Water Corporation's Journey from Application to Infrastructure

Presented by **Ian Scott**

Water Corporation of Western Australia

Agenda

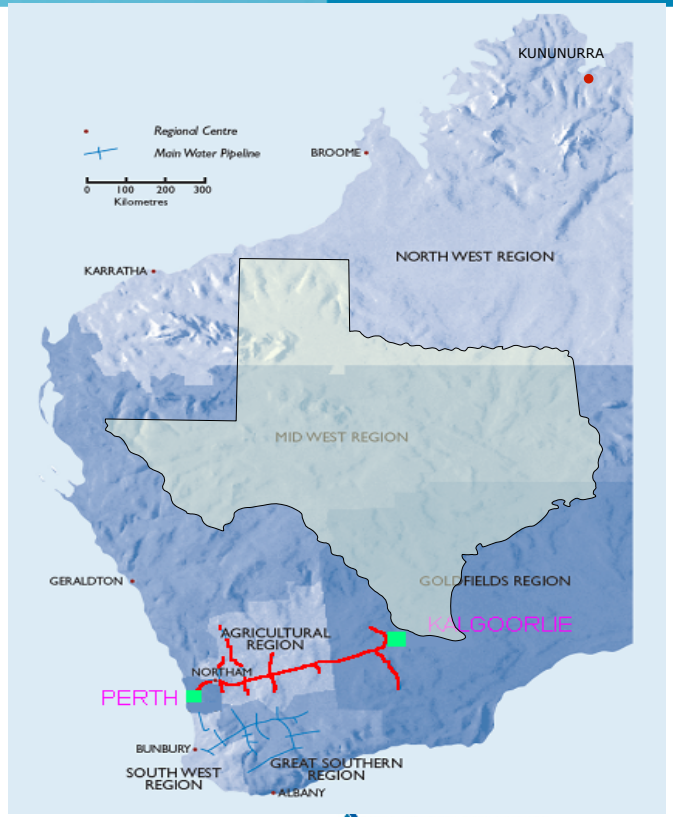
- About the Water Corp
- Strategic Challenges
- Modular solutions
  - Dashboards
  - Alert Monitoring (Cockburn Sound)
  - IT Monitoring
  - Data Quality Manager (AANT)
  - Drinking Water Compliance Tracking (CCP)
  - System Capability Forecasting
  - Automatic Meter Reading
- The Next Challenge

Water Corporation at a glance

- One of the Australia's largest water service providers

- State-wide responsibility
- Area of over 2.5 million km2
- World's largest water supply area
- +$25 Billion Asset Base
- Serves population of 2.4 million
- More than 2,000 employees
- Annual revenue >$1.5 Billion
- Capital program - +$900M /yr.
- Water to 300 cities and towns
- Wastewater to 100 cities and towns

- Western Australia is almost 4 times larger than Texas
- Texas has over 10 times the population
- It is almost as far from Perth to Kununurra as it is from San Francisco to Dallas



Strategic challenges

- Drying Climate
    - Impact on water resources (Reducing stream flows and groundwater levels)
- Population Growth
- Booming Economy
    - Significant capital program
    - Difficulty in accessing skilled staff
    - Increasing costs
- Increasing Customer and Stakeholder Expectations
- Increasing Regulator Requirements

Dashboards

What do you do when you have >600 assets to check each day?






WATER CORPORATION

Business Challenge

- SCADA shows current activities on the site.
- Poor at identifying if the asset is meeting design specs.
- Difficult to focus on problem sites.

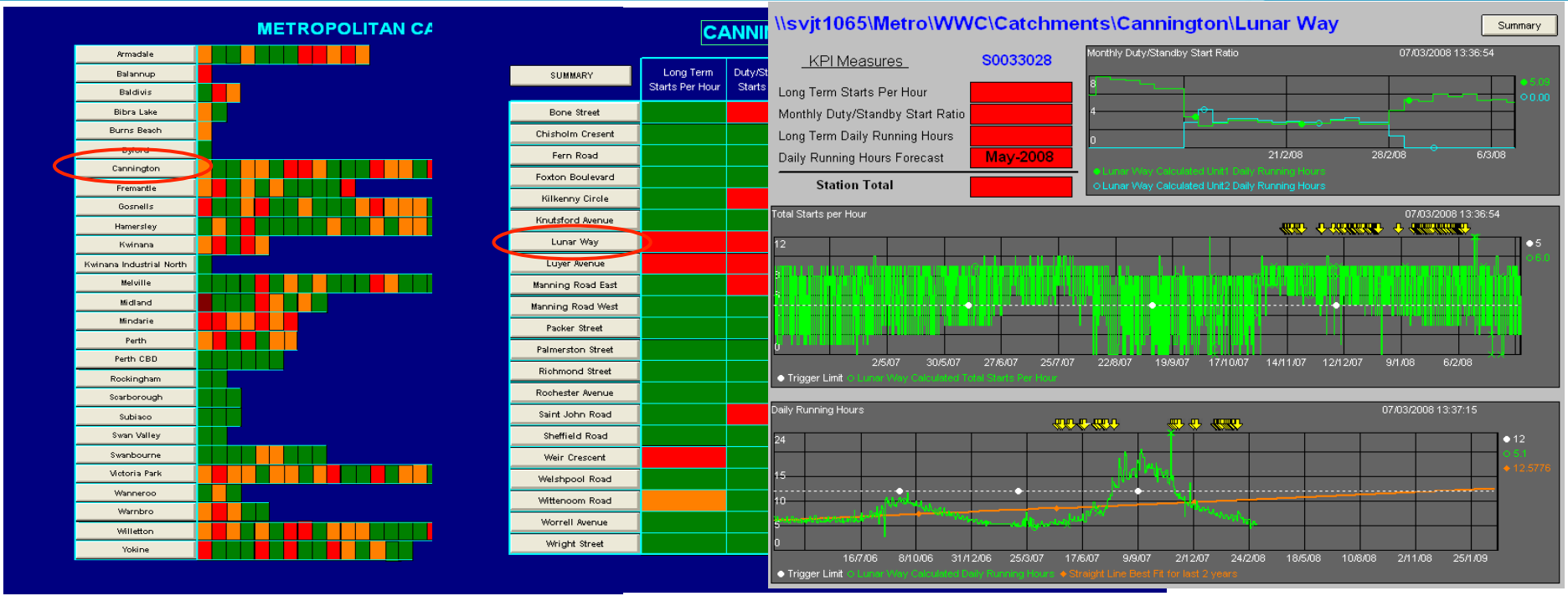
Solution

- Build a repeatable and scalable solution in PI ACE for each site
- Develop roll up logic to group sites
- Develop ProcessBook dashboard display for easy access

Results and Benefits

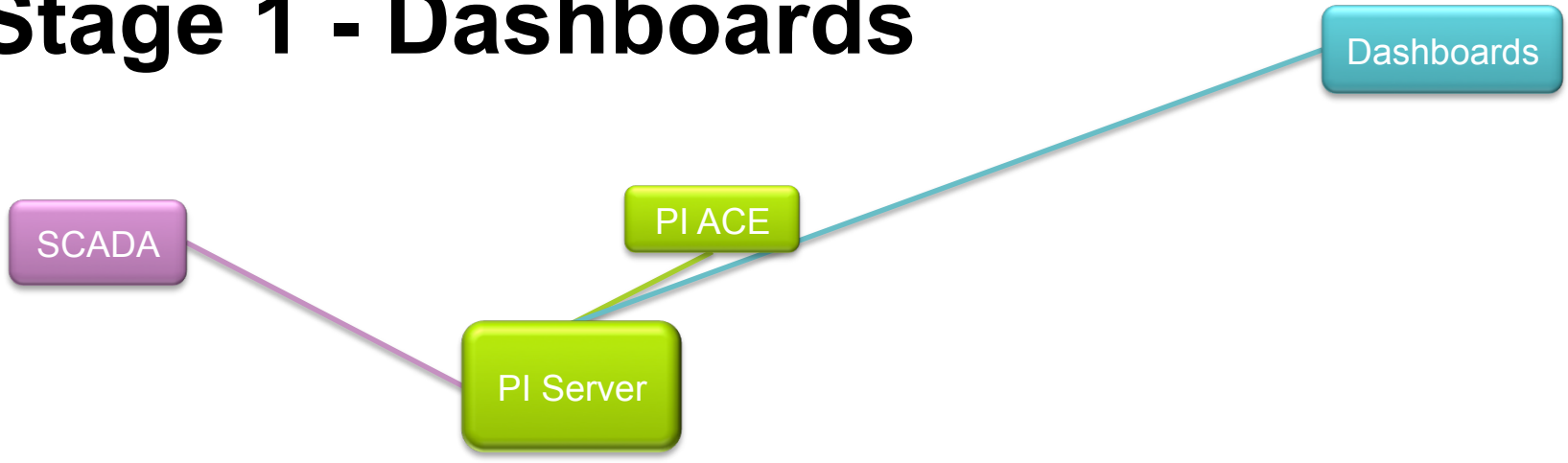
- Provides a quick view of long-term performance of each asset.
- These KPI's are not monitored by SCADA.
- Each site is analysed using the same method – "one best way".
- Predictive forecasting when design limits will be reached

Wastewater pump station KPI forecasting



- "A wastewater overflow that makes the front page of the newspaper is about $1M in lost reputation" – CEO Water Corporation

Stage 1 - Dashboards



Source

Information

Alert Monitoring

Shifting PI from a historian to an operational partner of SCADA

Business Challenge

- Critical monitoring for brine discharge into Cockburn Sound.
- Operating License has comprehensive parameters that can cause the Desalination Plant to be shut down if exceeded.
- EPA/DEC need to “interact” with the data. **Static web pages not workable.**

