OSIsoft.

REGIONAL SEMINAR 2012

APAC

The Power of Data

SA Water Integrated Demand Management System

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Integrated Demand Management ?

- A software decision support tool
  - Creates optimised pipeline pumping schedules
  - Provides pipeline models for operational “what-if” analysis
  - Used by systems engineers and pipeline operators
  - Built using the OSIsoft tools and databases that are SA Water’s Operational Data Store (ODS)
  - Developed by SA Water and Ericsson-Optimatics

Water Supply in South Australia

- Typical annual water consumption = 220GL
  - Metropolitan Adelaide ~ 140 GL
  - Country ~ 80 GL
- Typical Metropolitan Adelaide water sources
  - River Murray 80%
  - Surface water 20%
- Typical annual pipeline pumping power cost ~ $20,000,000


PORT AUGUSTA
IRON KNOB
STREAKY BAY
PETERBOROUGH
WHYALLA
KIMBA
PORT PIRIE
MORGAN
PASKEVILLE
WAIKERIE
RENMARK
LOXTON
SWAN REACH
PORT LINCOLN
ADELAIDE
MANNUM
MURRAY BRIDGE
TAILEM BEND
VICTOR HARBOR
PENNESHAW
KEITH

Business Drivers

- High and rising electricity costs
  - Variable tariffs
- Concerns about raw water supply continuity
  - Limited storage with highly variable natural inflows
  - High dependence on the River Murray
- Complex pipeline-reservoir-river network
- Frequent operational constraints on pipeline operations

Monitoring and Control Infrastructure

- One SCADA system covering South Australia
  - ~150,000 tags
- Large pipelines controlled via SCADA from a control room
- SCADA network is separate from the business network
- Pi historian in place on business network
- Limited business visibility of operational data
- Few data quality management policies or procedures

