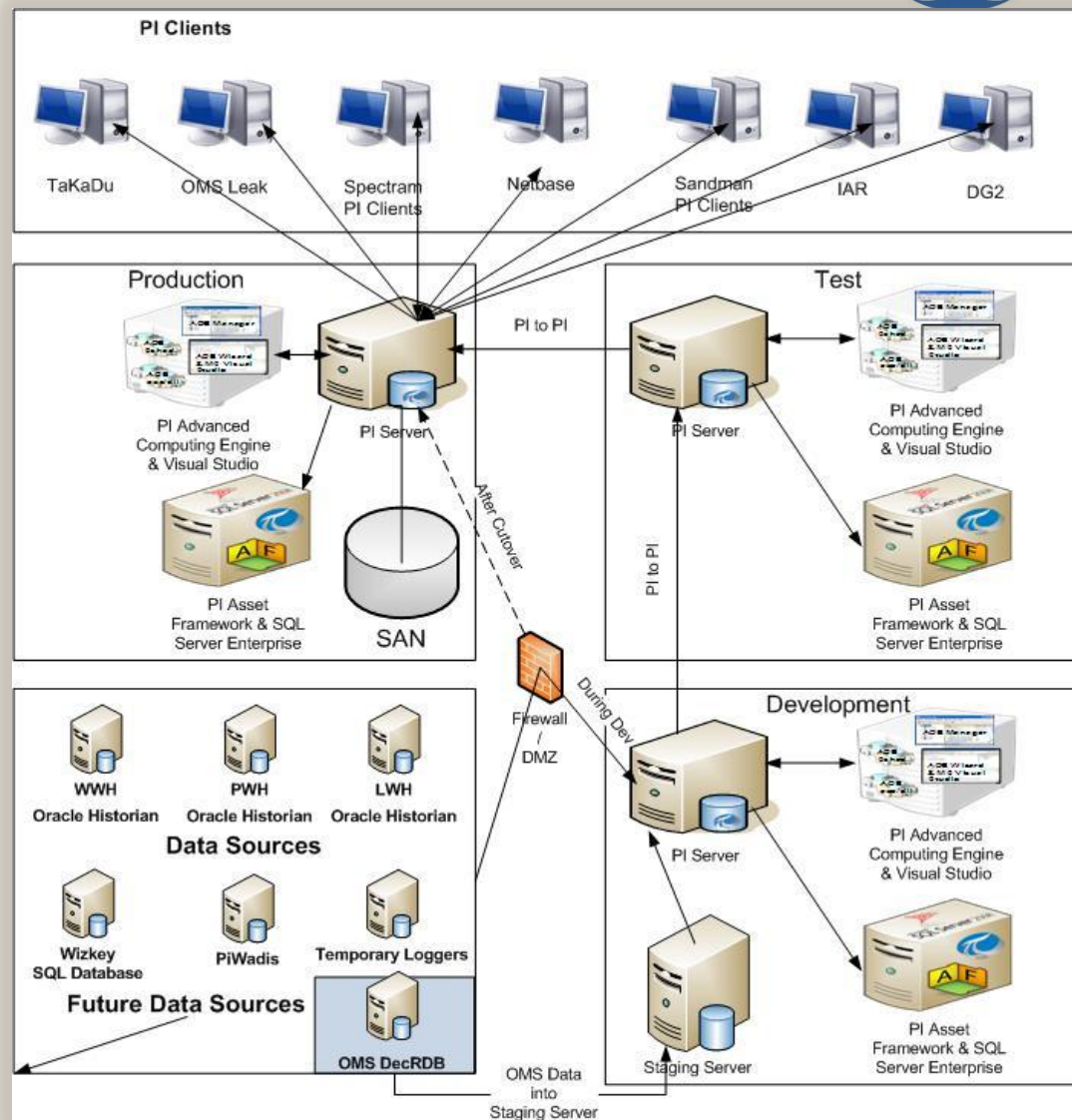
AORTA - Solution contd..