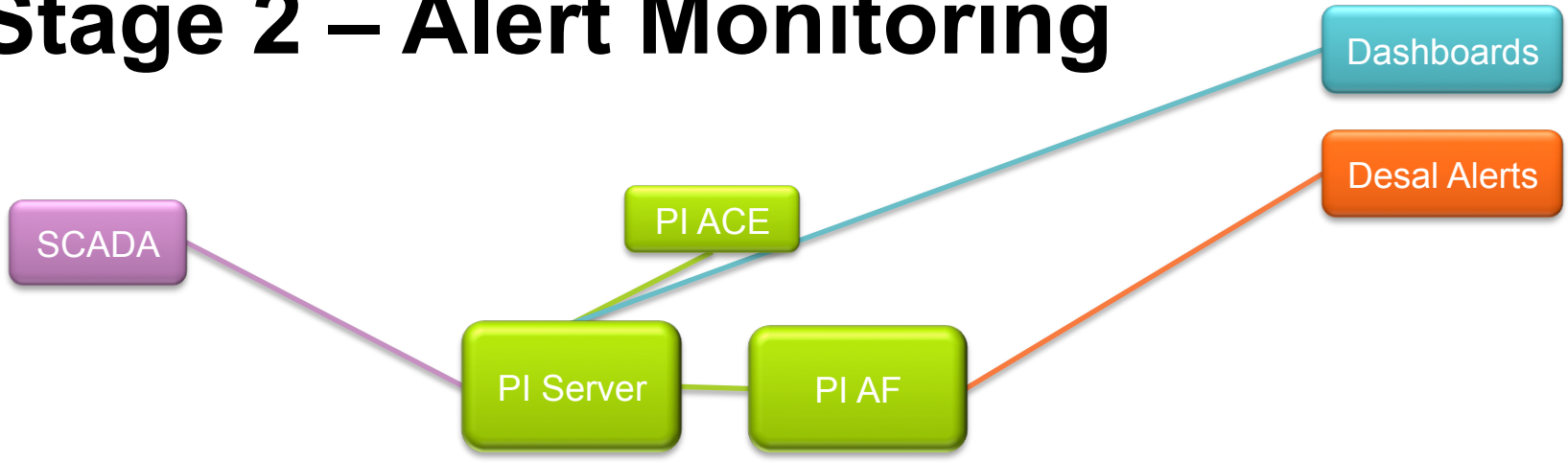
Solution

- PI delivered requirements for modelling, data collection and client delivery.
- Integration with PI ACE modelling and PI AF structure.
- External Regulator view of the data via Citrix.

Results and Benefits

- Broke down perceived barriers within the business
- Data is viable across a wider audience
- It is reliable
- Confidence with Regulators as they can see live data.