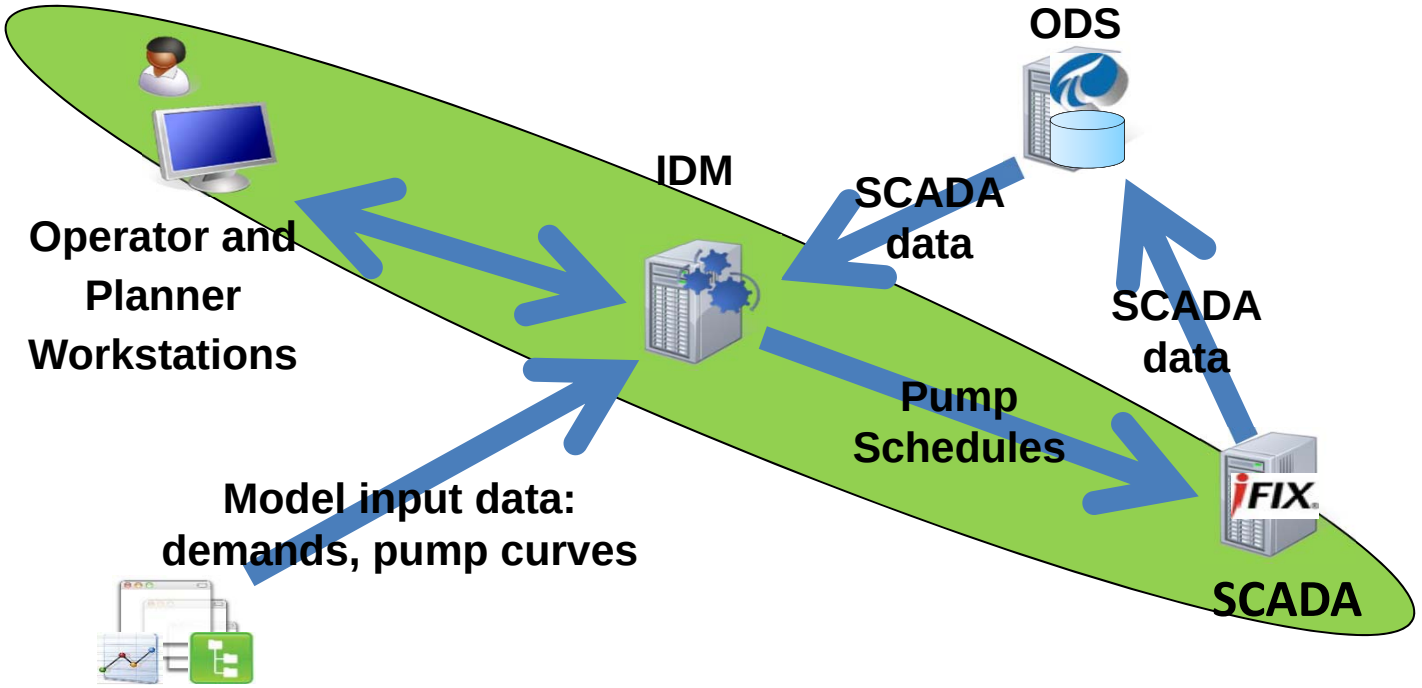
IDM System Development Objectives

- Energy cost savings of 2% to 5% per annum by pipeline
- Optimisation to both minimum energy cost & consumption
- More accurate pipeline network simulation
  - Planning reservoir levels and pipeline transfer volumes
- Appropriate features and complexity to suit users
  - Data management, fault resolution
- Robust and adaptable pipeline control

IDM Development

- First pipeline operational optimiser deployed in 1999
  - Optimised pumping schedules and forecasted power consumption
  - Ran on DEC Alpha computers
- Redevelopment project commenced in early 2008
- Contracted with Ericsson-Optimatics in April 2010
- IDM System “entered production” in June 2012