AORTA technical architecture



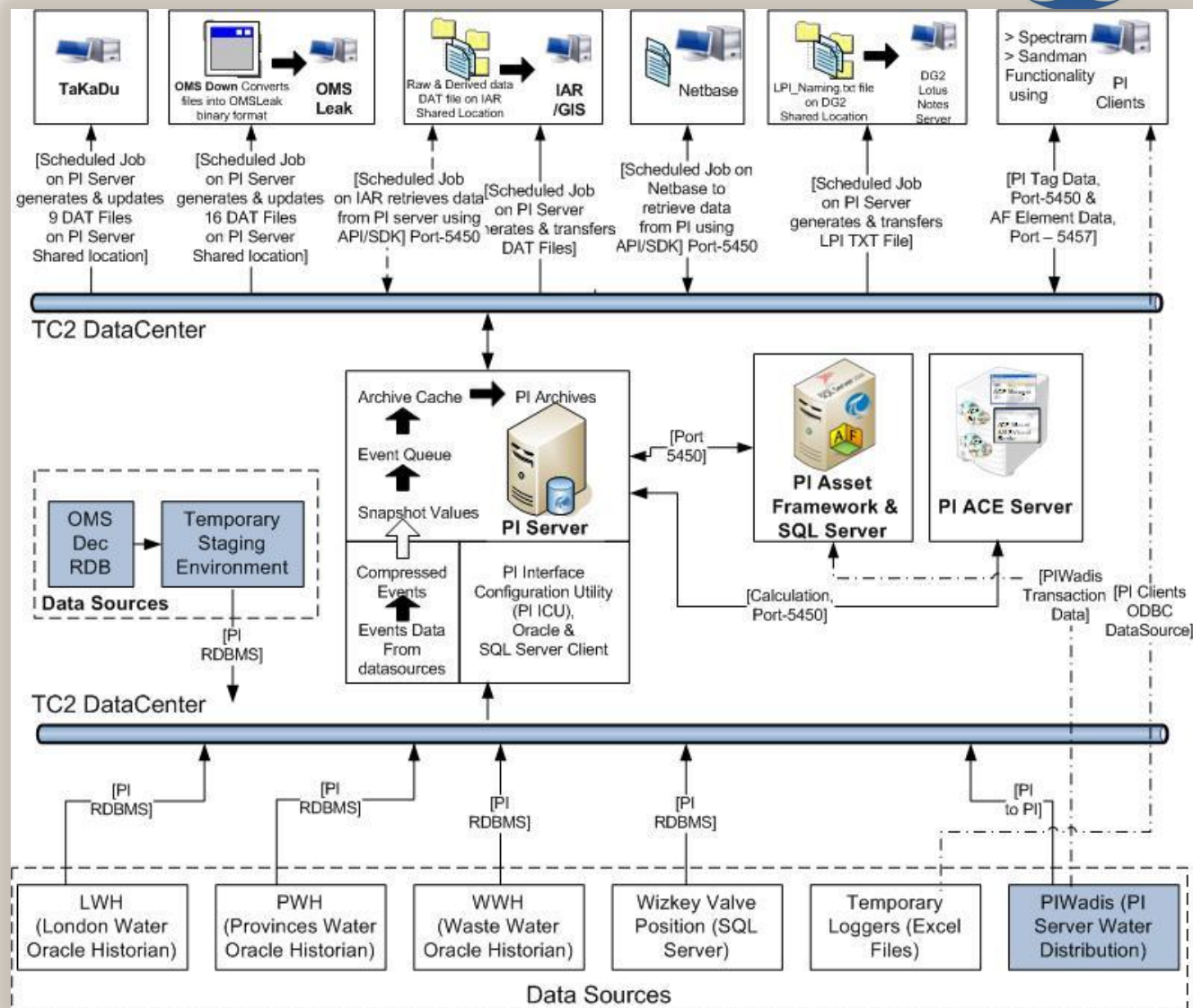
- Logical separation of business rules data presentation
- Data collection from discrete data sources
- Data storage and compression
- Common user interface
- Enterprise Connectivity and single version of truth



AORTA Data Flows



- Near real-time data for online users
- DG2 low pressure updates
- Daily demands
- Flow and pressures
- Derived reservoir flows



PI Tools used



- PI Asset Framework : configured about 10,000+ assets
- PI Server : Data historian
- PI ProcessBook : For schematic displays and trending, legacy functionality from OMS, Sandman, PIWADIS and Spectram
- PI DataLink : For the data retrieval and updates by administrators
- PI ACE (Advanced Computing Engine) : For reservoir calculations
- PI SDK, API and OLE DB : For the migration of legacy and interface functionality into PI
- PI RDBMS & PI to PI: To collect SCADA data from legacy historians
- PI SMT tools : For the administration

Screen shots - Administration



Before



After

Organisational Area Maintenance

Area Code: **AYLESB** Area Name: **AYLESBURY** Edit Name: ☐ Area Type: **CAR** Area Type Name: **CONTROL AREA**

☒ Short List Flag Sequence Number: **1** ☐ Area Prediction

1 **DESCRIPTION**

2 **WDP Decl status**

3 **Pred op decl status**

Area details

Area Maintenance / [Link to Area](#) / [Link to Item](#) / [Link to MMT Series](#) / [Unavailability](#) / [Unmetered Infusion](#)

AORTA - PI System Explorer

File Edit View Go Tools Help

Database Query Date Back Check In New Element New Attributes Search

Elements

- Elements
 - AREA
 - LEAKAGE
 - OMS
 - CENTRAL NORTH
 - Bar/Su
 - ZBARHT
 - 14N STANDISH RD-ZN
 - FLOW1
 - ADD
 - Address: 14n Standish RdZBA
 - ADD: 0m
 - Description: 14n Standish RdZBA
 - Grid Ref Easting Coo: 0
 - Grid Ref Northing Coo: 0
 - Item No: 20152
 - ITM_PNT_DSC: 0
 - Max backward flow: 0
 - Max forward flow: 0
 - Max pressure: 0
 - Min pressure: 0
 - MMT Serial No: 75212
 - Size of main: 0
 - Tagname: 1.8973668813705444
 - Value: 0
 - Water carried: 0

General Child Elements Attributes Ports Version

Name: ADD Group by: Category

Description: Above Ordnance Datum

Configuration Item: ☐

Categories:

Default UOM: meter

Value Type: Double

Value: 0m

Data Reference: <None>

Settings...