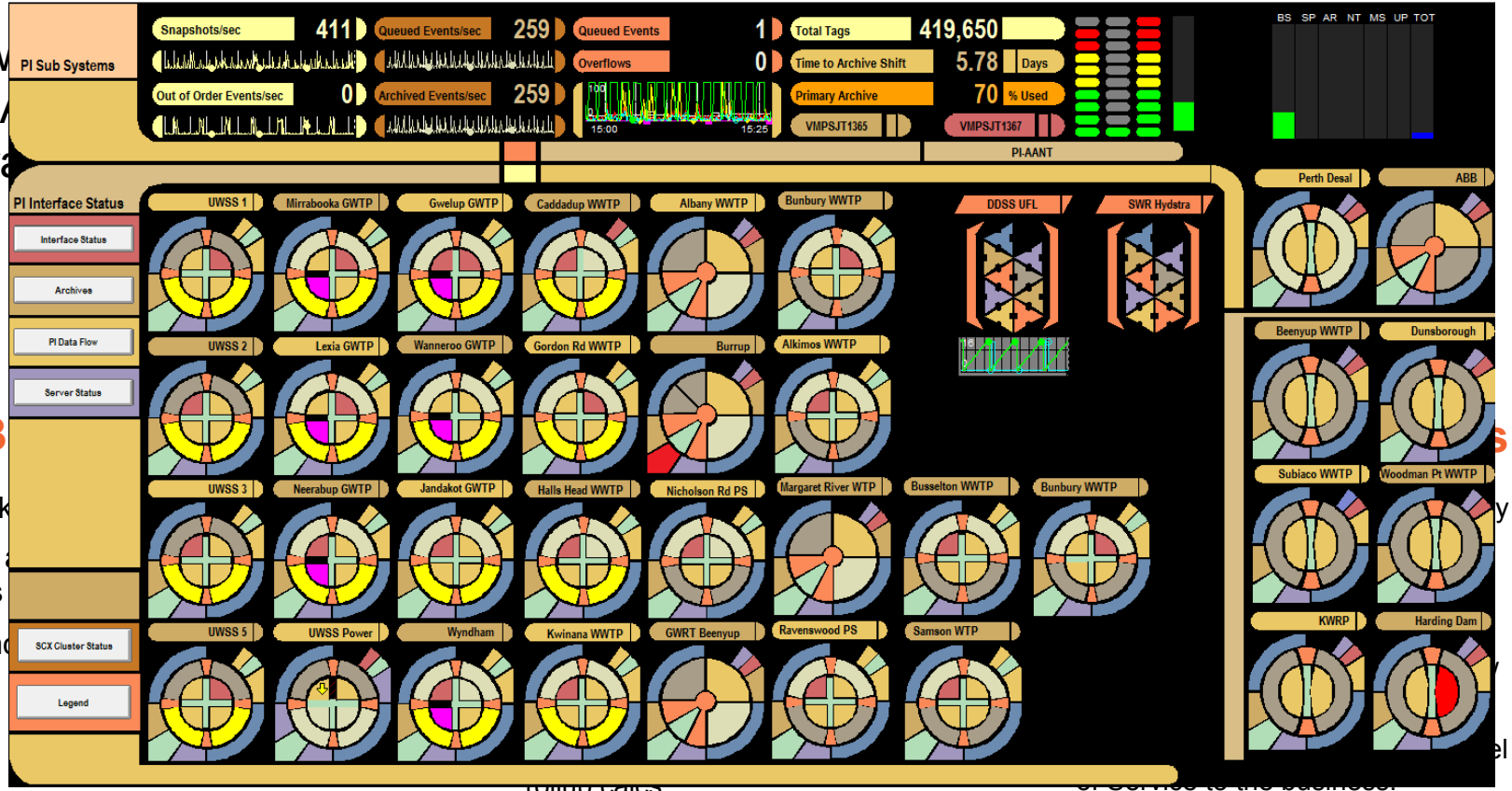
Stage 2 – Alert Monitoring



Source | Information | Monitoring

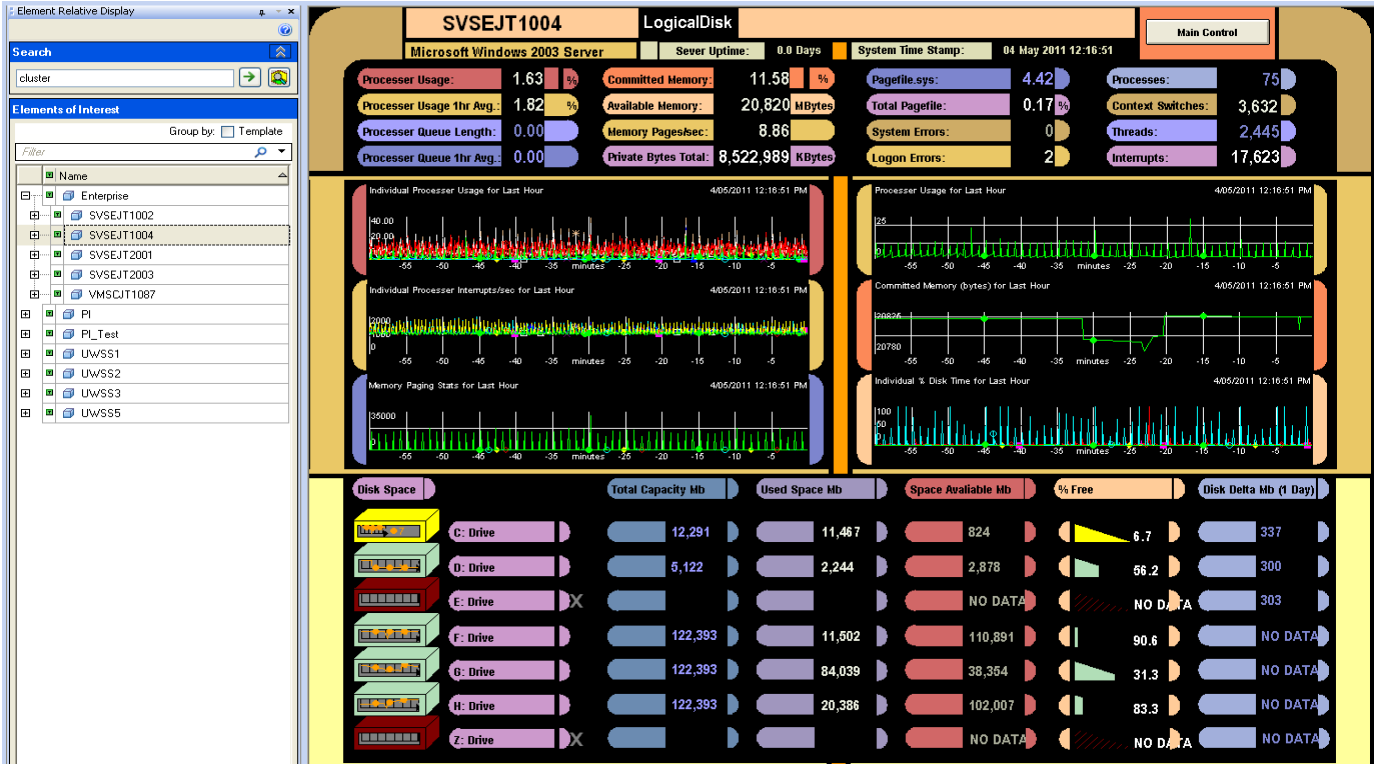
IT Monitoring

Hov
SCA
infra

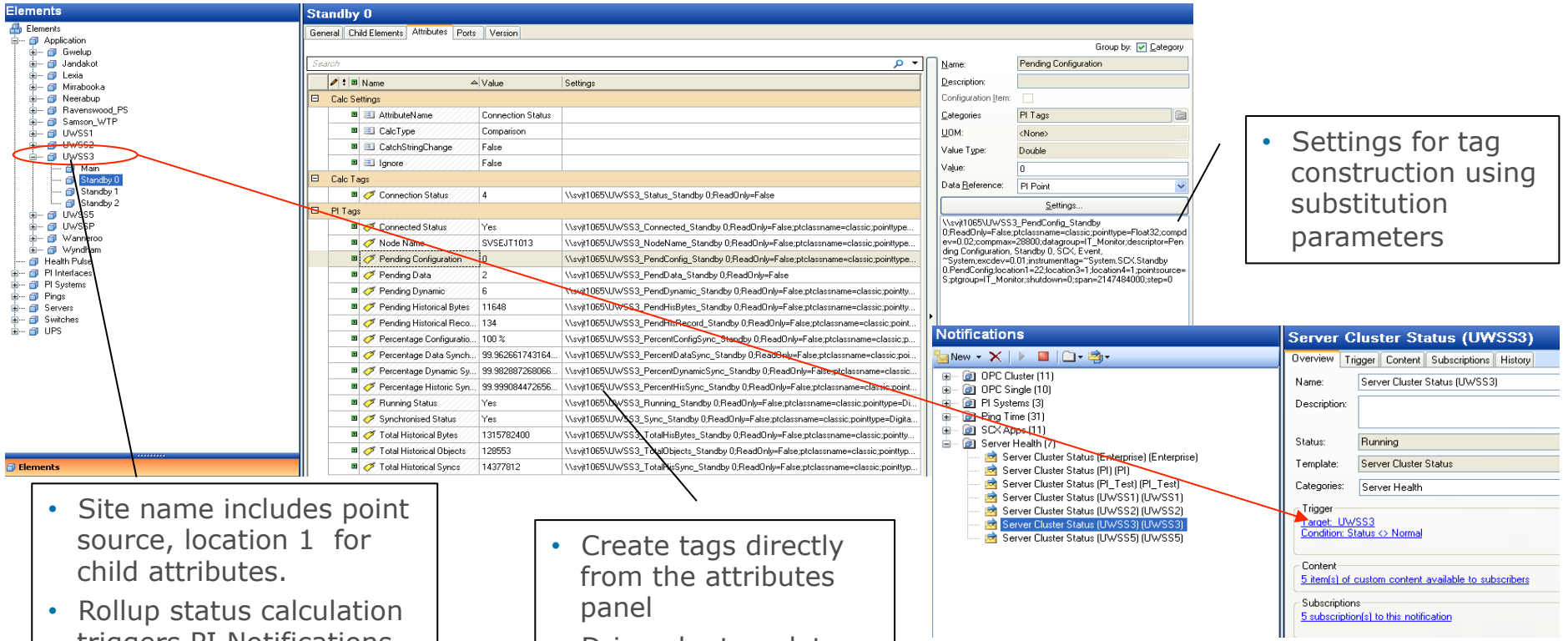


- Must k
- Need
  status
- Diagn
  chain

IT Monitoring Element Relative Display for Servers



IT Monitoring AF structure

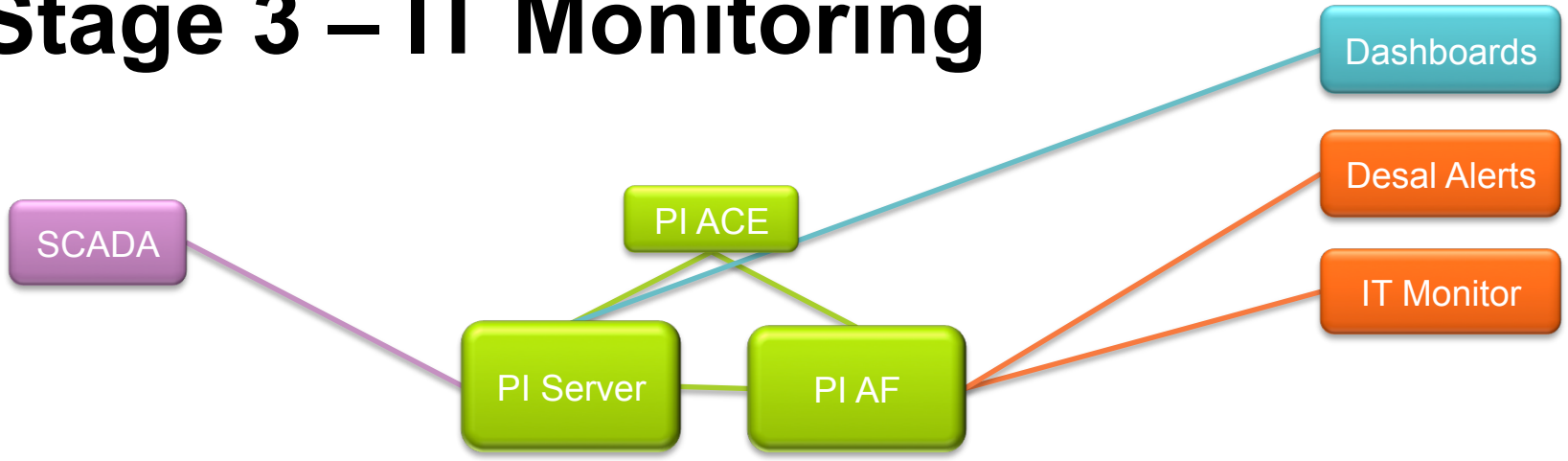


- Settings for tag construction using substitution parameters

- Site name includes point source, location 1 for child attributes.
- Rollup status calculation triggers PI Notifications

- Create tags directly from the attributes panel
- Driven by templates

Stage 3 – IT Monitoring



Source | Information | Monitoring

Data Quality Manager

If machines are gathering data how do you know the data is any good and how do you let the data consumer know?

Annotation,
Aggregation and
Notification
Tool for PI data

Business Challenge

- A fundamental need to quality assure its data from the field
- Current culture relies on people to spot errors, rather than systems.
- Have information the business uses without question

Solution

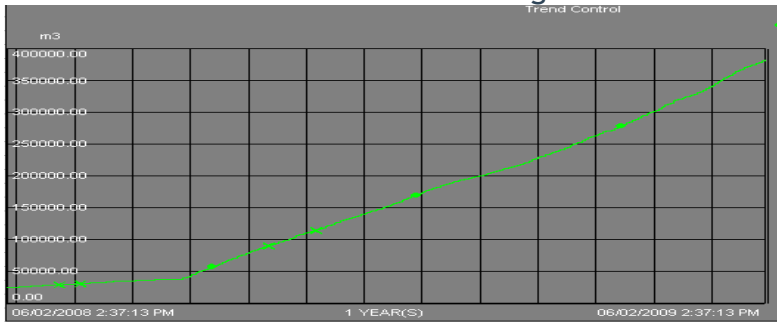
- Consistent analysis approach
- Audit both business logic modification along with the data
- Aggregates the data.
- Auto analyse the raw data for quality issues (out of limits, missing data, etc.) and flag the aggregated data as questionable.
- Allow users to modify the questionable data to establish the Corporate truth.

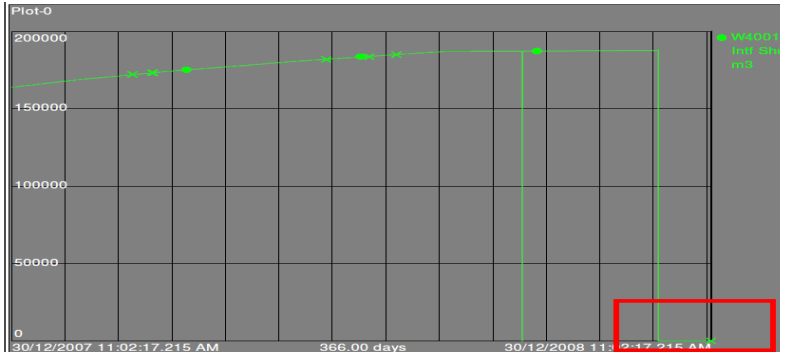
Results and Benefits

- Enforces business quality levels on the data
- Easy to organically grow the structure to fit the changing business
- One Version of the Truth
- Data Integration can now progress to other systems.