IDM System Architecture

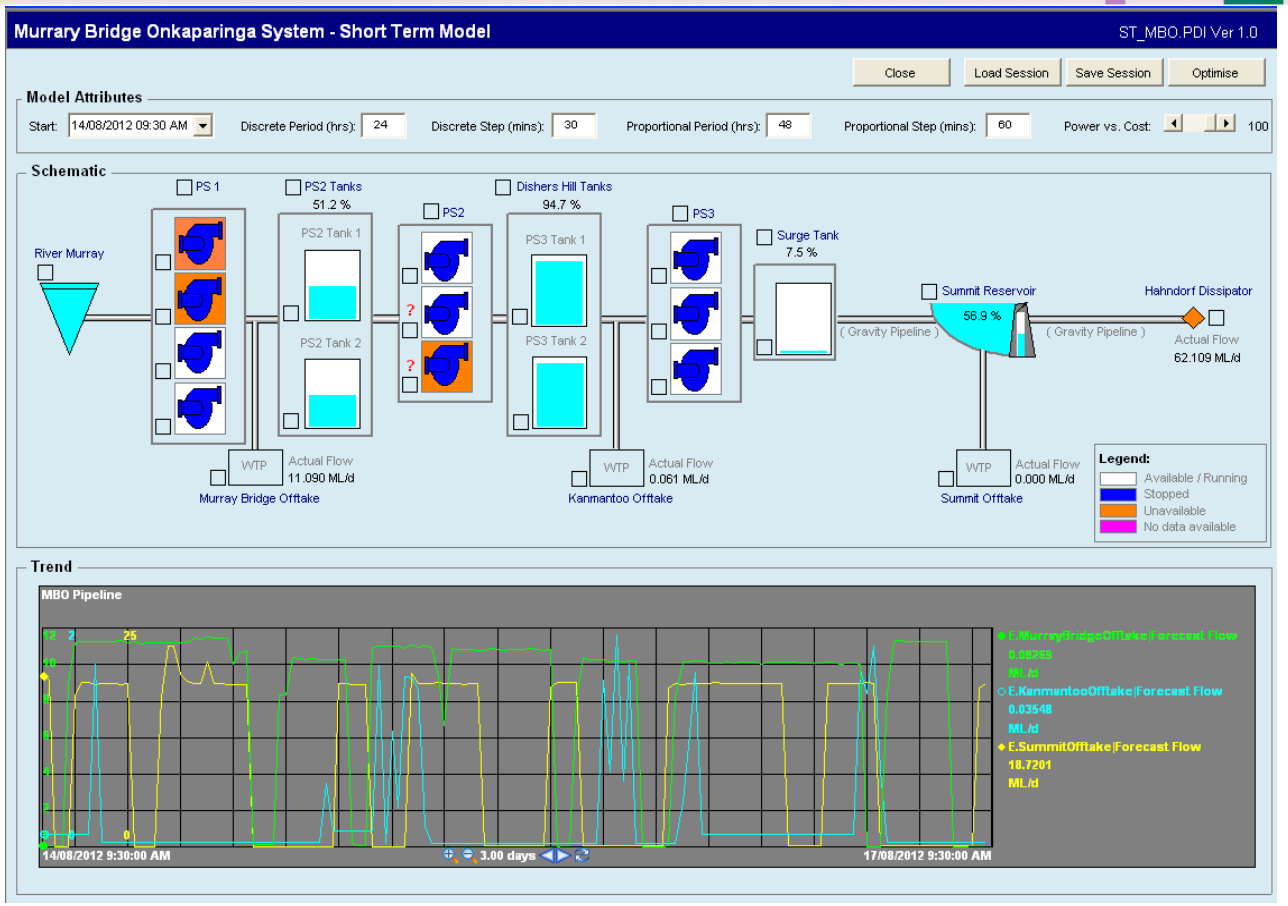


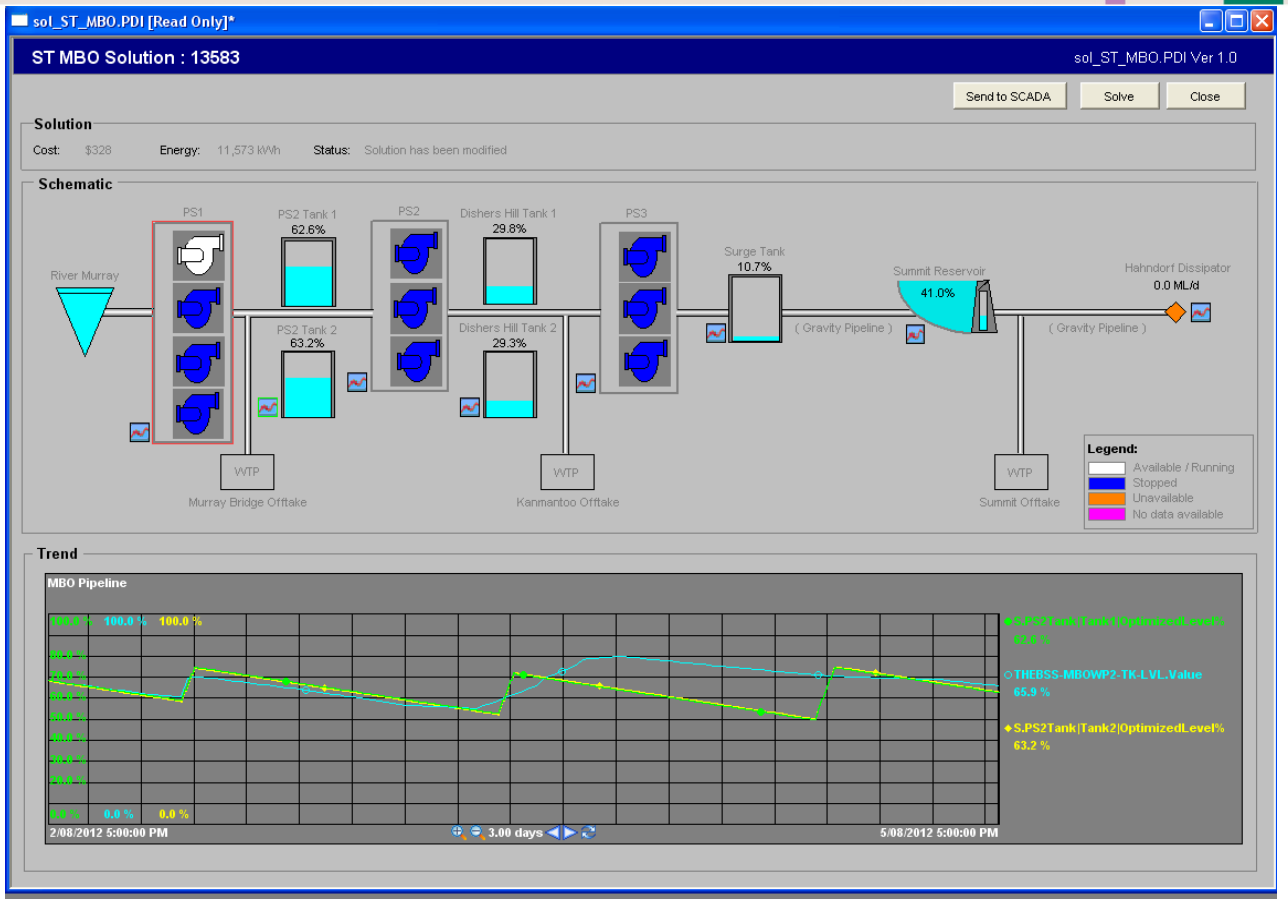
IDM System Overview

- Long Term Modules:
  - Designed for pipeline/reservoir planning and “what if” analysis
  - Used by systems engineers
  - 2 week time step, 2 year outlook
  - 2 modules: MB–O Pipeline, combined M-A, SR-S and M-W pipelines

IDM System Overview - Continued

- Short Term Modules:
  - Creates optimised pumping and dissipater schedules
  - Used by control room operators
  - 30 minute time step, 2 week outlook
  - 6 modules: MB-O, M-A,TB-K, SR-S, M-W, IK-K


Murray Bridge Onkaparinga System - Short Term Model
ST_MBO.PDI Ver 1.0
Close
Load Session
Save Session
Optimise
Model Attributes
Start: 14/08/2012 09:30 AM
Discrete Period (hrs): 24
Discrete Step (mins): 30
Proportional Period (hrs): 48
Proportional Step (mins): 60
Power vs. Cost: 100
Schematic
River Murray
PS 1
PS2 Tanks
51.2 %
PS2 Tank 1
PS2 Tank 2
PS2
Dishers Hill Tanks
94.7 %
PS3 Tank 1
PS3 Tank 2
PS3
Surge Tank
7.5 %
(Gravity Pipeline)
Summit Reservoir
56.9 %
(Gravity Pipeline)
Hahndorf Dissipator
Actual Flow