Simpler and visual creation of Asset hierarchy

Bulk configuration of Assets

As is OMS to PI OMS comparison.xlsx - Micro

Home Insert Page Layout Formulas Data Review View Developer Add-Ins PI AF Builder

Current AF Connection: System: OMSW06 Database: AORTA

Connection:

	A	B	C	D	E	F	G	H	I	J	K
1											
2											
3											
4											
5											
6											

Screen shots - Administration



Before

AORTA

After

The image shows two overlapping windows from the AORTA software. The top window is 'Calculation Maintenance' with fields for Calculation Id, MMT Series, Calculation Function Type, MMT Type, Period Type, and Statistic Type. The bottom window is 'Signal Maintenance' with fields for OMS Signal Name, Edit Name, MMT Series, MMT Type, Signal Description, Signal List (set to 'LWS - RTAP Analogue sgl'), Signal Source (with radio buttons for London SCADA, Provinces SCADA, RADCOM, and PI WADIS), Record Type (set to 'ANALOGUE'), Log. Freq. (set to '15'), Data Type, Units (set to 'Unassigned'), Signal Name (set to 'ASHFORD:Test Outstation - 1.Analogue PNT0000005'), and Critical Pressure Point fields. It also has buttons for Update, Insert, Change, Delete, and Close.

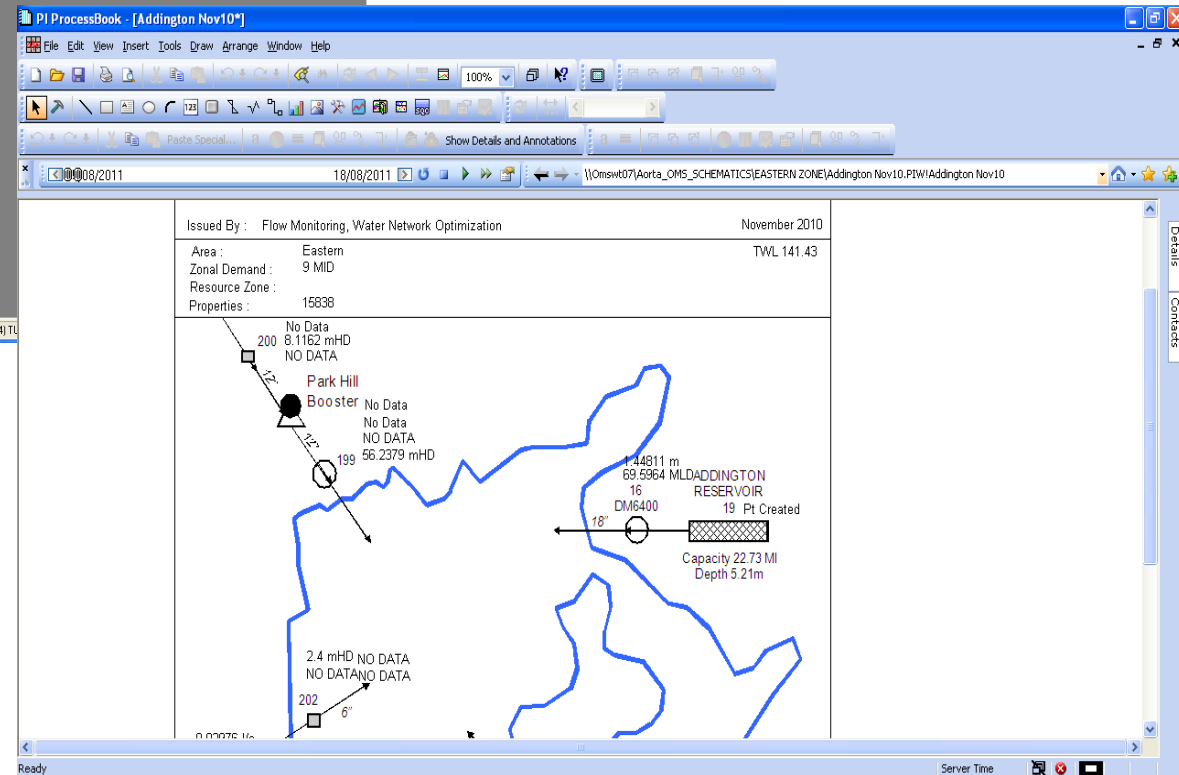
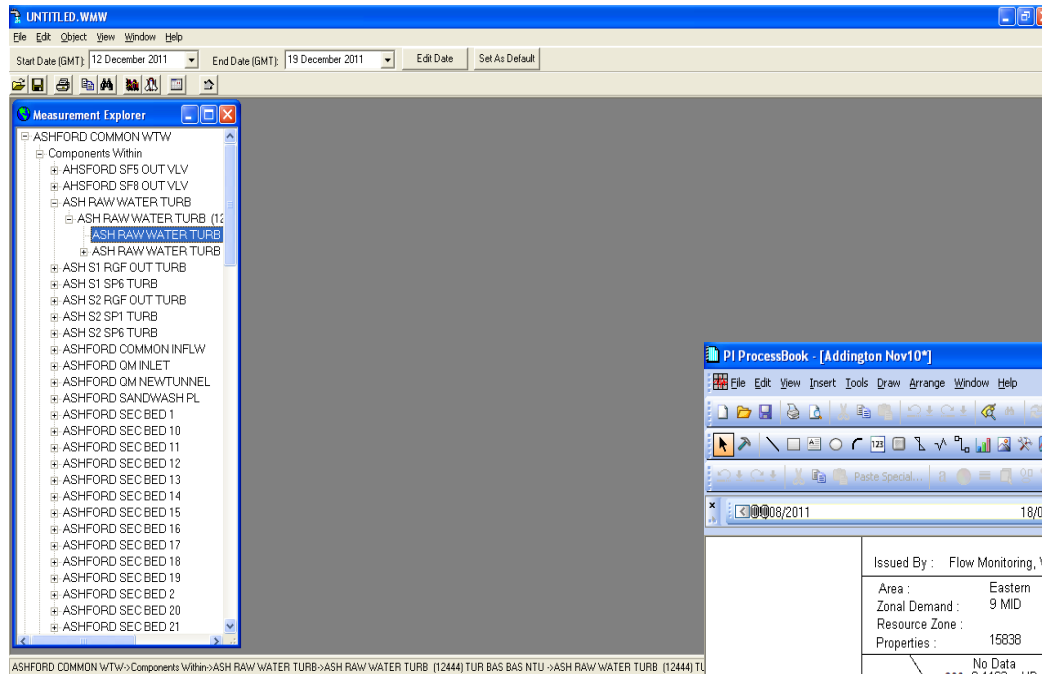
Sophisticated GUI for
creation of signals and
calculations