Data Error examples

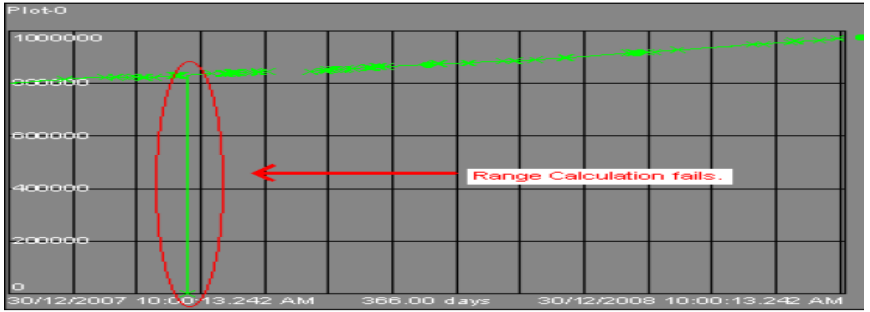
Local RTU scale changes

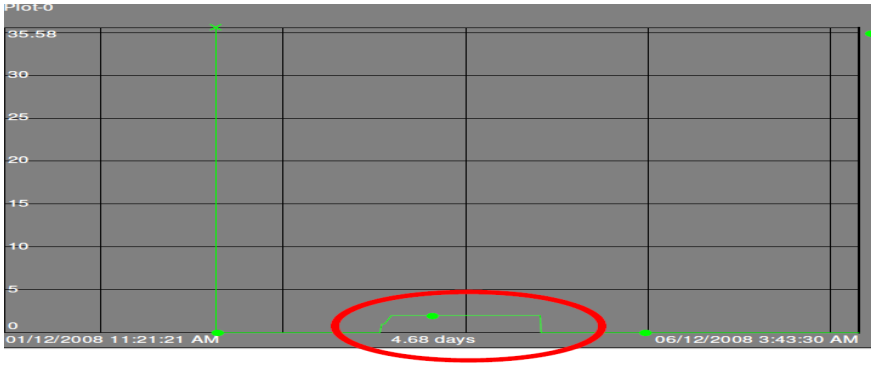




Scales set to zero

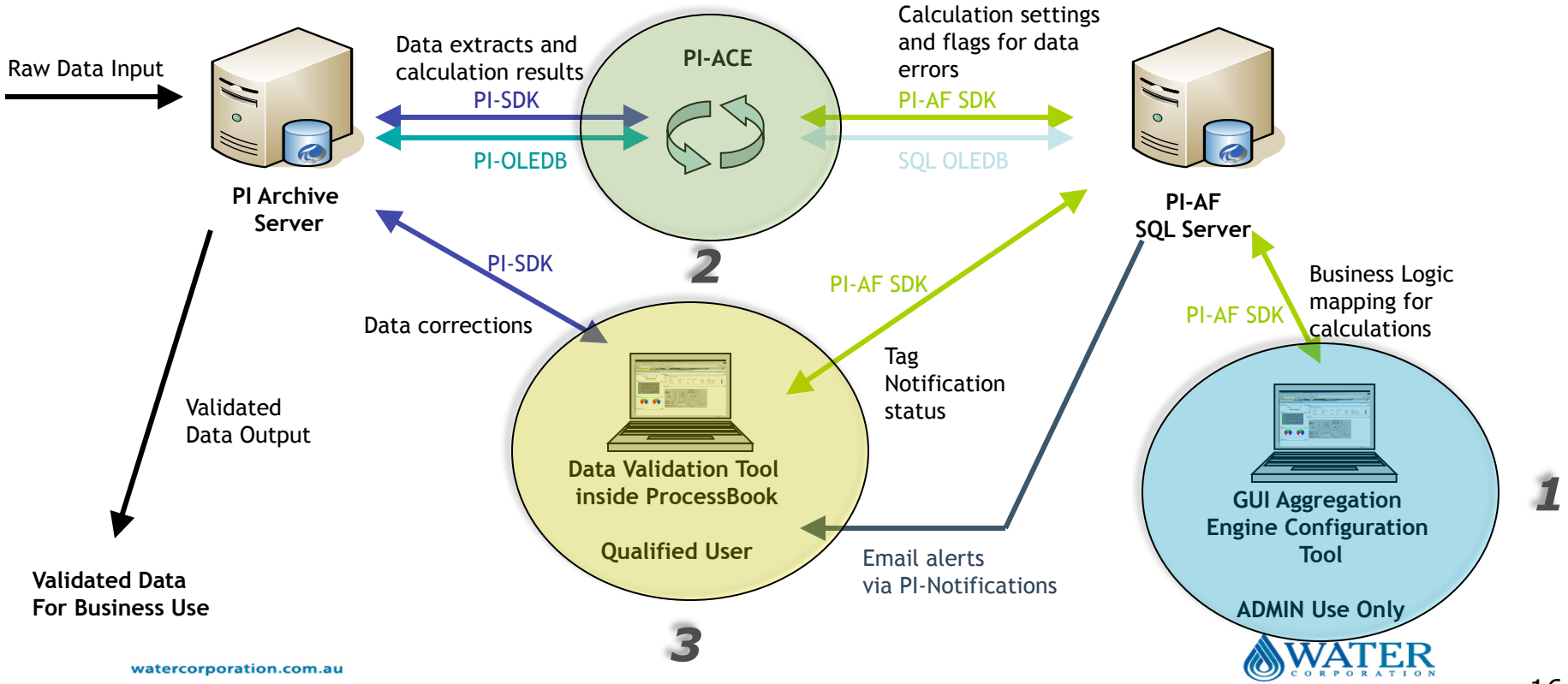
Instrument spikes



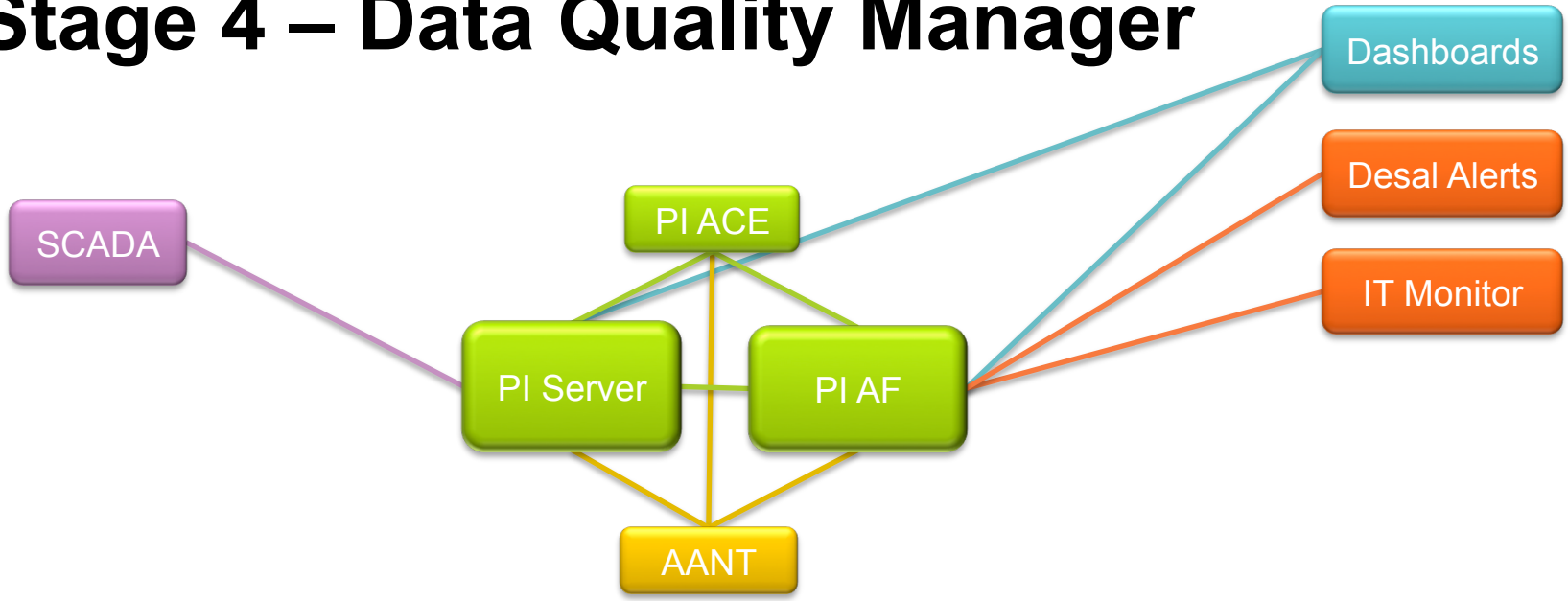


Totaliser not functioning correctly

AANT – 3 Part Solution



Stage 4 – Data Quality Manager



Water Quality Monitoring

Is that water safe to drink **ALL** of the time?

Business Challe

- Historical spot sampling gave confidence the wat was safe for each sampl
- 210 remote water quality dosing modules across t state for Chlorination, Turbidity and UV
- Spreadsheet prototype t slow and poor scalability