62.109 ML/d
WTP
Actual Flow
11.090 ML/d
Murray Bridge Offtake
WTP
Actual Flow
0.061 ML/d
Kanmantoo Offtake
WTP
Actual Flow
0.000 ML/d
Summit Offtake
Legend:
Available / Running
Stopped
Unavailable
No data available
Trend
MBO Pipeline
E.KanmantooOfftake|Forecast Flow
0.03548
ML/d
E.SummitOfftake|Forecast Flow
18.7201
ML/d
14/08/2012 9:30:00 AM
3.00 days
17/08/2012 9:30:00 AM


sol_ST_MBO.PDI [Read Only]*
ST MBO Solution : 13583
sol_ST_MBO.PDI Ver 1.0
Send to SCADA
Solve
Close
Solution
Cost: $328
Energy: 11,573 kWh
Status: Solution has been modified
Schematic
PS1
PS2 Tank 1
62.6%
PS2
Dishers Hill Tank 1
29.8%
PS3
Surge Tank
10.7%
Summit Reservoir
41.0%
Hahndorf Dissipator
0.0 ML/d
River Murray
PS2 Tank 2
63.2%
Dishers Hill Tank 2
29.3%
(Gravity Pipeline)
(Gravity Pipeline)
WTP
Murray Bridge Offtake
WTP
Kanmantoo Offtake
WTP
Summit Offtake
Legend:
Available / Running
Stopped
Unavailable
No data available
Trend
MBO Pipeline
100.0 %
100.0 %
100.0 %
THEBSS-MBOWP2-TK-LVL.Value
65.9 %
S.PS2Tank|Tank2|OptimizedLevel%
63.2 %
0.0 %
0.0 %
0.0 %
2/08/2012 5:00:00 PM
3.00 days
5/08/2012 5:00:00 PM