Bulk configuration of
Signals/Calculations

The image shows two overlapping windows. The top window is 'PI-SMT - Point Builder - PI System Management Tools' with a table of data. The bottom window is 'Microsoft Excel' with a menu open showing options like 'Import Tags...', 'Export Tags...', 'View Log Messages...', etc.

Server	Point	Point Source	Point Type	Point Class	Descriptor	Point Security
DMSWT05	SOM_10007_FLOW_R	AORTA_RDB_701-1063	Float64	classic	MMT-5552 OMS:10007 LWSANA River:Level	piadmin: Aft(w) piadmin: Aft(w) PIWorld

Screen shots - GUI



Ability to display the data in schematics views representing real life entities

Easy to use User interface

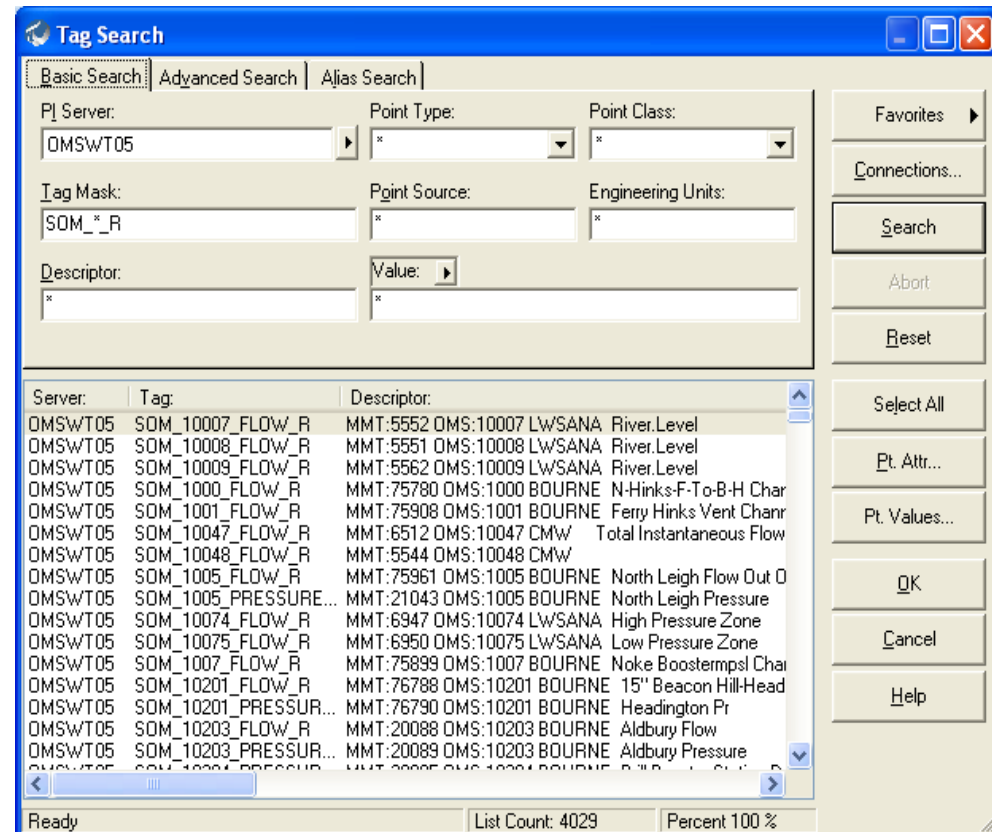
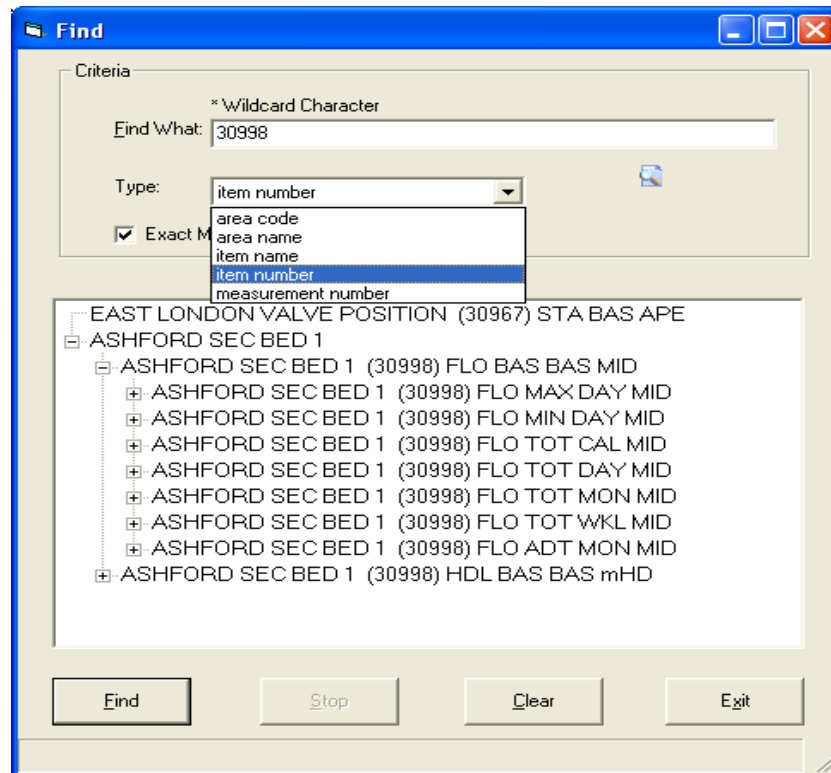
Screen shots - GUI