elements

lts and Benefits

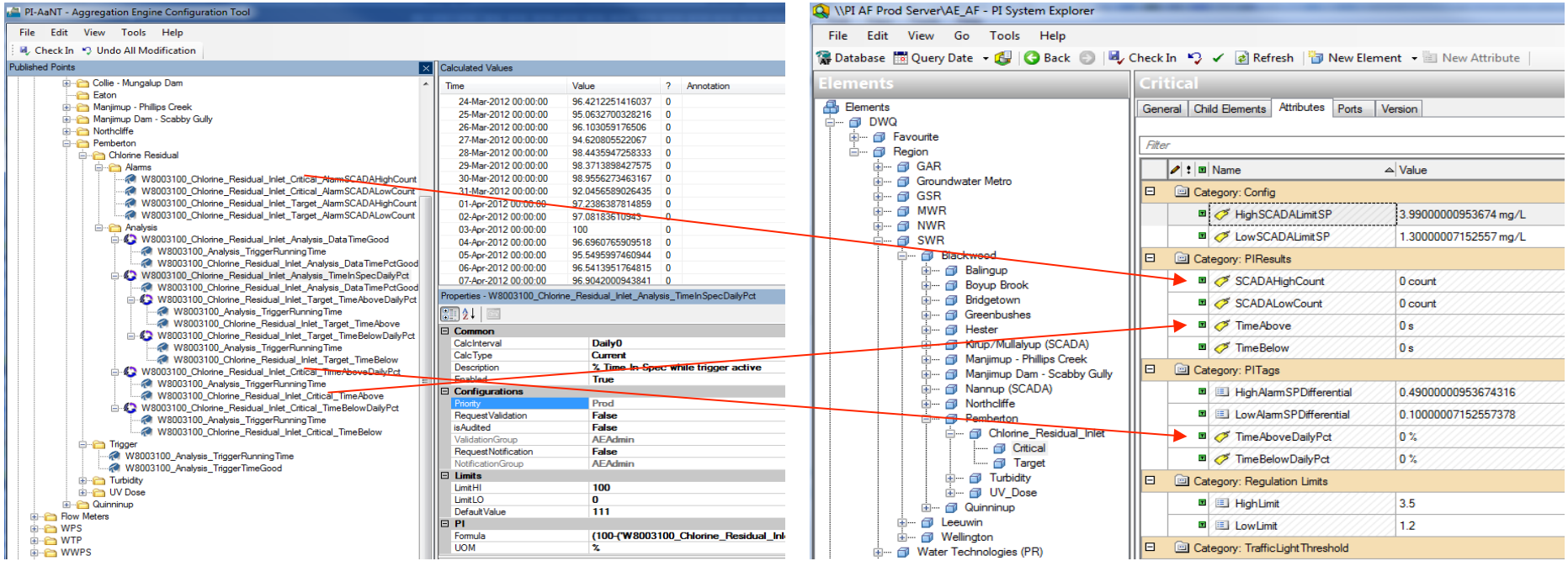
rces compliancy rigor to ysis

ly Scalable

Version of the Truth

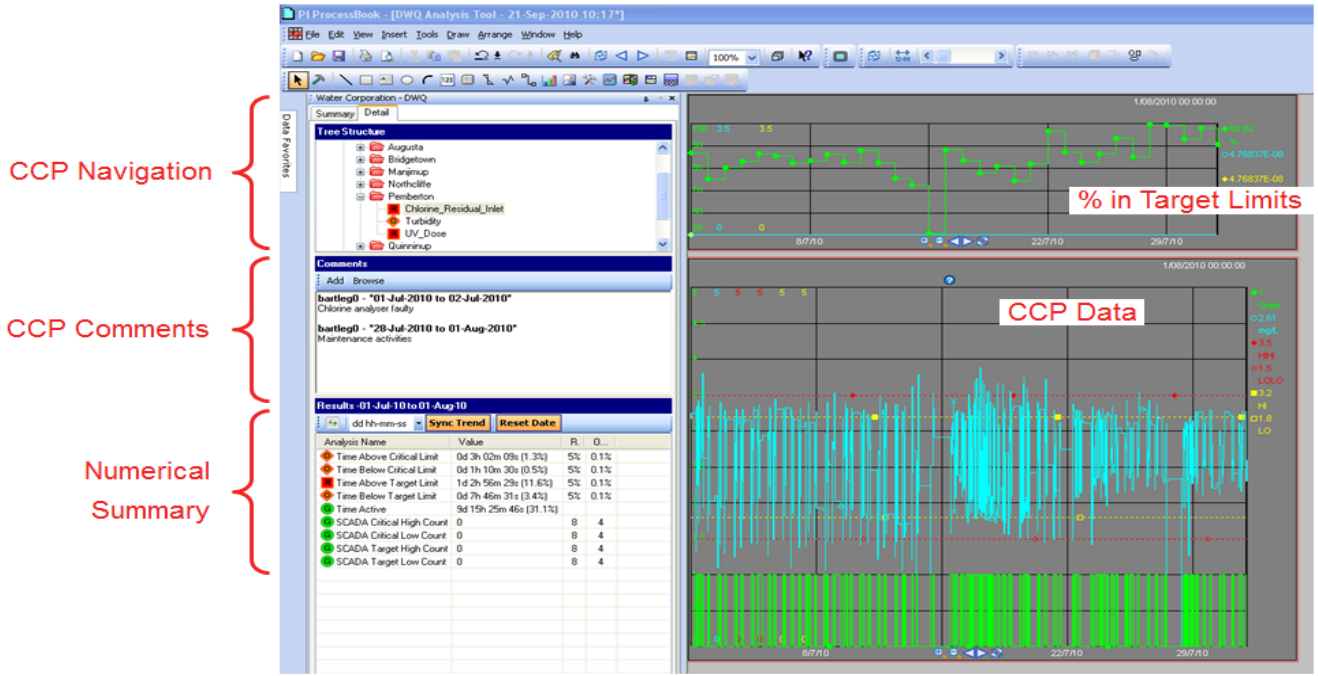
is transparent from field ugh to Regulators

Solution: User Screens

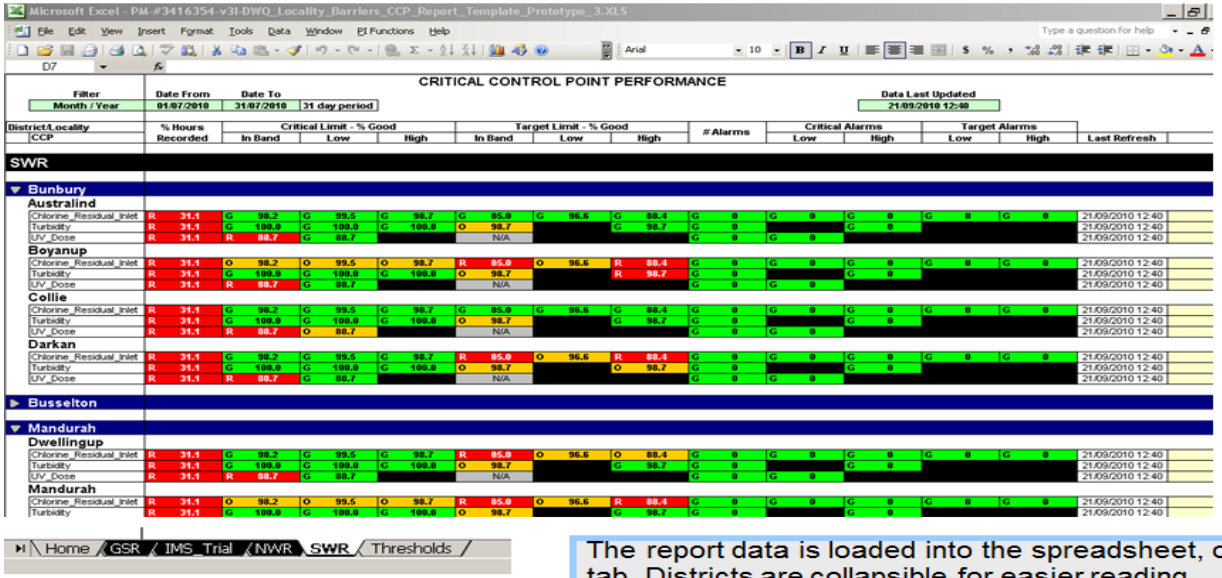


Locality Barrier Tool – Detail Page

The Detail page shows the data from a single CCP in graphical and numeric forms.



Locality Barrier Tool – Reporting

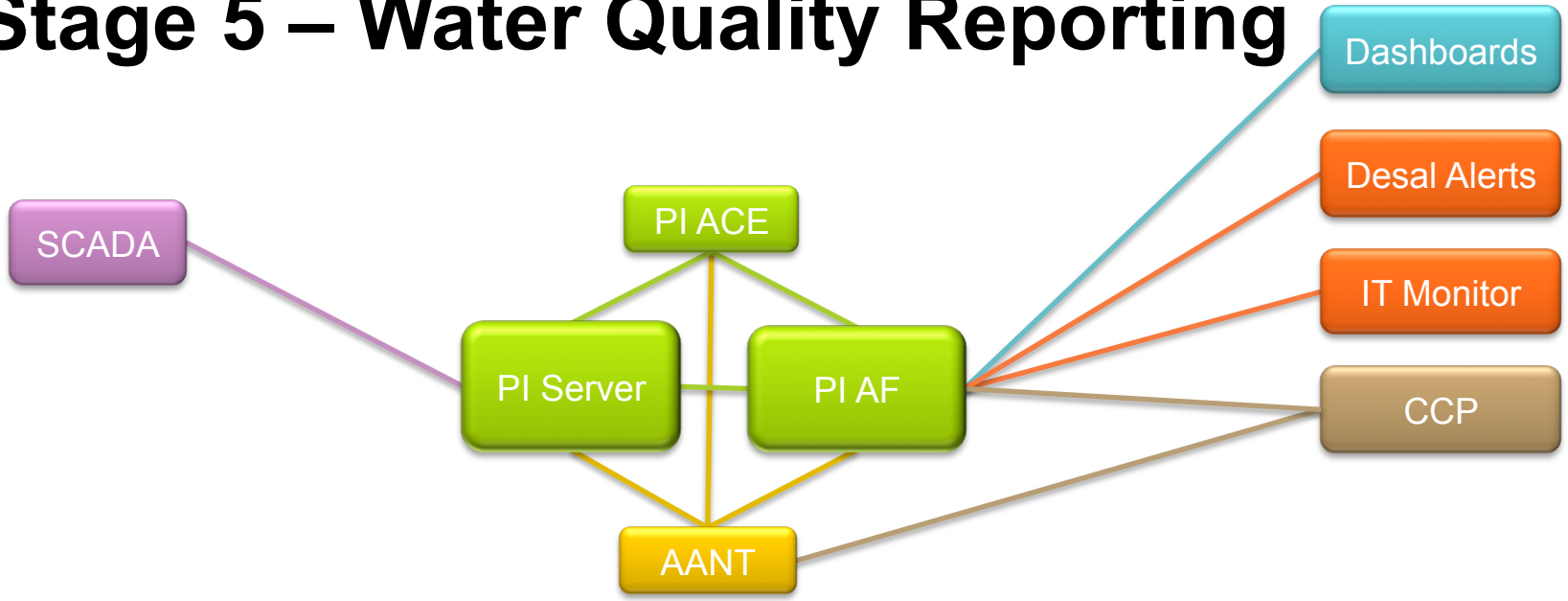


The report data is loaded into the spreadsheet, one region to a tab. Districts are collapsible for easier reading.

The report allows users to view comments entered in the Data Review client and summarise these for the report.

Individual CCPs, localities, districts or regions can be refreshed with the latest data.

Stage 5 – Water Quality Reporting



Source | Information | Monitoring | Infrastructure Project

System Capability Forecasting

How do I know if my scheme infrastructure is capable of meeting my customers needs?

If its OK now when will it be a problem?

Business Challenge

- Current growth/capacity information is done in a ad-hoc and manual manner
- Inconsistent and multiple data sources exist
- There is no single source of the “truth” regarding data and assumptions.
- There are knowledge capability gaps for people undertaking the analysis.

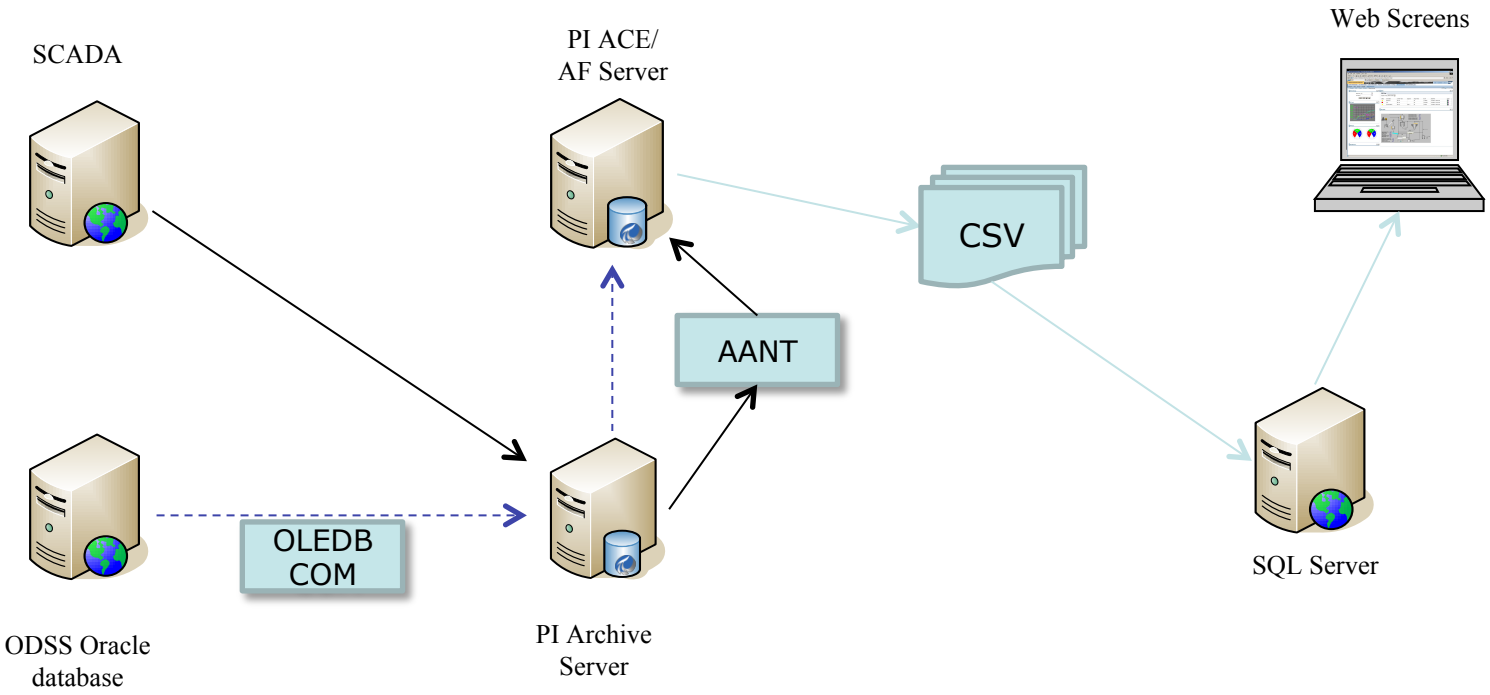
Solution

- Use PI Server and PI AF to centralise operational data from key systems
- Use PI AF to define the information distributed to the Reporting solution