Benefits Realised

- Energy cost savings of 3% – 8%
- Improved network simulation and forecasting
- Forced repairs to critical SCADA data feeds
- Forced pipeline infrastructure asset data updates
- Forced clarification of pipeline operating procedures
- Created business interest in software decision support tools

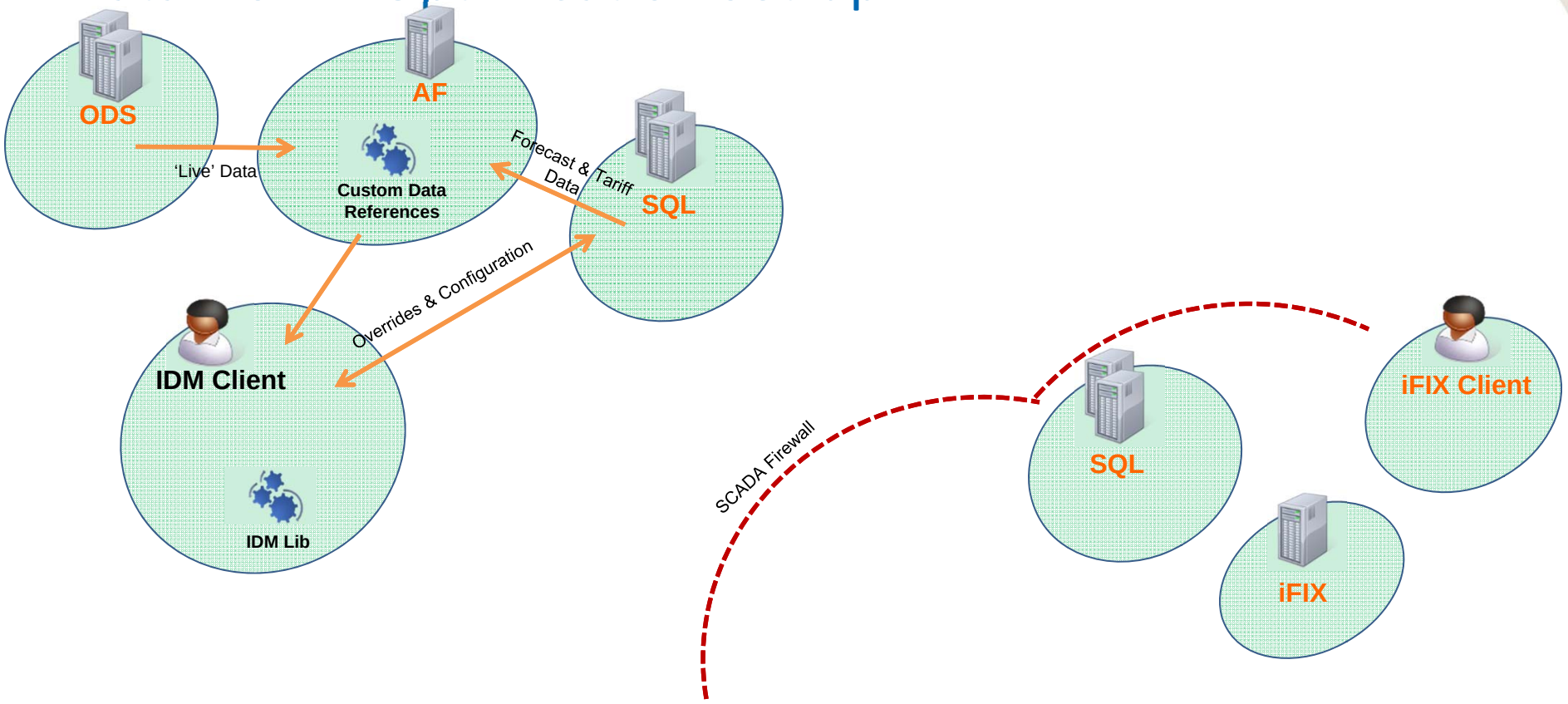
Project Challenges

- Very technical topic involving many disciplines
  - Hydraulic modelling and network optimisation
  - SCADA system integration and live data access
  - IT system development, testing, user training, support, etc.
- Required accurate knowledge of the infrastructure
- Difficult to quantify benefits beyond energy savings
- Implementation involved changed work practices and new skills