Before



After



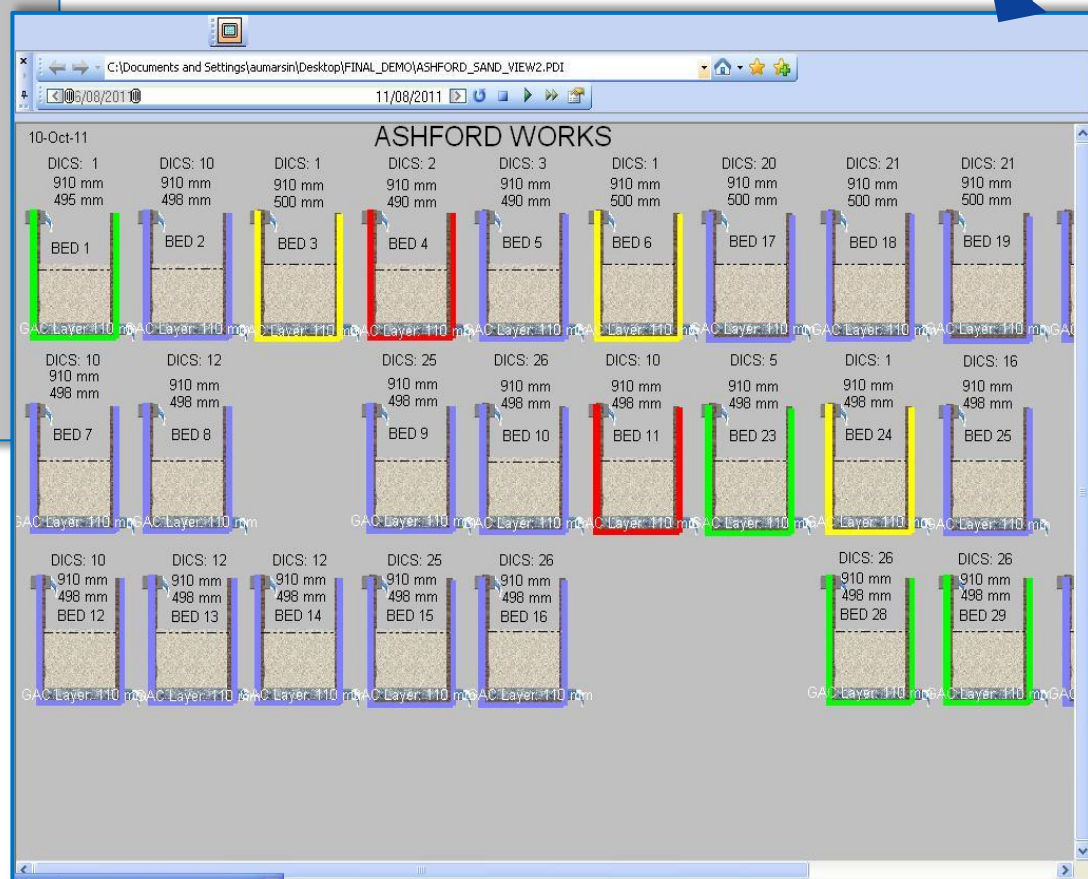
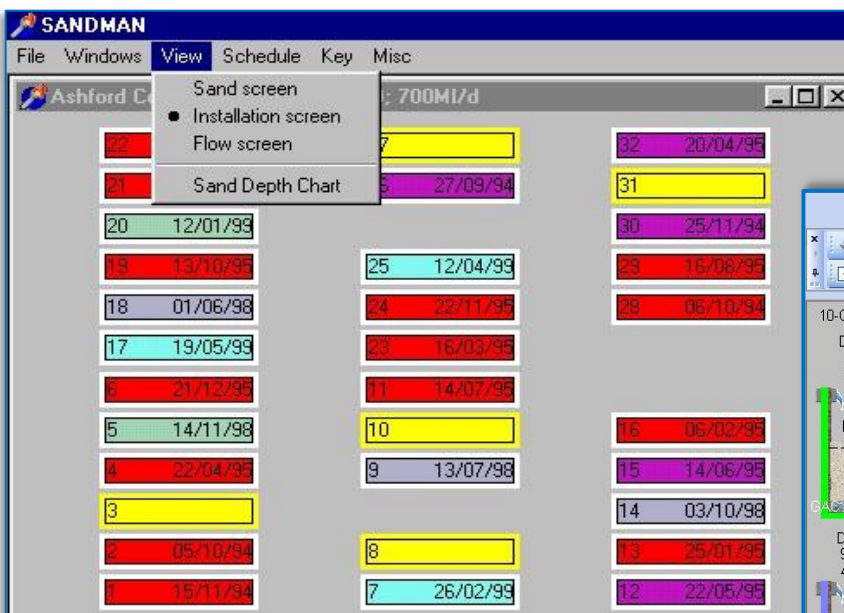
More search options
including the wild card
search