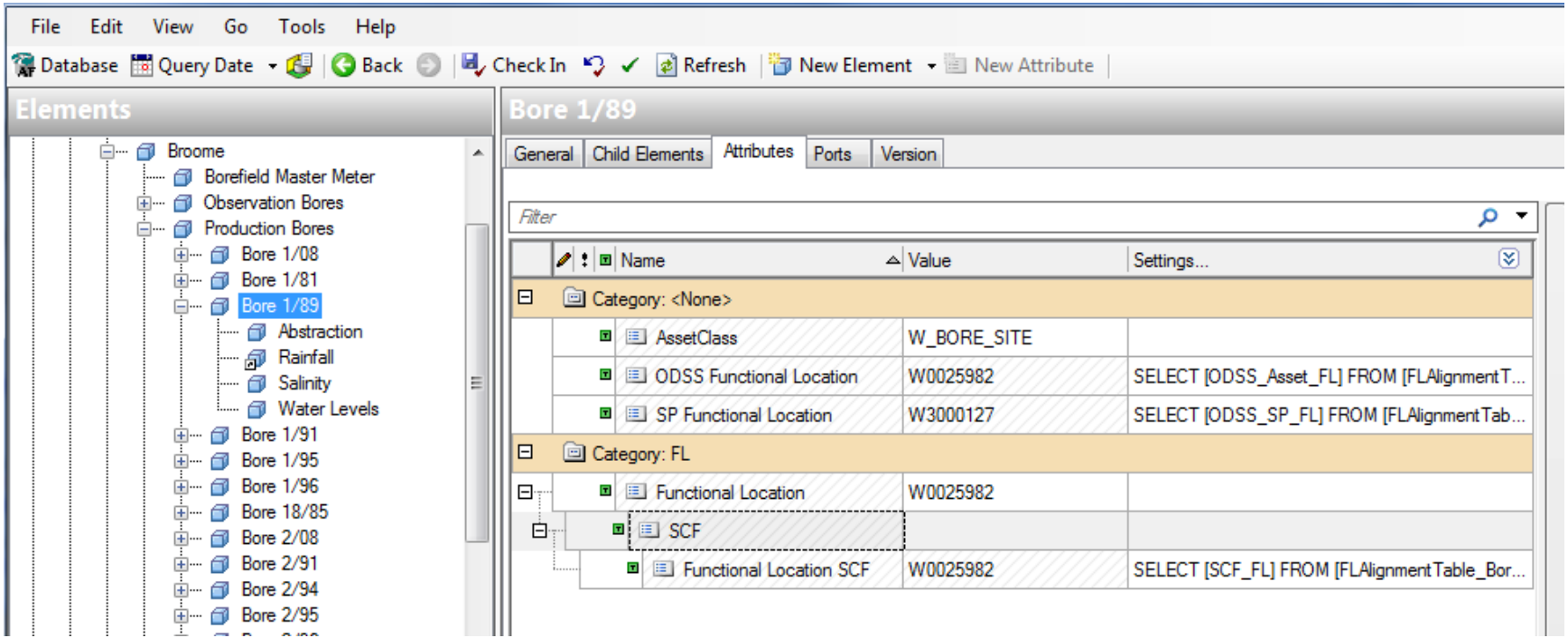
Results and Benefits

- One Version of the Truth
- Focus on long term growth/ capacity
- Become proactive instead of reactive.
- To streamline and speed up delivery of information.

Architecture Diagram



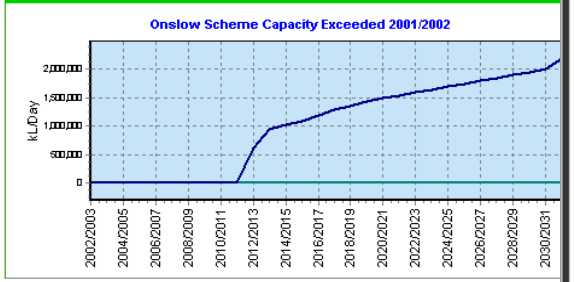
AF Structure – Site Level



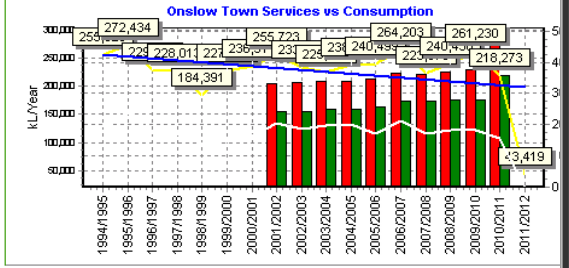
Scheme Overview

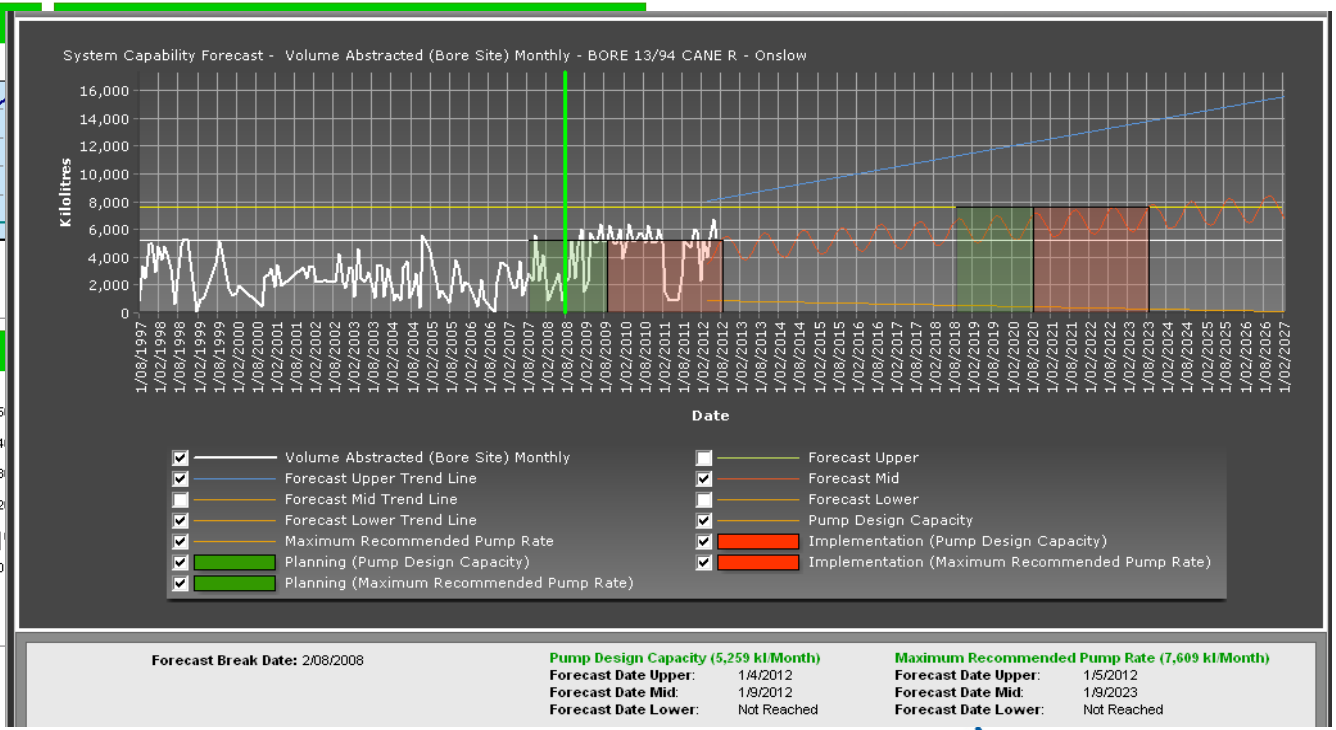
List | System Overview | Development | Data Sheets | Hierarchical Flow Chart | PI Tag Analysis