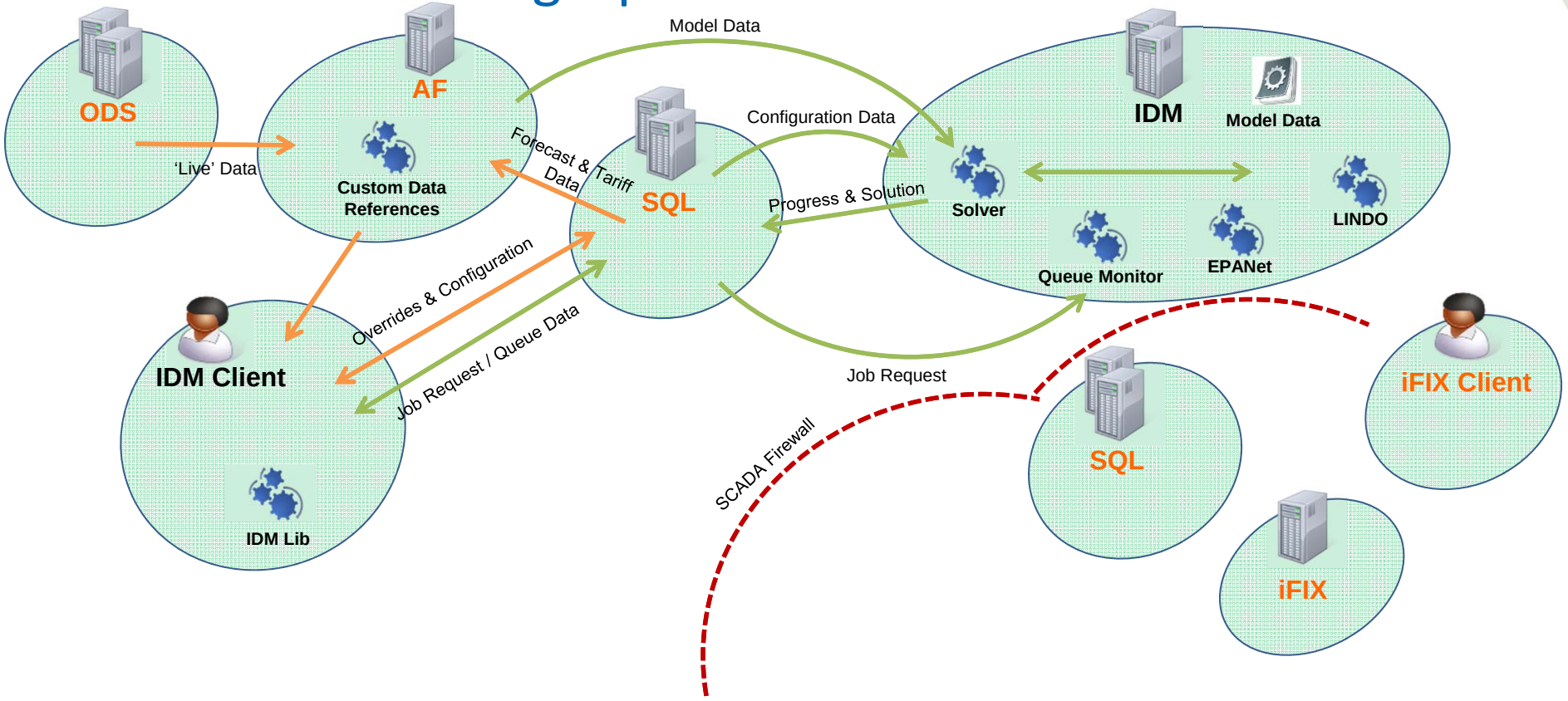
Lessons Learned

- Development environment was cobbled together
- Business users were heavily involved from the start
- SCADA data and field instrument fix-ups were slow
- ProcessBook has significant limitations as a UI
  - ‘90s look, limited programmability
- Tender process included a limited prototype