Screen shots - GUI

Before

AORTA

After



Clearer, easy to understand graphic representation

Various states of the works beds are visible in a Single View

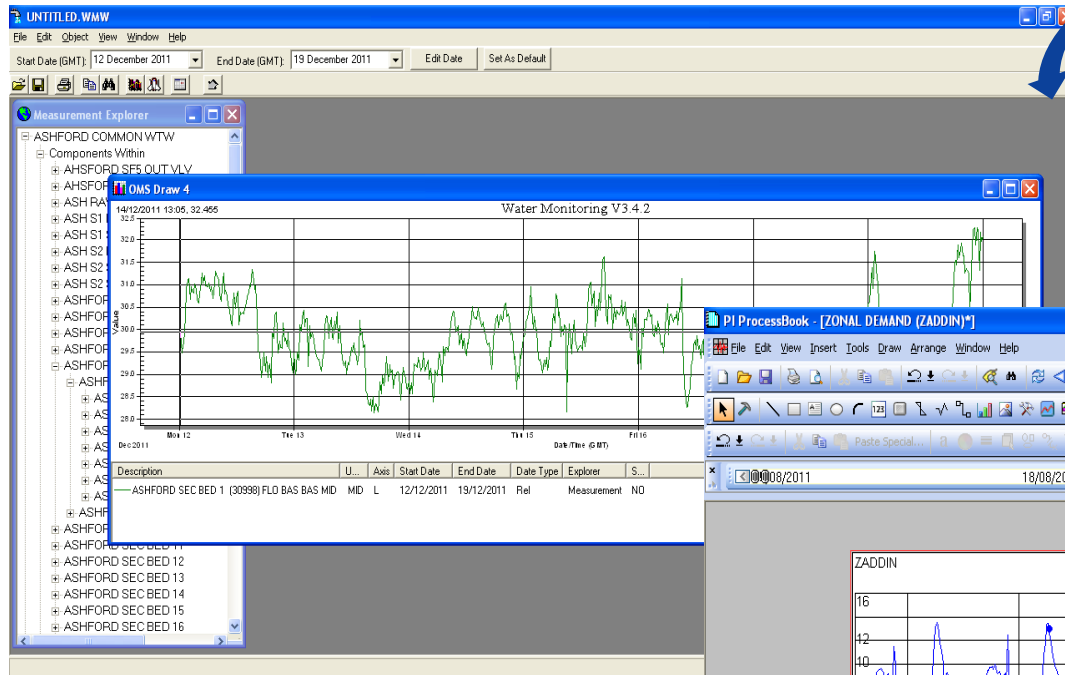
Screen shots - trends



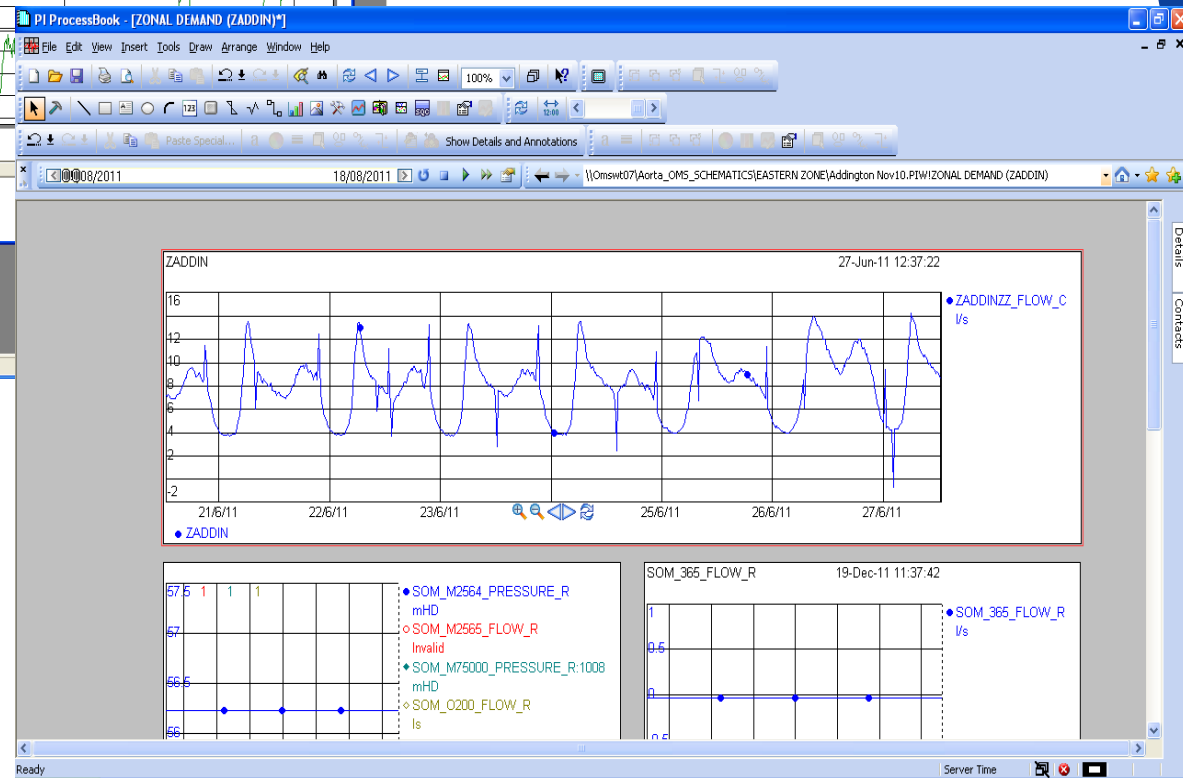
Before

AORTA

After



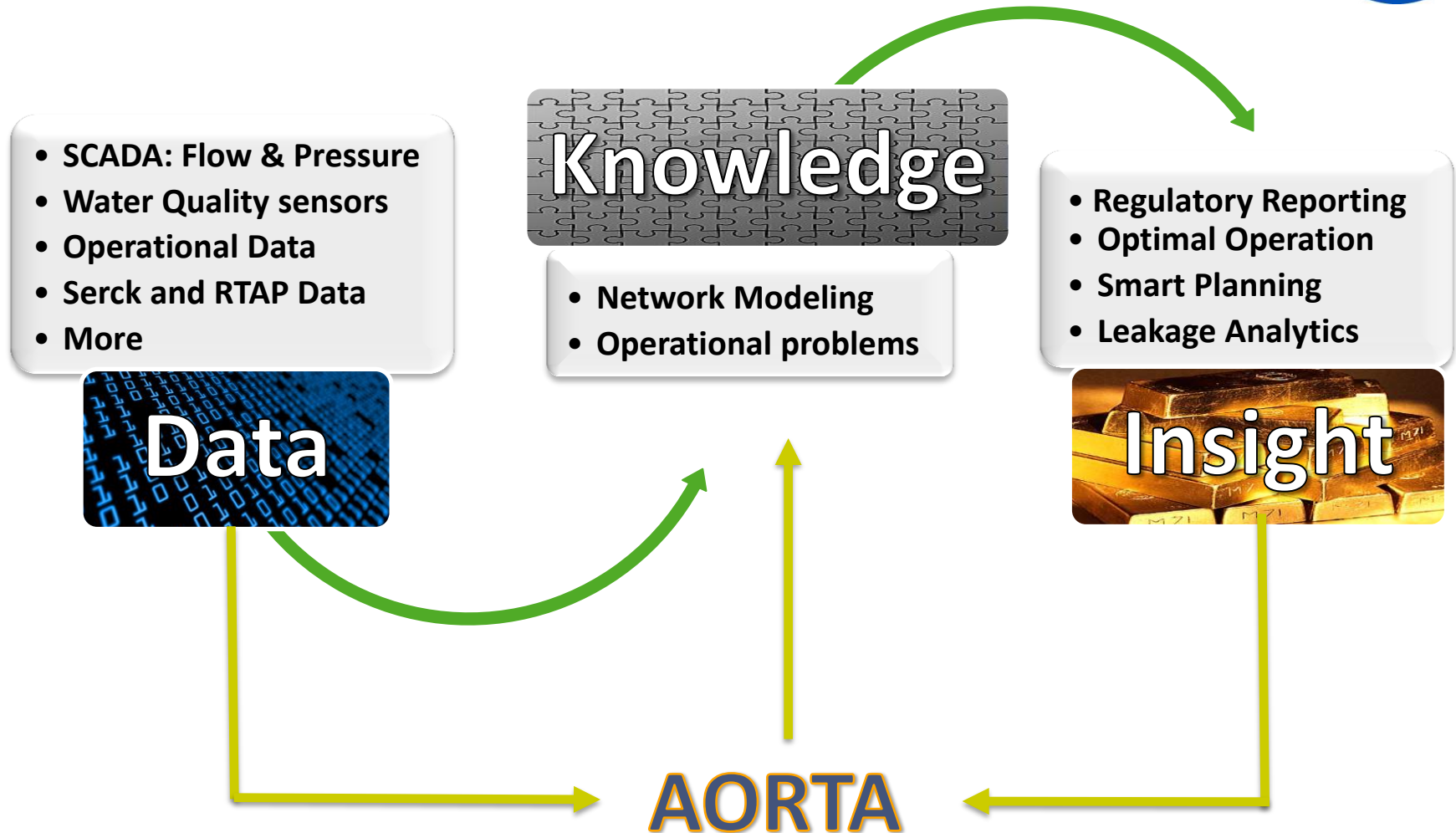
Advanced trends with
more features