Scheme Capacity



Town Services vs Consumption





Forecast Break Date: 2/08/2008

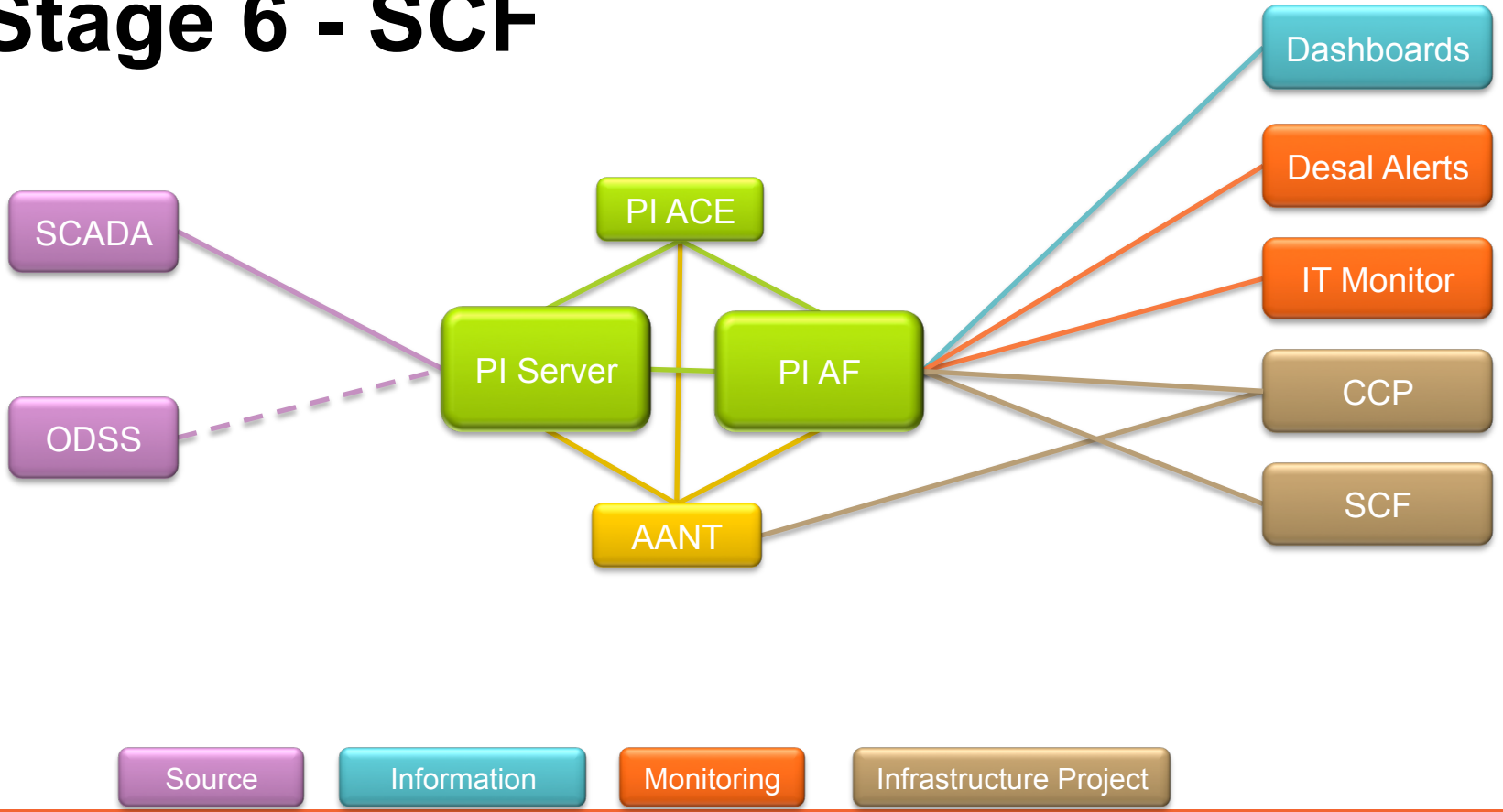
Pump Design Capacity (5,259 kl/Month)	
Forecast Date Upper:	1/4/2012
Forecast Date Mid:	1/9/2012
Forecast Date Lower:	Not Reached

Maximum Recommended Pump Rate (7,609 kl/Month)	
Forecast Date Upper:	1/5/2012
Forecast Date Mid:	1/9/2023
Forecast Date Lower:	Not Reached

Success Story

- SCF identified an upgrade was required at Yanchep WWTP caused by overloading at peak flow periods
- Planning identified a capital upgrade of +$5M
- Multi-stage level settings for pump starts were added to two main wastewater pump stations
- Inflow to the WWTP flattened out in peak periods improving the efficiency of the plant and deferred the upgrade by 5-10 years

Stage 6 - SCF



Automatic Metering

We will spend $1M on water saving options before spending $1M on new infrastructure.

WATER CORPORATION

Business Challenge

- Major OSH risk to personnel reading meters
- Add value to customers to inform them of leakage
- Cost of delivering water ~5x $/kL than Perth
- Infrastructure upgrades in x$10M
- Water Corporation is one of the largest energy users in the State

Solution

- Install meters and connection infrastructure to bring it back to PI
- Develop Interfaces to gather the XML from the field
- Develop connections between PI AF and the customer database to manage meter changes
- Develop web connections to provide meter data into billing system

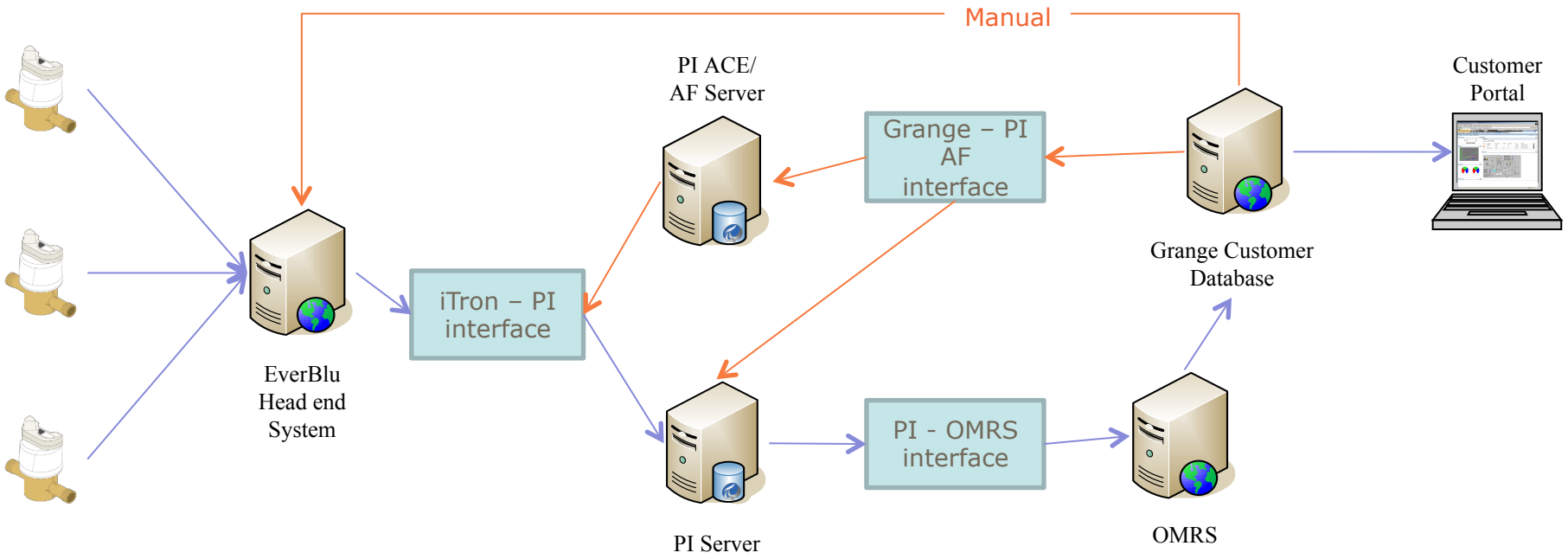
Results and Benefits

- Customers already saving money
- Water Zones being established for water loss detection.
- Better determine customer water use patterns on a weekly/monthly basis
- Optimise the scheme storage for a given period.
- Schedule maintenance windows during months of low use