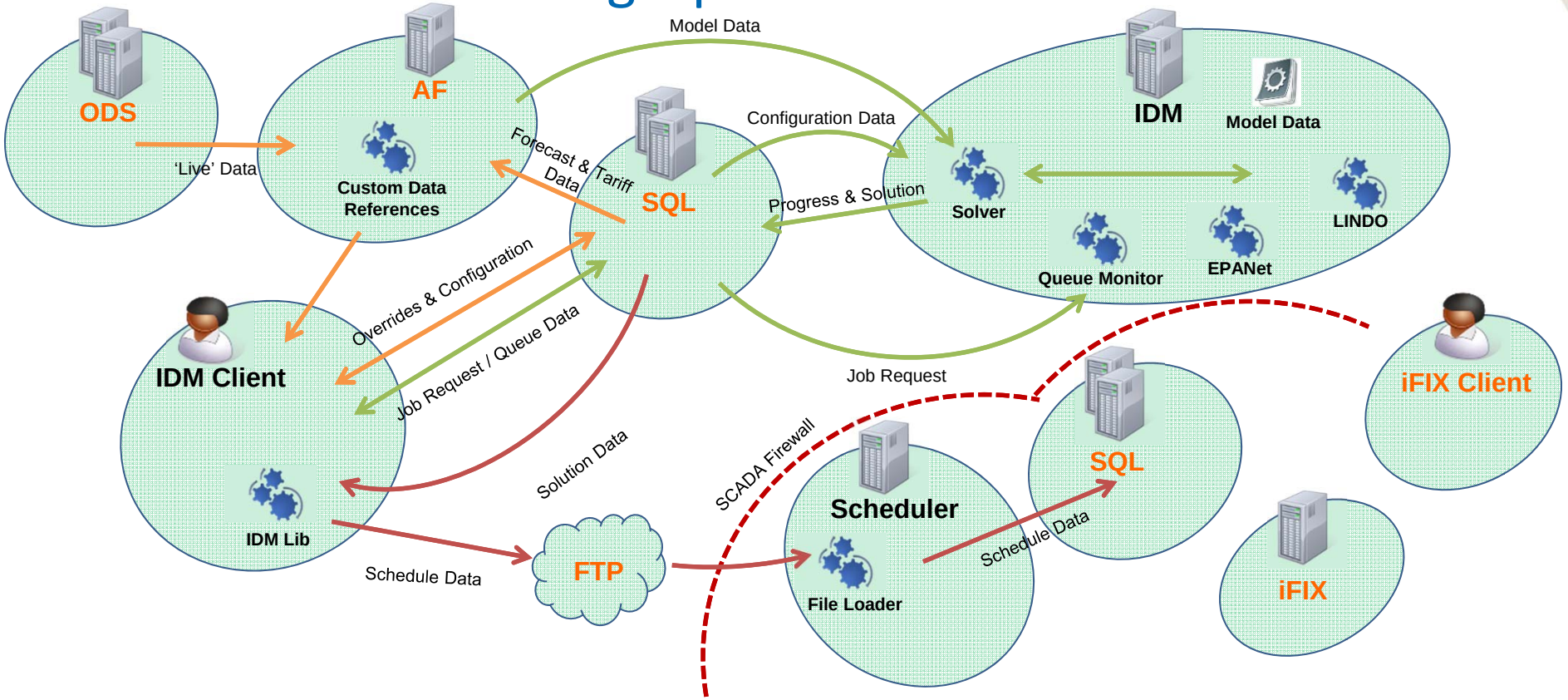
Data Flow – Optimisation Set-up



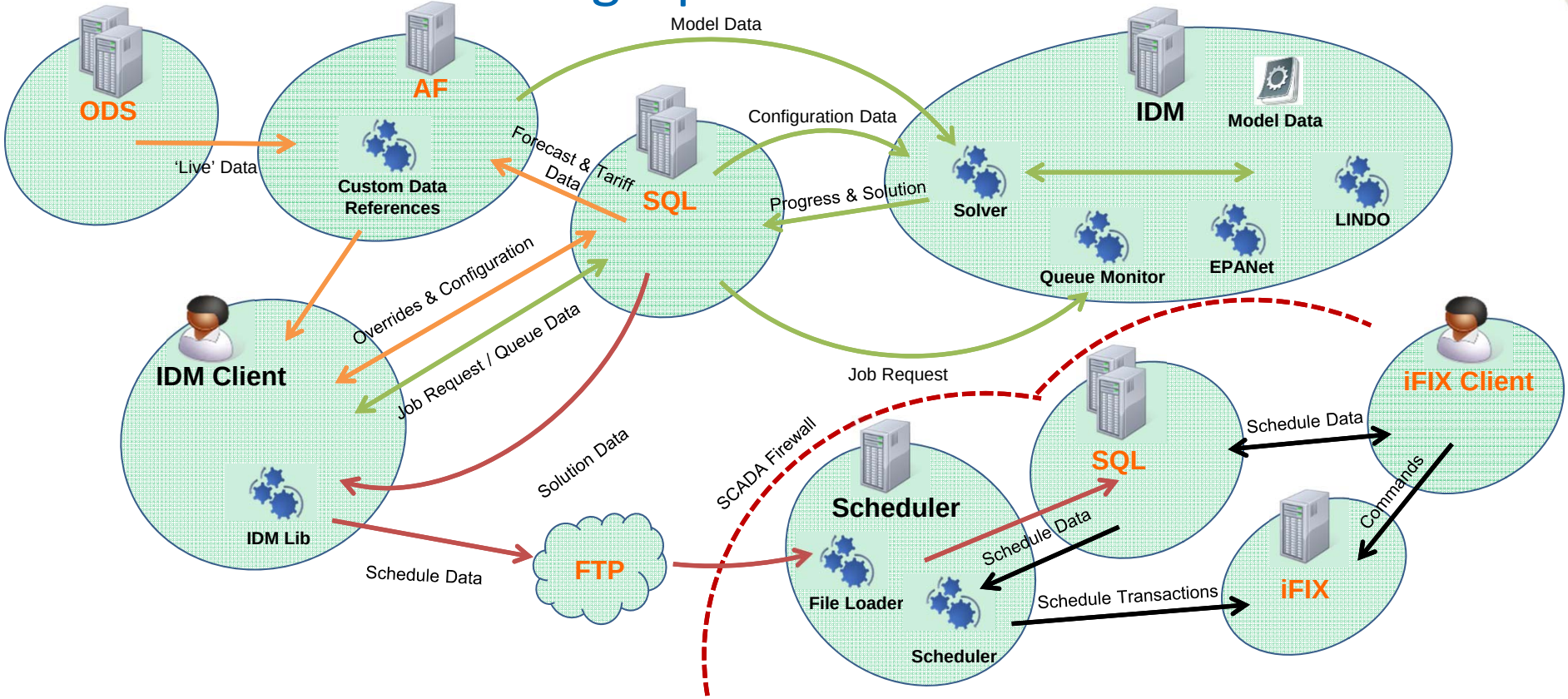
Data Flow – Finding Optimised Schedule



Data Flow – Publishing Optimised Schedule



Data Flow – Executing Optimised Schedule



THANK YOU

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