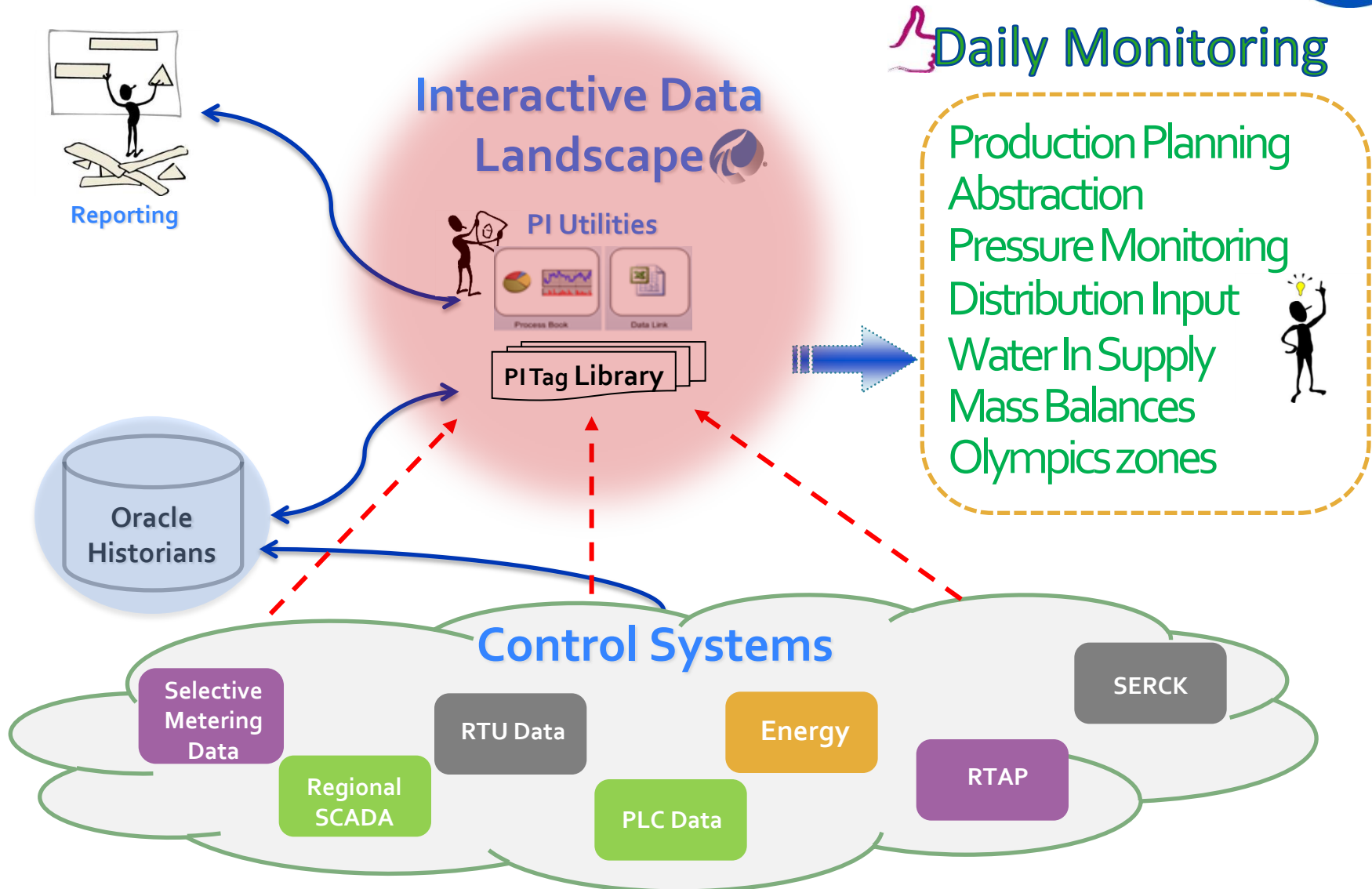
How PI helped

- Risk avoidance from aging systems
- Single version of truth
- Faster and more reliable applications
- Daily demand flows
- Ease of access to data for user specific analysis
- Reservoir calculations
- Simplified administration
- Same home for regional and district meter data
- Olympics Village schematics

Future plans for PI



Future plans for PI – contd...



Future plans for PI – contd...



- PI Applications for maintenance of filter beds
- KPI Analysis and weekly reporting
- Integration with Energy Monitoring
- SCADA and business integration
- Event monitoring
- Leakage Reporting
- Production Planning



THANK YOU

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