Reading Meters Manually

The reader would sta
back of a truck and lo
the fence to read the

Architecture Diagram

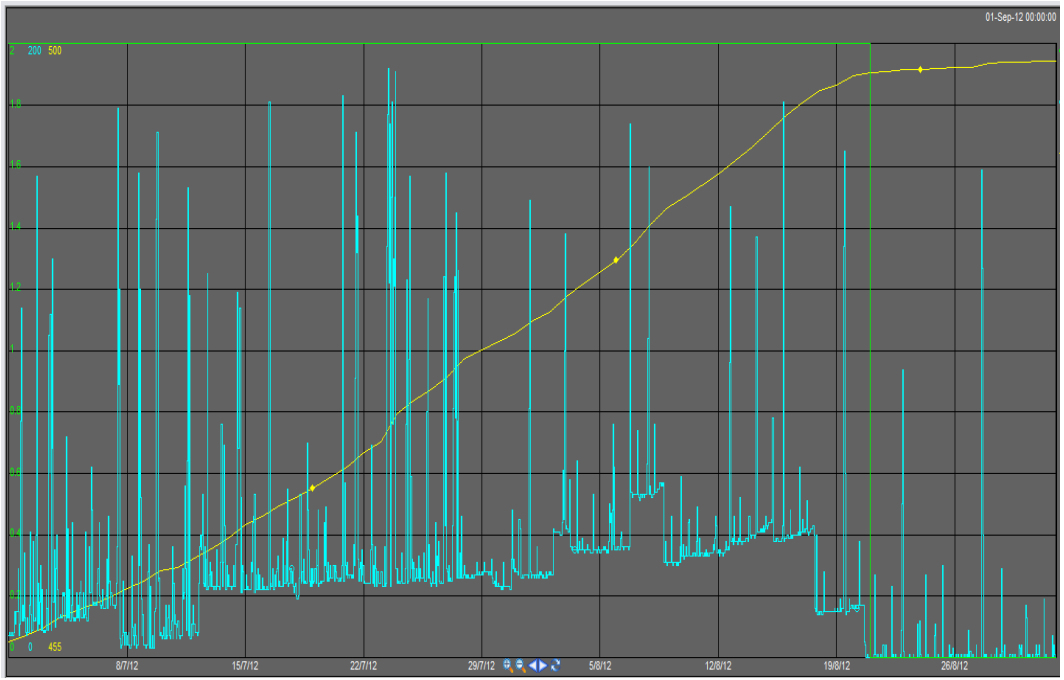


Data Flow

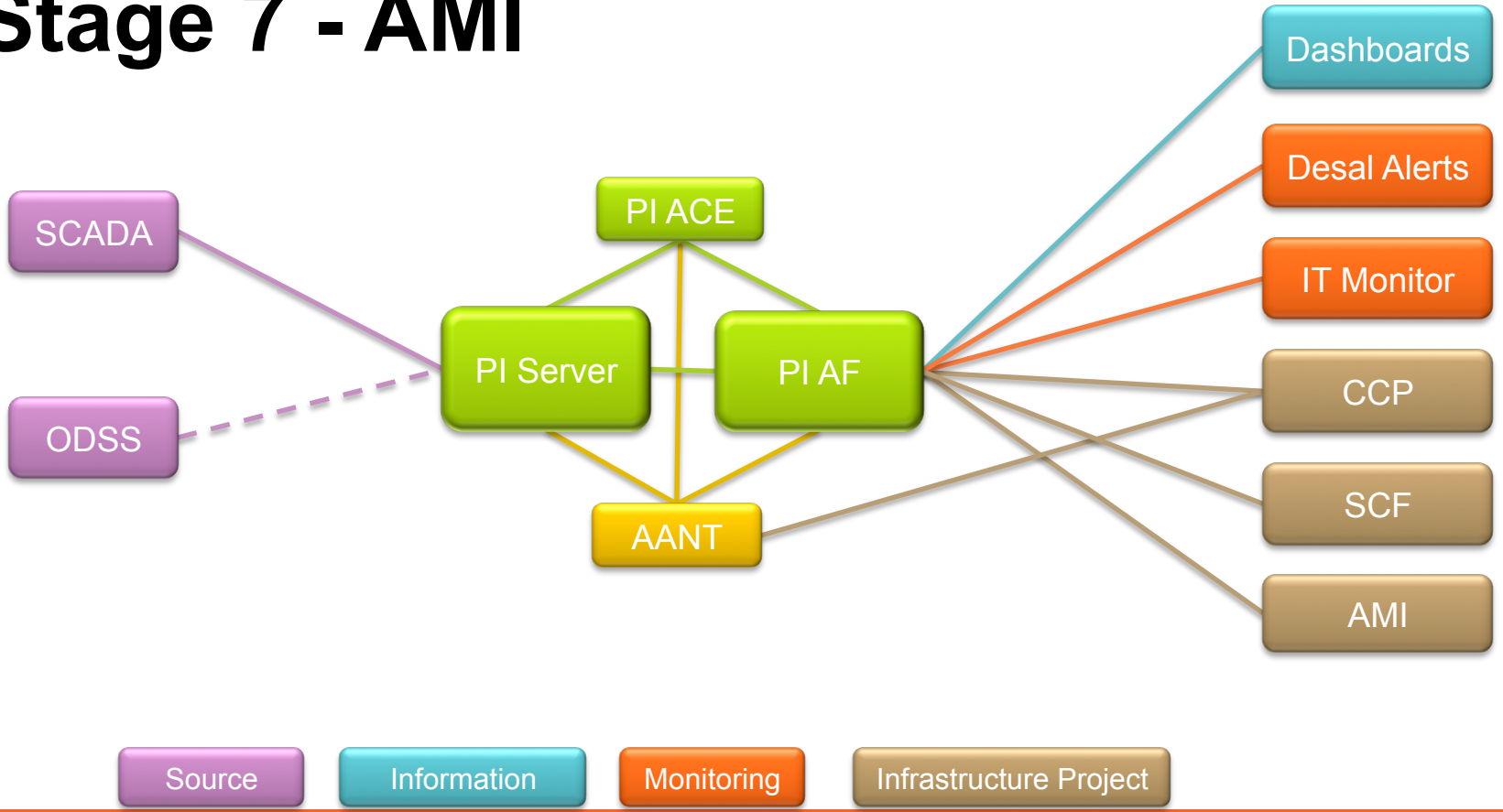
Configuration changes

Success Story

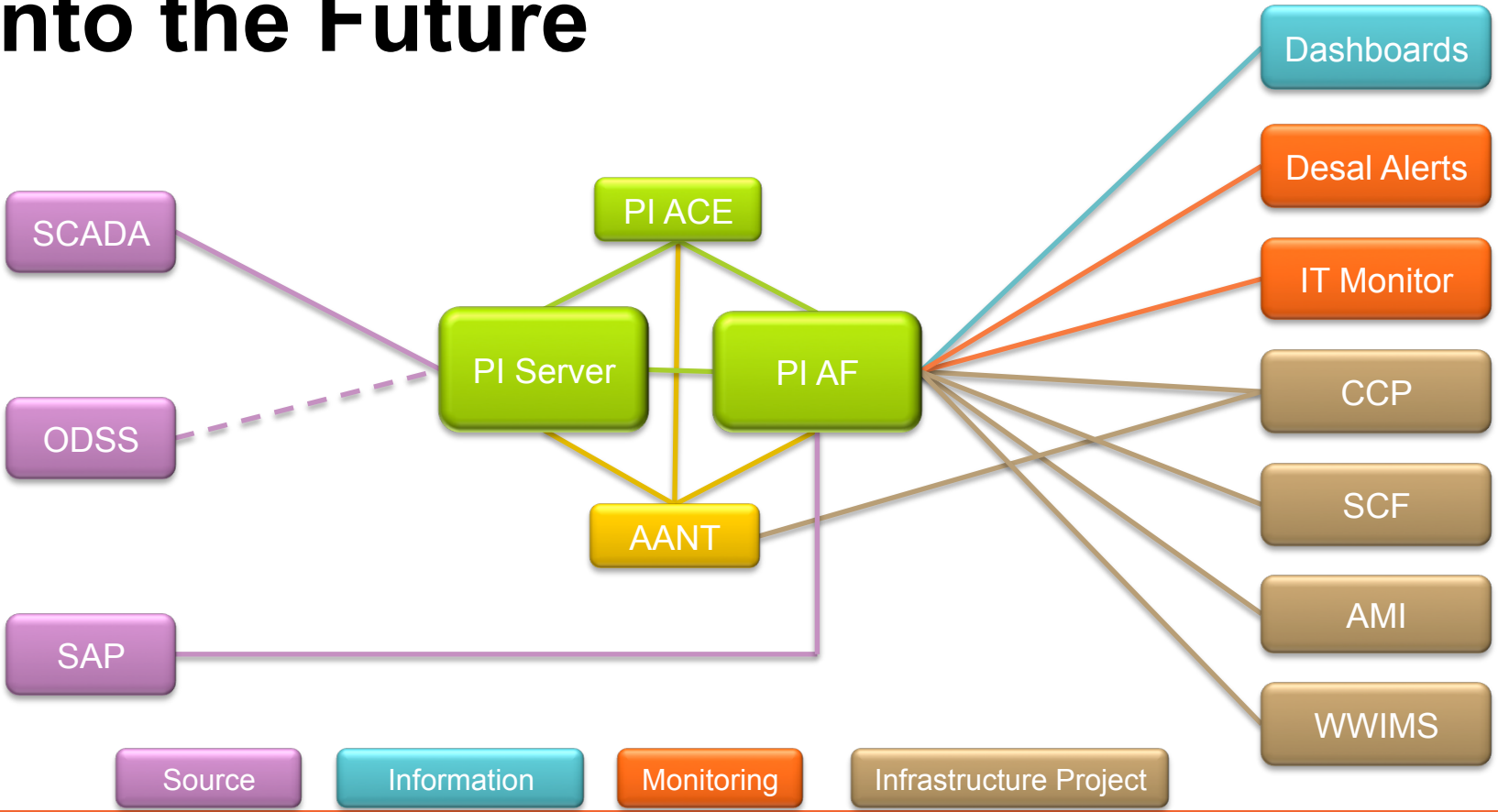
- Detected constant flow alarm of 1.5kL per hour
  - 25 litres per minute
  - 37kL per day
- Property was unoccupied
- Contacted agent and had site inspection
- 170kL was lost due to the leak
- Leak could have wasted 3700kL until the next meter reading
- Account would have been about $21,000



Stage 7 - AMI



Into the Future



Conclusion

- Each new development is built on top of the learning from the last
- Key to the solutions is PI AF and a solid integration partner (Optimate)
- PI System has moved from data storage to a key infrastructure platform on the last 6 years
- Business change with PI System is our next big challenge.
- Francois Mevis, Verve Energy, is an example of doing it right.

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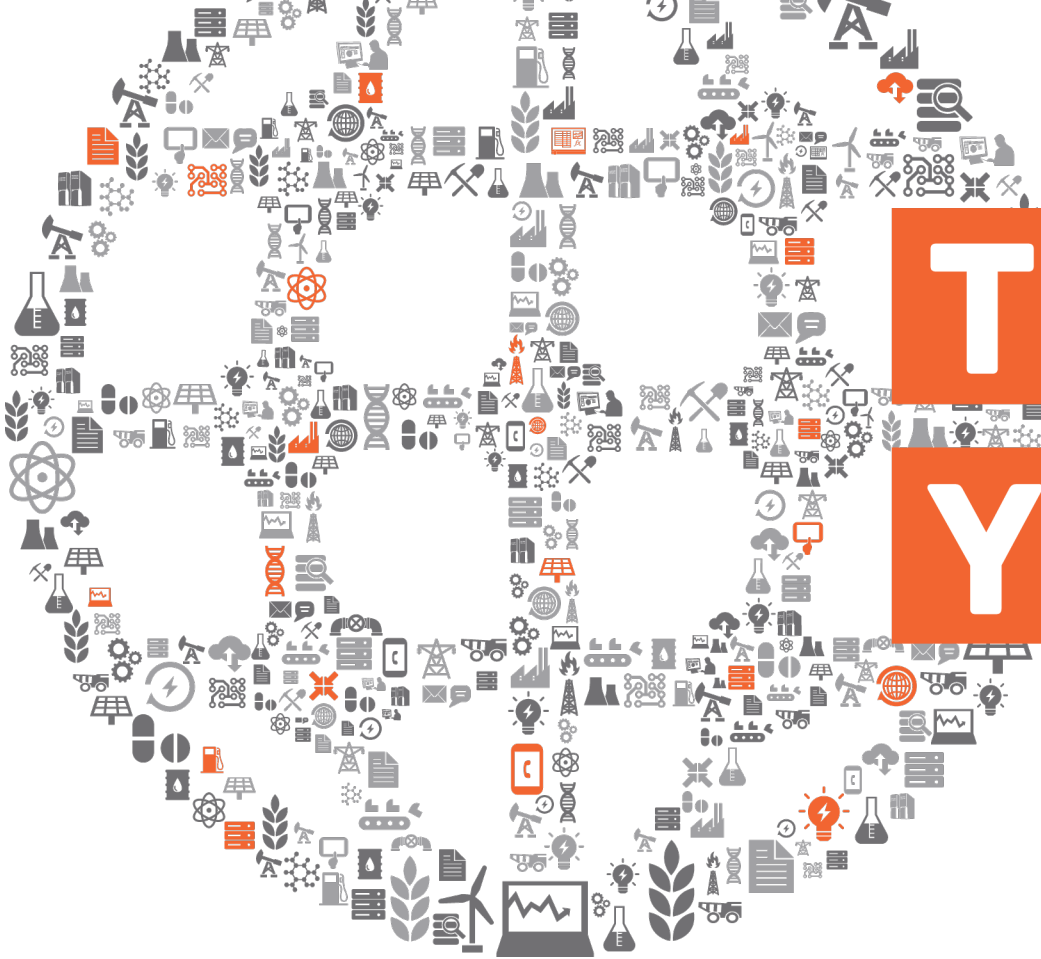

THANK YOU

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